UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Comparative Research Report on the Localized Performance Indicator Systems of the International Guidelines for Industrial Parks in China

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UNIDO Centre for South-South Industrial Cooperation

(UCSSIC China)

Executive summary

In November 2019, the United Nations Industrial Development Organization (UNIDO) promulgated the International Guidelines for Industrial Parks (hereinafter referred to as "the Guidelines"). The Guidelines were prepared by the UNIDO Cross-Disciplinary Team on Industrial Parks (CDTIP), which combines UNIDO's technical experience and international best practices in the development and implementation of industrial park programmes and is consistent with the Sustainable Development Goals (SDGs). The Guidelines address the needs and challenges faced by developing countries and middle-income economies for the development of industrial parks. Their aim is to provide step-by-step guidance and duly substantiated suggestions on all aspects of industrial park planning, development and operational management for stakeholders in existing and new industrial parks in countries at different stages of development, and general guidance for the development of inclusive and sustainable industrial parks. At present, UNIDO has been advancing the cooperation with industrial parks in developing countries, promoting the implementation of the Guidelines in relevant countries, and contributing to the sustainable development of industrial parks. As a comprehensive framework for reference, the Guidelines cover existing and newly built industrial parks in different international environments. It is still necessary, however, to consider the specific development of the country and region where the Guidelines are to be applied.

The UNIDO Centre for South-South Industrial Cooperation, a collaborative venture with China and known as "UCSSIC China", will assist UNIDO headquarters in promoting the Guidelines in the industrial parks in China and countries along the Belt and Road Initiative. This will be achieved through the South-South cooperation platform, in particular, its application in the UNIDO Programme for Country Partnership (PCP).

During the promotion of the Guidelines and their application to China's industrial parks, certain problems have been revealed by a preliminary review. The index system is more comprehensive than the current index systems used in China for various parks. There are challenges such as the need to choose between evaluation dimensions, the need to quantify indicators as much as possible, and the need to adjust the weighting of certain indicators according to the actual conditions of China's industrial parks.

With the organization and coordination of UCSSIC China, experts from the Green Development League of National Economic and Technological Development Zones, the Chinese Research Academy of Environmental Sciences (CRAES) and the School of Architecture in Southeast University jointly carried out comparative research on the localized performance indicator systems within the framework of the Guidelines. As part of the research exercise, the expert team consulted a large number of documents, analysed and interpreted the policy documents related to the development of China's industrial parks, made field investigations to typical industrial parks in China, interviewed various stakeholders such as management and operation departments, enterprises and workers of industrial parks, compared the evaluation index system of the Guidelines and those related to the development of industrial parks in China across a number of dimensions, and reflected the opinions and suggestions of Chinese experts and scholars, government officials, industrial park operators and enterprise managers.

Before the comparative study, the research team briefly reviewed the development process, current development status, management mode and green development evaluation index system of China's industrial parks with a view to gaining a comprehensive understanding of the development of

China's industrial parks. Based on the comparative study, this report compares and analyses the performance indicator systems of the Guidelines and those used in various guiding documents for the industrial parks that are set up under a range of names in China, including "green industrial parks", "low-carbon industrial parks", "circular transformation industrial parks", "eco-industrial demonstration parks", "State-level economic and technological development zones" and "national high-tech industrial development zones".

Based on the research and analysis, the report summarizes and refines the key points of the localized performance indicator systems from the perspective of availability, applicability and special value of the relevant indicators. After screening, suggestions related to various localized indicators are put forward and these fall into three main categories: "can be directly applied", "can be used after adjustment", and "to be integrated or deleted".

In order to analyse the applicability of the localization index system to China's industrial parks, during the research process, the Tianjin Economic and Technological Development Zone, Hefei High-Tech Industrial Development Zone and Suzhou Industrial Park were selected for the conduct of local verification exercises from the three dimensions of economic, social and environmental performances. On that basis, the report makes recommendations on the Guidelines' adjusted performance indicator system and on those related to localized quantitative indicators for practical applications in China.

In addition, the research team made suggestions on how to promote the application and promotion of the localized indicator systems in China, and how to promote inclusive and sustainable development of China's industrial parks, so as to provide important reference for the follow-up research, pilot application and international cooperation of UNIDO and its projects.

Overview of industrial parks in China

As an important driving force for China's economic development and urbanization development, the development of industrial parks is an important element of the process of China's reform and opening-up, and also the vehicle for the practical implementation of China's industrial intensive and environmental development strategy. Since the launch of the reform and opening-up process, the rapid development of China's economy and industry has enabled many industrial parks to thrive, producing more than 50 per cent of the country's industrial output and making significant contributions to the development of a modern industrial system.

According to the China Development Zone Audit Announcement List (2018), there are 2,543 development zones in China, accounting for about half of the total number of special economic zones (parks) around the world. The development process of China's industrial parks can be divided into the initial and exploratory stage (1979–1991), the growth and rapid promotion stage (1992–2002), the adjustment and development stage (2003–2015), and the transformation and upgrading stage (2016 to date). The development model and concept of China's industrial parks also display different characteristics. The management modes for industrial parks in China are mainly of three types: government-owned, business-driven and mixed mode, with management by both government and the businesses involved.

While industrial parks in China are booming, they are facing a range of challenges, such as unbalanced development, insufficient innovation capability, pollution and greenhouse gas emissions, and intensive resource and energy consumption. Over the past 20 years, in response to the above challenges, the Chinese Government has been vigorously promoting the practice of green and sustainable development concepts in the field of industrial park development and constantly exploring new park development modes, and

remarkable achievements have been made.

At present, China has set in place top-down evaluation methods and systems for green and sustainable development performance of provinces, municipalities and autonomous regions. The industrial parks have some specific characteristics, however, in their administrative framework, functional structure and economic and environmental statistics system. Since the industrial parks clearly differ widely from the urban administrative districts in terms of their management function and management mode, it is impossible for them to evaluate the green development and the performance of various indicators at the administrative district level in accordance with the superordinate documents.

To solve this problem, competent ministries and commissions in China began to create demonstration pilots and establish evaluation systems for industrial parks from particular viewpoints for a green, low-carbon and circular economy. At present, evaluations on the comprehensive development level of national economic development zones and the establishment and evaluation of national eco-industry demonstration parks, recycling transformation demonstration pilot parks, pilot low-carbon industrial parks, green parks and other demonstration pilot parks are either separately or jointed promoted by the National Development and Reform Commission, Ministry of Commerce, Ministry of Ecology and Environment, Ministry of Industry and Information Technology and other ministries.

Comparative research on the localized performance indicator systems

To gain a systematic understanding of the relevant policies and regulations of development evaluation for China's industrial parks, the research team selected policy documents at different levels, from the national level to that of typical provinces, cities, parks and enterprises, and interpreted and analysed the selected documents from the dimensions of evaluation purpose, applicable objects, evaluation dimensions, indicator system structure, evaluation calculation method, evaluation comparison scope, data availability and constraints. The national-level policy documents included those on the comprehensive assessment of the development level of green parks, low-carbon parks, circular transformation parks, eco-industrial demonstration parks, national-level economic and technological development zones, national high-tech industrial development zones evaluation index system, and the social responsibility evaluation index system of Chinese industrial enterprises.

The policy documents of typical provinces and cities include the evaluation of Zhejiang's scenic industrial parks (development zones), the evaluation of Shaanxi's high-tech industrial development zones, and the comprehensive evaluations of Shanghai's development zones; the policy documents of typical parks include the comprehensive evaluation of the intensive use of industrial enterprise resources in Suzhou Industrial Park , and the Qingdao Sino-German Ecological Park Index System. At the same time, the research team analysed policy documents on the performance evaluation of industrial parks issued by international organizations and by certain developed and developing countries to understand the latest practices in related fields at the international level, aiming in this way to provide references for the localization of the Guidelines index system and the optimization of China's existing evaluation index system.

This study analyses the differences in administrative systems, industrial development stages and cultural customs of Chinese and foreign industrial parks, in order to understand the differences in management of Chinese and foreign industrial parks, and the major differences in the concepts, models, and content of the evaluation of the development of the parks. The management modes of industrial parks in China are not highly diversified at present and relies on top-down administrative management by government agencies. In the initial period of development, evaluation of the parks is also limited to the economic indicators, which are largely

associated with the evaluation of local political achievements. In recent years, in the pursuit of environmental awareness and high-quality development, a series of indicators related to these goals, including resource productivity, pollutant emission levels and scientific and technological innovation levels, have been incorporated into the evaluation system of industrial parks. The evaluation of industrial parks in China is growing more and more scientific and exerting a guiding influence on the operational management of the industrial parks.

China has promulgated and implemented evaluation index systems at different levels for seven types of industrial parks, namely, green parks, low-carbon parks, parks in transformation to the circular economy, eco-industrial demonstration parks, national economic and technological development zones, national high-tech industrial development zones, and socially responsible parks of Chinese industrial enterprises. The framework, implementation and assessment of these indicator systems have an important reference value for the incorporation in Chinese national frameworks of the Guidelines.

The present research exercise compares the Guidelines with the evaluation index system of China's seven types of industrial parks, with a view to identifying commonalities and differences in the evaluation practices. It mainly focuses on the evaluation purpose, applicable object, evaluation aspect, indicator system structure, evaluation calculation method, data availability and evaluation constraint, in order to identify differences between evaluation indicator systems.

Overall, in terms of the evaluation coverage of the indicator system, the evaluation indicator system in the Guidelines has been developed in three dimensions: the economy, the society, and the environment, rendering it highly compatible with the current evaluation indicator system for major industrial parks in China.

In terms of the evaluation object, the evaluation indicator systems for industrial parks in China are subject to horizontal comparison and are mostly used to evaluate the development zones above the provincial level, while the Guidelines imposes no requirements on the size of evaluation objects, so they have a complementary value for the evaluation of small and medium-sized industrial parks in China.

In terms of the evaluation system set-up and score calculation, the existing evaluation indicator system for industrial parks in China is relatively complex, and a scoring system has been employed in the Guidelines, so the evaluation method is more intuitive.

In terms of data availability, given the restrictions of the existing statistical coverage, most of the existing evaluation indicator systems for industrial parks in China require industrial parks to complete relevant data by themselves. Similar approaches will also be used to obtain data in the process of adaptation and promotion of the localized Guidelines.

In terms of incentives and penalties for the industrial parks in China, these are commonly practised in the existing evaluation indicator system by granting badges of honour to industrial parks or revoking such badges of honour from industrial parks in response to their evaluation, which may affect their access to financial resources.

In addition to the above, an index frequency analysis was carried out on the Guidelines and seven sets of evaluation indicator systems prepared for industrial parks in China to gain a better understanding of the differences in the evaluation index system. The results of this analysis also serve as the scientific basis for the adjustment of the localized indicators of the Guidelines by this comparative study.

The research team has established an index analysis framework that meets the promotional needs of the Guidelines in China. According to the framework, the research team analysed the secondary indicators in the Guidelines one by one from the standpoint of availability, applicability and special value, and gave further suggestions of additions, deletions and modifications of the indicators to meet the needs

of promotion and application in China. Based on this analysis framework, the research team divided the indicators into three types: “may be directly applied”, “may be used after adjustment”, and “to be integrated or deleted”. Based on the collected feedback, the research team adjusted and proposed the localized index system of the Guidelines.

To ensure that the localized index system of the Guidelines is applicable to China’s industrial parks, the research team selected a number of domestic industrial parks as test cases to verify the index system. To ensure scientific and effective localization verification for the Guidelines, in terms of the number of samples, from three to five parks in China are selected as verification cases in this study; in making this selection, the research team took full account of such factors as location of the industrial parks, the different types of business covered by the parks, the different development levels of the parks and the feasibility of obtaining the parks’ data. In the end, Tianjin Economic and Technological Development Area, Hefei National High-Tech Industry Development Zone and Suzhou Industrial Park were selected for adaptation and verification. Based on the conclusions of local verifications, this study further optimized the final localization index system.

The comprehensive performance of the Tianjin Economic-Technological Development Area (TEDA) was evaluated in economic, environmental and social terms. A comprehensive evaluation score of 143 points (out of a maximum of 173) was obtained, including 46 points (out of 48) for economic performance, 50 points (out of 69) for social performance, and 47 points (out of 56) for environmental performance. The higher overall score is consistent with TEDA’s leading role among industrial parks in China. In the three major evaluation fields of economy, society, and environment, TEDA is relatively far ahead in scale and development quality, so the indicators reflecting the level and scale of resource allocation and whether it is better than the national average score close to the maximum. In addition, the scores in many additional indicators also demonstrate that TEDA has made great achievements in actively pursuing economic quality and green development.

Comprehensive analysis of indicators at the second and third levels shows that TEDA does not score highly, primarily in the international quality management system and international green building certification, demonstrating not only that industrial parks in China are still deficient in terms of their overall internationalization but also that such internationalization indicators are applied with a relatively higher frequency when applying the Guidelines to industrial parks in China. In addition, some international certification indicators are not scored because the proportion of applicable enterprises is lower than 50 per cent, possibly because it is difficult for the park management organization to conduct refined management on each enterprise given the large number of resident enterprises in this leading industrial park in China.

The comprehensive performance of the Hefei National High-Tech Industry Development Zone was evaluated in economic, social and environmental terms. A comprehensive evaluation score of 138 points (out of 173) was obtained, including 41 points (out of 48) for economic performance, 55 points (out of 69) for social performance, and 42 points (out of 56) for environmental performance. As a whole, the Hefei High-Tech Zone achieved higher scores in the evaluation of its economic, environmental and social performance, which is representative of the development level of leading industrial parks in China.

The verification analysis of the Hefei High-Tech Zone demonstrates that the modified indicator system in the Guidelines is entirely applicable to the Hefei High-Tech Zone, even though some economic performance and social performance indicators are not applicable for industrial parks in China. It is suggested that appropriate modifications be made by referring to the applicable indicator system for the evaluation of industrial parks by competent national ministries and commissions based on actual conditions in China.

The comprehensive performance of Suzhou Industrial Park was evaluated in economic,

environmental and social terms. A comprehensive evaluation score of 144 points (out of 173) was obtained, including 47 points (out of 48) for economic performance, 47 points (out of 56) for environmental performance, and 49 points (out of 69) for social performance. As a whole, Suzhou Industrial Park achieves relatively high scores in the evaluation of its economic, environmental and social performance, although, compared with its outstanding economic and environmental performance, its social performance falls well short of the maximum score. The verification analysis of Suzhou Industrial Park demonstrates that, despite some issues to be optimized, the modified indicator systems in the Guidelines are well applicable to that park.

Recommendations on the modified indicator system

Where the adaptation of indicator systems in the Guidelines is concerned, the research team puts forward certain suggestions, including adjusting the unattainable indicators in order to improve their data accessibility, integrating similar types of international evaluation indicators while considering domestic indicators, adjusting the scoring basis of some evaluation indicators, clarifying the definition of some proportion indicators, and performing verifications and further research of the modified indicator systems at different levels and in different categories.

To promote the modified indicator systems of the Guidelines in China, the research team proposes such measures as improving the alignment between the indicator systems of the Guidelines and basic situation and development stage of China, improving the applicability of the indicator systems to various industrial parks in China, considering the risk management and technological innovation in the indicator systems, ensuring the timeliness of the indicator systems, improving the supporting role of evaluation work for making development decision, and promoting the study outcomes and carrying out pilot and demonstrative operations and management in selected industrial parks for adaptation of the localized Guidelines.

To help promote the efforts by industrial parks in China to achieve more inclusive and sustainable development, the research team suggested that, on the one hand, the international development of park management institution and resident enterprises should be brought more in line with international standards, and the international competitiveness of China's industrial parks should be enhanced. On the other hand, the evaluation of the social performance of industrial parks and enterprises should be emphasized to promote and demonstrate the leading roles of industrial parks in advancing social development. To that end, the research team put forward detailed suggestions, including encouraging China's industrial parks and park enterprises to obtain social responsibility certification, adding statistics on social performance and corporate social responsibility performances, and setting up a reasonable reward and penalty mechanism as a tool of clear policy orientation.

Acknowledgements

The report has been produced by UNIDO South-South Industrial Cooperation in China Project under the support and strategic guidance of Mr. ZOU Ciyong, Managing Director, Directorate of Programme, Partnerships and Field Coordination of UNIDO. In particular, we would like to acknowledge Mr. ZHAO Jie, Chief of Regional Coordination Division - Asia and the Pacific, and his team members Mr. ZHANG Ming, Mr. Eneyew Abera Gebremenfas and Mr. DING Hao for their general guidance of the report.

In drafting, consolidating, editing and coordinating the preparation of the report, we would like to express our sincere thanks to the experts from the research group of Comparative Research of Performance Indicators for the Application of UNIDO International Guidelines for Industrial Parks in China. They are Ms. SONG Yuyan, Dr. SHI Fangbiao, Ms. REN Mi and Ms. LI Xi from Green Development League of National Economic & Technological Development Zones, Dr. QIAO Qi, Mr. YAO Yang, Ms. YUAN Yin from Chinese Research Academy of Environmental Sciences, Dr. WANG Xingping, Dr. ZHAO Shengbo and Ms. LI Kailun from Southeast University. Mr. Guo Li and Ms. Li Xiao from UCSSIC China participated in the whole process of drafting, compiling, revising and reviewing the report and made important contributions to the final draft. Ms. Zhu Li, Ms. Song Bo and Ms. Yang Hongping from CICETE partially participated in some of the work.

We would like to thank Mr. Dejene Tezera, Ms. Fatma Nilgun Tas, Ms. Yvonne Lokko and Mr. Rafik Feki of UNIDO for their work on the technical review and valuable inputs.

Finally, we are grateful to many other people and organizations for providing inputs and all our other partners whom we are unable to mention individually.

Table of Contents

1. Overview

1.1 Background and source

The United Nations Industrial Development Organization (UNIDO) is a specialized agency of the United Nations with the mission of promoting industrial development for poverty reduction, inclusive globalization and environmental sustainability. UNIDO is entrusted with promoting and accelerating inclusive and sustainable industrial development in Member States.

The 2030 Agenda for Sustainable Development of the United Nations, which, together with its related Sustainable Development Goals (SDGs), recognizes the mission and mandate of UNIDO, will serve as the guidance for the United Nations and its Member States to achieve sustainable development in the coming 10 years. Goal 9 calls for "building resilient infrastructure, promoting sustainable industrialization and fostering innovation". To this end, the Organization's programmatic focus is structured in four strategic priorities:

- Creating shared prosperity
- Advancing economic competitiveness
- Safeguarding the environment
- Strengthening knowledge and institutions

UNIDO is experienced in promoting the development of industrial parks. As early as 1978, it issued the first guidelines for the establishment of industrial parks. In 1988, guidelines and standards for the construction of small industrial parks were issued. For more than 40 years, UNIDO has been actively involved in the planning, design, and management of industrial parks around the world and provides comprehensive assistance to parks in Member States at different development stages. Since the 1970s, UNIDO has been an active consultant and partner of its Member States in the planning, design and management of industrial parks, export processing zones, special economic zones and eco-industrial parks.

UNIDO has been assisting in pre-feasibility and feasibility studies for the construction of industrial parks in certain countries, including China, Côte d'Ivoire, Ethiopia, Iraq, Nigeria, Senegal and Viet Nam, promoting the development of local public-private partnerships and addressing regulatory and institutional issues, in countries such as Cambodia, Côte d'Ivoire, Iraq, Morocco, Nigeria and Senegal. Within the framework of the Programme for Country Partnership (PCP), an innovative model developed by UNIDO that intends to accelerate inclusive and sustainable industrial development in Member States, UNIDO has been assisting countries in the development of industrial parks. The programme is consistent with the development agenda of the countries concerned and focuses on sectors with high growth potential, thus supporting a country in achieving its industrial development goals.

In June 2019, the International Conference on Promoting Inclusive and Sustainable Development of Industrial Parks was jointly convened in Lima by UNIDO, the Ministry of Industry of Peru and the National Industry Federation of Peru. At the conference, a wide variety of knowledge and experience related to industrial parks was collected from countries around the world, including China, and helpful suggestions were proposed, in terms of government policies, financial instruments, roles of the private sector, eco-industrial parks, the practice of the circular economy and the application of the fourth industrial revolution, known as "Industry 4.0". In addition, the conference also addressed cross-cutting issues related to the social inclusion of industrial parks, including gender equality, gender empowerment and the creation of job opportunities for young people.

In November 2019, UNIDO issued the International Guidelines for Industrial Parks ("the Guidelines"). The Guidelines are intended to provide basic international guidelines for the development of industrial parks for countries at different development stages so that the development of

industrial parks will uphold such standards as health and safety, effective energy management and environmental protection, and in this way provide guidance for the development of modern, inclusive and sustainable industrial parks.

UNIDO takes an active part in and coordinates South-South cooperation among developing countries with a view to promoting sustainable industrial development. South-South and triangular industrial cooperation is an important tool for UNIDO in its efforts to promote inclusive and sustainable industrial development. UNIDO's initiatives within this framework include the formulation of industrial strategies for developing small and medium-sized enterprises, investment promotion, vocational training and skills development, enhancement of technology transfer and institutional capacity-building. It has also established South-South industrial cooperation centres in a number of developing countries, including China, which will promote the partnership of mutual benefits between the more advanced developing countries and other developing countries, including the least developed countries.

In September 2006, a memorandum of understanding was signed between UNIDO and the Ministry of Commerce of China, announcing the establishment of the UNIDO Centre for South-South Industrial Cooperation (known as "UCSSIC China") to further consolidate and strengthen cooperation between China and other developing countries. In July 2008, UCSSIC China was officially established. Since its establishment, UCSSIC China has developed into an important portal and platform for China to establish partnerships and to promote knowledge and experience sharing, capacity-building, industrial development and technology transfer with other developing countries. In future years, UCSSIC China will continue to be operated in line with the PCP approach and other priority areas of cooperation of UNIDO, so as to promote the operation of UNIDO and further South-South and triangular industrial cooperation between China and other developing countries. UCSSIC China is assisting UNIDO headquarters in completing this study, promoting the implementation of the Guidelines in China and its localized application in industrial parks in China and in countries along the Belt and Road Initiative and PCP countries. In the future, on the basis of the Guidelines, the UCSSIC China will continue to contribute to the development of industrial parks in China and other developing countries.

1.2 Introduction to the International Guidelines for Industrial Parks

In recent years, developing countries have been showing a growing tendency of early de-industrialization, and the contribution of their manufacturing industry to gross domestic product (GDP) is declining. Industrial parks have become a catalyst to promote industrial development with the advantages that they offer in supporting policies and initiatives to provide public products and encourage investment. Most notably, by encouraging environmentally and socially responsible industrialization projects by businesses in the park, the industrial park sets an example to other area of the country where it is located, constituting an important contribution to achievement of the SDGs.

The industrial parks in the future will be diversified in terms of development. First, the number of industrial parks has been growing since the 1990s, leading to intensified competition in attracting investment and upgrading services among such parks. Second, in the process of urbanization, more and more residential and mixed-use projects are appearing in the industrial park and adjacent areas, forcing the industrial park to spread into the city. Third, in the context of growing concern about climate change, effectively controlling the impacts of economic activities on the environment has become an increasingly important factor in the operation and decision-making in the business models of green

growth and the resource-efficient circular economy. Lastly, the digital transformation, in particular with technologies related to industry 4.0, is bringing opportunities and challenges to firms that strive to follow this trend and improve their productivity.

Over the past 40 years, UNIDO has been committed to helping its member States to plan and establish industrial parks to achieve sustainable economic growth by promoting industrial development. To this end, UNIDO is integrating its leading technical experience and best practice in the field of industrial parks and has established a cross-disciplinary team on industrial parks to prepare the International Guidelines for Industrial Parks. While preparing the Guidelines, which serves as a comprehensive reference framework, members of the preparation team referred to UNIDO's previous research outcomes, feasibility analysis tools, and successful technical cooperation projects in the field of industrial parks, in addition to the information obtained from field visits to industrial parks and the interviews with industrial park managers and regulators, studied the practice of industrial parks in China, Ethiopia, Peru and other countries, and referred to feedback from United Nations agencies, development financial institutions, banks, academia, consulting companies and other sectors concerned.

The Guidelines focus on developing economies and economies in transition and are applicable to all types of industrial parks under construction and existing industrial parks at various development stages. They include guidelines for the planning, design, construction, operation, marketing, investment attraction, risk management, waste management and energy management for the industrial parks, and put forward a general indicator evaluation system that includes economic, social and environmental performance indicators, aimed at providing stakeholders in various fields of the industrial park, including the park regulatory authorities, park developers, and the park operators, park tenants, stakeholders and partners (such as multilateral development institutions and financial institutions), with guidance and reference.

In the future, UNIDO will continue to pay close attention to progress and trends in global development and industry and will evaluate and update the Guidelines on a regular basis in accordance with the comments and recommendations of members and partners. At the same time, UNIDO is willing to cooperate with industrial parks in developing countries and promote the implementation of the Guidelines in relevant countries in order to contribute to the sustainable development of industrial parks.

1.3 Overview of industrial parks in China

The construction of industrial parks is an important practice of China's reform and opening-up, an important driving force for China's economic development and urbanization development, and a realization of China's intensive and ecological industrial development strategy. Since the reform and opening-up, the rapid development of China's economy and industry allowed many industrial parks to thrive, which have produced more than 50 per cent of the industrial output and made significant contributions to the construction of a modern industrial system. According to the China Development Zone Audit Announcement List (2018), there are 2,543 development zones in China, accounting for about half of the total number of special economic zones (parks) around the world. While industrial parks in China are booming, they are facing such challenges as unbalanced development, insufficient innovation capability, pollutant and greenhouse gas emission, and resource and energy consumption. In the past 20 years, in response to the above challenges, the Chinese Government has been vigorously promoting the practice of green and sustainable development concepts in the field of industrial park development and constantly exploring new park development

modes, and remarkable achievements have been made.

1.3.1 Evolution of industrial parks in China

In 1978, the course of China's reform and opening-up officially started. In the next year, China's first industrial park, Shekou Industrial Zone in Shenzhen, was approved and its construction was commenced. The concept of "Industrial Park" was gradually formed and improved. In the subsequent 40 years after the establishment of Shekou Industrial Zone, industrial parks in China witnessed a rapid development, which can be divided into four evolution stages:

Initial and exploratory stage (1979–1991): This stage started with the establishment of Shekou Industrial Zone. At the beginning of the country's reform and opening-up, productivity in China was relatively low and much remained to be done. As the trend of global industrial division emerged, China began to undertake processing businesses from the Hong Kong Special Administrative Region and Taiwan province, and also from Japan and the Republic of Korea, in the form of a "three-plus-one" trading-mix in Zhuhai, Shenzhen and other special economic zones. As a manufacturing base, industrial parks in China began to participate in the international industrial division.

Growth and rapid promotion stage (1992–2002): This stage was marked by Deng Xiaoping's inspection tour in South China in early 1992. China's reform and opening-up and economic development entered a new stage. A wave of enthusiasm, known as the "development zone craze", swelled up in all cities and counties, and the development of industrial parks also accelerated and was pushed forward. The second generation of industrial parks, including Zhangjiang High-tech Park and Suzhou Industrial Park, were established during this stage, and they later developed into the most important industrial cluster in China.

Adjustment and development stage (2003–2015): during this stage, the increasing demand for international trade stimulated by China's accession to the World Trade Organization (WTO) brought significant momentum to the development of many industrial parks. There were instances of malpractice and wrongdoing, however, including unreasonable planning, disorderly development and intense competition for investment promotion among local governments in the context of what is known as the "development zone craze". These processes during the previous stage also led to a significant loss of central and local financial and tax revenues and waste of resources. In 2003, the process of national rectification and adjustment to industrial parks was launched.

Transformation and upgrading stage (2016 to date): This stage substantially coincides with the 13th five-year plan period. During this stage, the keywords of development in China include, among others, supply-side reform, ecological civilization construction, environmental protection and strategic emerging industries. The previous development concepts emphasizing GDP growth rate are replaced by the concepts of "high-quality development" and "green and sustainable development". In this context, industrial parks are also committed to environmental protection, the development of high-tech industries and high-value-added service sectors, and to development into multi-functional comprehensive industrial zones. In this way, the industrial parks are entering the stage of transformation and upgrading.

1.3.2 Current conditions of industrial parks in China

There are a large number of industrial parks which are of many types in China. According to the China Development Zone Audit Announcement List (2018), there are 2,543 development zones in China, accounting for about half of the total number of special economic zones (parks) around the world. Among them, there are 552 national development zones (including 219 economic and technical development zones, 156 high-tech industrial development zones, 135 special customs supervision zones, 19 border and cross-border economic cooperation zones and 23 development

zones of other types), and 1991 provincial development zones. In 2018, the 219 national economic and technical development zones and 169 national high-tech industrial development zones, which are the most representative of China's typical industrial parks and whose main function is to conduct industrial agglomeration, achieved a total GDP of about 21.3 trillion yuan, accounting for 23.7 per cent of the national GDP in 2018.

While industrial parks in China are booming, they are facing such challenges as unbalanced development, insufficient innovation capability, pollutant and greenhouse gas emission, and resource and energy consumption. In the past 20 years, in response to the above challenges, the Chinese Government has been vigorously promoting the practice of green and sustainable development in the context of industrial park development and exploring new park development modes with the construction of eco-industrial parks, recycling transformation parks, low-carbon industrial parks and green parks, among others. As a result, a Chinese plan for the green and sustainable development of industrial parks has been formed in respect of the construction of artery and vein industry chains, industrial symbiosis, clean production, infrastructure sharing, environmental management, and remarkable achievements have been made. Where the national economic and technical development zones are concerned, for example, the floor area, water resource consumption, comprehensive energy consumption, chemical oxygen demand and sulphur dioxide emission account for only 0.15, 1.9, 2.2, 0.8 and 0.6 per cent of the national total, respectively. For reference, these zones create 8.7 per cent of the national GDP and 15.6 per cent of the industrial added value.

Box 1: Introduction to well-known industrial parks in China

Shenzhen Shekou Industrial Zone: Shenzhen Shekou Industrial Zone, which is located in south-eastern Shenzhen and adjacent to Hong Kong, covers an area of 10.85 square kilometres. Founded by the Investment Promotion Bureau in 1979, it not only represents an exploratory move into the construction and development of industrial parks in China, but also an initial Chinese export processing economic model. As the first industrial park opened to the world in China, its establishment and development played a role as a pathfinder for the establishment of Shenzhen Special Economic Zone.

In 1981, the Investment Promotion Bureau, which was responsible for the development of Shekou Industrial Zone, proposed that "the industrial structure of Shekou Industrial Zone should be based on industry, with capital mainly from abroad and products mainly for export purpose", thus establishing an export-oriented economic system. In 1985, Shekou Industrial Zone launched more than 200 foreign investment projects, and the products are sold to the United States, Canada, Western Europe, south-east Asia and other parts of the world.

Shekou Industrial Zone has scored 24 unprecedented achievements in China, including being the first centre to offer extra payment for over-fulfilment of work quotas, the first to implement the national recruitment and employment system, the first to reform the wage system, and the first to implement the social insurance system, and others. Such popular slogans as “time is money, efficiency is life” and “empty talk is harmful to the nation while doing practical work will make it thrive” were born here. The concepts of “development is the hard truth” and “pursuing efficiency” reflected in these slogans embody the surmounting of many obstacles and the promotion of reform and innovation in the special economic zone at that time, and the slogans still ring true today.

Tianjin Economic and Technological Development Area (TEDA): TEDA is located in the centre of the Bohai Economic Circle. It is an important part of Tianjin Binhai New Area and a component of the national comprehensive reform pilot zone. Established on 6 December 1984, with the approval of the State Council of China, it is one of the first national economic and technical development zones in China and one of the first national development zones in China. TEDA has been ranked first in the comprehensive evaluation of national economic development zones for 14 consecutive years, and it is also the first development zone in China with a GDP exceeding 300 billion yuan.

At present, more than 3,300 foreign-invested firms have been established in TEDA, with a total investment larger than US$ 15 billion. With Nestlé, SEW, Novo Nordisk and other international firms as residents, the Area now comprises four pillar industries: electronic communication, food, machinery and biological medicine, and the GDP per capita has reached the level of moderately developed countries.

Beijing Economic and Technological Development Area: located in Yizhuang Region, Daxing District, Beijing, the Area was established in 1992. It is the only national economic and technical development zone in Beijing that enjoys the preferential policies extended both to national economic and technical development zones and to national high-tech industrial parks. The Beijing municipal government stressed, in the urban planning process, that efforts should be made to undertake the functions of the capital and to build Yizhuang New City into a low-density green city without the usual “big city diseases”.

At present, more than 20,000 firms have established themselves in Beijing Economic and Technological Development Area, including more than 120 projects of more than 80 firms in the Fortune 500 list of companies (Mercedes Benz, GE, Bayer, ABB, and Jingdong) with a total investment of nearly US$ 100 billion, ranging across four leading industries, namely: electronic information; equipment manufacturing; bioengineering and medicines; and automobile and transportation equipment. In addition, Beijing Economic and Technological Development Area is also a pilot industrial park for the construction of a "waste-free city" in China.

Caohejing Development Zone: this is the only development zone in Shanghai that performs the functions of a national economic and technical development zone, national high-tech industrial development zone and national export processing zone at the same time, and with a planned area of 14.28 square kilometres.

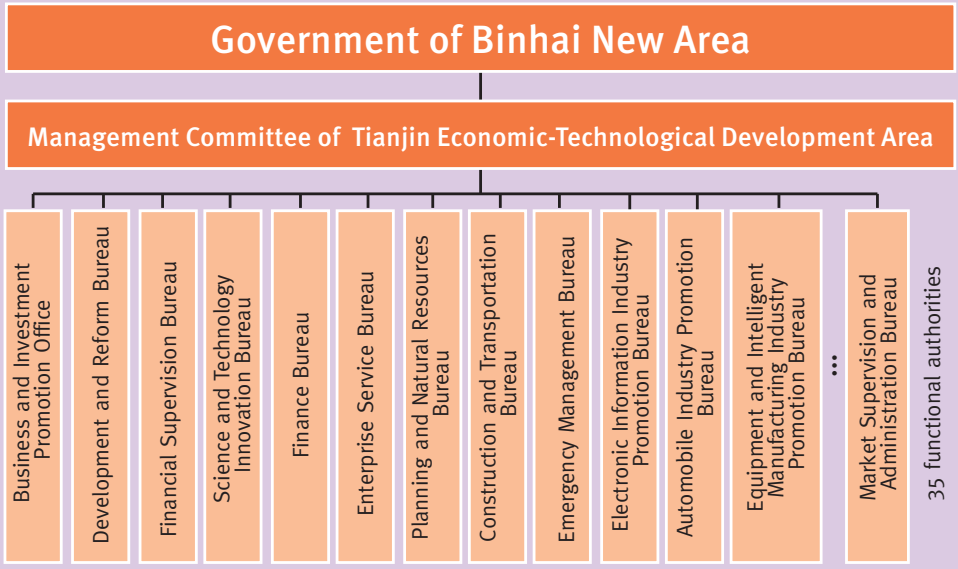
After 33 years' of development, Caohejing Development Zone has formed a "1+5+1" industrial cluster framework with electronic information as the pillar industry, new materials, biomedicine, high-end equipment, environmentally-friendly new energy and automobile R&D support as key industries, and high-value-added modern service industry as the supporting industry. Caohejing Development Zone has acted as an exemplary model and played a driving role in the dissemination of Shanghai's innovation and transformation development. It is one of the regions with the fastest development and the highest input and output per unit area among the national development zones.

1.3.3 Management mode of industrial parks in China

After years of unremitting efforts and researches, the management modes for industrial parks in China are mainly of three types: government-dominated, firm-dominated and mixed.

Government-dominated mode. As an agency of the government, the management committee is solely responsible for the infrastructure construction, land development, investment promotion and economic management of the development zone on behalf of the municipal government, reflecting the leadership of the government. At present, this mode is adopted by most industrial parks in China. The management committee, acting as an agency of the government with sufficient authority, generally has the economic management authority and corresponding administrative functions at the municipal level and is empowered to establish the planning, land, project approval, finance, taxation, labour and personnel, industry and commerce administration and other departments. This mode is the one followed by industrial parks of a relatively strong governmental nature and with relatively strong and clear administrative functions.

Box 2: Typical management organization structure of industrial parks in the government-dominated mode



Tianjin Economic and Technological Development Area (TEDA): in 2019, according to the deployment requirements of Tianjin City and Binhai New Area on the reform of statutory institutions, the TEDA management committee further optimized the responsibility allocated to internal departments and subordinate specialized working organs and clearly specified the relationship between authority and responsibility in accordance with the Implementation Plan for the Reform of Statutory Institutions in Tianjin of the Economic and Technological Development Area Management Committee, focusing on economic functions, including regional development, industrial development, investment promotion and firm service. In all, 35 internal departments and 23 specialized working organs were established.

Firm-dominated mode. The firm-dominated mode is of two types. In the first type, the park management is not a government agency, but an incorporated legal entity (for example, a development corporation) which is responsible for the investment operation and daily management of the park while enjoying the benefits and taking the risks. The firm does not perform governmental functions but reports directly to the local government in the municipal area where it is located. Guided by the government's development strategy and planning, the firm carries out contracted operations in infrastructure construction, fundraising, land development, corporate management and other areas. Taking Caohejing Development Zone in Shanghai as an example, this zone, since its establishment, has been engaged in institutional innovation and applies the management mode of "legislation by the People's Congress, management by the Government and operation by a company". It is one of the few development zones in China that does not have a management committee and operates as a firm. The Shanghai Caohejing New Technology Development Zone Development Corporation was established in July 1988, and comes under the jurisdiction of the Shanghai State-owned Assets Supervision and Administration Commission, and is a core enterprise of Lingang Group. According to the Provisional Regulations on Shanghai Caohejing New Technology Development Zone adopted by

the Shanghai Municipal People's Congress in 1990, the head office is responsible for the development, construction, operation, management, coordination and service of Caohejing Development Zone and performs certain management functions in the development zone, as authorized by the municipal government.

In the second type, the park is oriented towards a large firm, and the firms in the park are all supporting production units of that large firm. Examples of such arrangements include Guangxi Guigang Industrial Park (sugar industry), Shandong Lubei Chemical Industry Park, Inner Mongolia Baotou Aluminium Industry Park, among others. The core firms in these parks strongly dominate over the development and investment promotion of the park, and are also responsible for a part of the management, service and infrastructure construction of the park.

Box 3: Typical cases of firm-dominated industrial parks in China

Shandong Lubei Chemical Industry Park: located on the southern coast of Bohai Sea in Wudi County, Shandong Province, this park is an integral part of Shandong Lubei High-tech Development Zone. The main construction body of the park is Shandong Lubei Enterprise Group Corporation, which is the largest ammonium phosphate, sulphuric acid and cement co-production enterprise in the world, and consists of several companies, including Shandong Lubei Chemical Co. Ltd., the first-listed holding company in this industry in China, the wholly-owned subsidiary Shandong Lubei Haisheng Biological Co. Ltd., and Shandong Jinhai Titanium Resources Technology Co. Ltd. The park has formed an industrial chain development mode dominated by the Shandong Lubei Enterprise Group Corporation and supported by Shandong Lubei Chemical Co. Ltd., Datang Lubei Power Plant and nearby chemical firms, and with the planning and development department, engineering department, project department, science and technology department, personnel department, finance department and other departments assigned responsibility for the respective affairs. In this way, the park has gradually built up a management mechanism under unified leadership from the headquarters, with consolidated coordination and cooperation among the departments performing respective functions, and joint participation by affiliates. A joint digital monitoring system, in accordance with the principle of "one database, one supervision network and one management line", has been set in place in the park.

In 2003, the establishment of a national eco-industry demonstration park was commenced with approval from the former State Environmental Protection Administration (Huan Han [2003] No. 324), in which a Lubei ecological industrial mode with a titanium dioxide–sulphuric acid–ammonium phosphate–cement–heat supply co-production ecological industrial chain as its core has been set in place is formed, thus achieving the co-production of ammonium phosphate, sulphuric acid, cement, titanium dioxide, alumina, heat supply and seawater desalination; comprehensive recycling of phosphogypsum, desulphurized gypsum, titanium gypsum, titanium dioxide waste acid, alkylation waste sulphuric acid, etc.; and the use of seawater for multiple purposes. In addition to the close link with the thermal power, chemical industry, salt industry and other industries outside the park, an eco-industrial network of symbiosis and circulation within and between parks has thus been created. The park was successfully accepted by the expert demonstration meeting of the national eco-industrial demonstration park construction leading group in 2019.

Mixed mode with management by government and firm. The mixed mode means that both a management committee and a corresponding investment and development company are set up in the park. The management committee is responsible for the general governmental administration, while the investment and development company is responsible for the operation of firms. Examples include Suzhou Industrial Park and Hangzhou Economic and Technological Development Zone. The management committee of Suzhou Industrial Park is responsible for developing plans and policies and rendering public services, while China-Singapore Suzhou Industrial Park Development Group Co., Ltd. is responsible for the development of the park.

This development mode, which gives full play to the government and the market, clearly specifies the authorities and responsibilities, so it helps introduce multiple investor entities to carry out comprehensive and large-scale development as a whole, although it requires higher requirements on the coordination of government-firm relations. The management committee of Hangzhou Economic and Technological Development Zone is responsible for the administration by providing unified leadership and management on the work of the development zone. The asset management group company is responsible for the actual development and operation businesses of the development zone, including asset operation and management.

Box 4: Typical cases of industrial parks in China adopting the mixed mode, with management by both government and firms

Suzhou Industrial Park: in 1994, the State Council of China approved the development and construction of Suzhou Industrial Park as a joint venture between Suzhou and Singapore. In February of the same year, the governments of China and Singapore signed the Agreement between the Government of the People's Republic of China and the Government of the Republic of Singapore on the Cooperative Development and Construction of Suzhou Industrial Park, and the China-Singapore Joint Coordination Council was established. On the same day, the Suzhou Municipal Government and the Singapore consortium signed the General Commercial Agreement on Suzhou Industrial Park on behalf of the governments of China and Singapore, which specified that Suzhou Industrial Park Co. Ltd. (a Chinese consortium) and Singapore Suzhou Park Development Private Co. Ltd. (a Singapore consortium) would jointly establish Suzhou Industrial Park Development Co. Ltd. (now known as the China-Singapore Suzhou Industrial Park Development Group Co. Ltd., or CSSD). The mode followed in the management and development of the industrial park by the park management committee and the platform development company was established at the beginning of the development of Suzhou Industrial Park.

Following years of exploratory use of the cooperation mode, CSSD has formed four main businesses. At level 1, these are land development, real estate development and operation, municipal public utilities and diversified services. The level 1 land development business includes comprehensive development represented by the Sino-Singapore Science and Technology Eco-city of Suzhou; the real estate

development and operation business includes industrial real estate represented by the headquarters, and the commercial and residential real estate business is represented by China-Singapore Suzhou Industrial Park Smart Land Co., Ltd.; the public utilities include municipal, water, electricity, gas and other businesses represented by the China-Singapore Suzhou Industry Park Public Utilities Development Group Co. Ltd.; while the diversified services mainly include investment, engineering, international education, property management and hotel management.

A large number of industrial parks in China are developed by urban development investment corporations and other companies. Suzhou Industrial Park is a special case, in that the platform company is at a high level and was established at the time the park was launched. The development company has the same level of authority and responsibility as the management committee, and administrative matters are carefully separated from technical matters, such as development. The administrative organ of the park is streamlined and efficient. The development company, which is free of all types of administrative restrictions, is genuinely market-based and has developed exceptional market competitiveness. In 2019, as the development entity of Suzhou Industrial Park, CSSD was successfully listed in the A-share market, becoming the first national development and operation entity of a national economic development zone to be so listed in China. This also marked a milestone for China's industrial park development programme, in its efforts to gain capital market support.

Hangzhou Economic and Technological Development Zone: this is a national development zone established with the approval from the State Council in April 1993. It is the only national development zone integrating an industrial park, higher education park and export processing zone. Since its establishment, the administrative authority of the Hangzhou Economic and Technological Development Zone has changed several times. At present, the zone has a management committee and an asset management group company responsible for its administrative management, development and operation. The management committee provides central leadership and management over the work of the development zone on behalf of the Hangzhou municipal people's government. If necessary, the management committee can entrust a number of functional organizations with specific responsibility for the administration of the development zone. The management committee currently exercises 15 categories of municipal administrative approval authority, and the asset management group company, which reports directly to the management committee, is a wholly State-owned group company. It is responsible for the operation and management of assets, foreign industrial investment, investment consultation, storage, self-owned house leasing, property management and other functions for the development zone.

1.3.4 Green development evaluation index system

At the current time, China has set in place a number of evaluation methods and systems for the green and sustainable development performance of provinces, municipalities and autonomous regions, which form part the country's top-level political performance evaluation system. In 2016, the General Office of the Central Committee of the Communist Party of China and the General Office of the State Council issued the Measures for the Evaluation of Environmentally Friendly Construction Objectives, and the State Development and Reform Commission, the National Bureau of Statistics, the Ministry of Environmental Protection and the Central Organization Department issued the Green Development Index System and the Ecological Civilization Construction Evaluation Goal System, used for the evaluation of progress towards to the goal of environmentally friendly construction. Accordingly, measures for evaluation against this construction goal have been issued in Beijing municipality, Shanghai municipality, Guangdong province, and other provinces and autonomous regions, in order to consolidate the green development goals and tasks of the respective cities and regions. In 2020, the State Development and Reform Commission issued the Evaluation Indicator System and Implementation Plan for the "Beautiful China" programme, designed to evaluate the "Beautiful China" development process throughout the country and in 31 provinces, autonomous regions, and municipalities.

The industrial parks have certain specific features in their administrative system, functional structure, and system of economic and environmental statistics. Since the industrial parks are clearly different from the urban administrative districts in terms of their management function and management mode, it is not possible for them to evaluate progress in green development and performance against various indicators at the administrative district level in accordance with the documents applicable at higher levels.

In order to solve this problem, the competent ministries and commissions in China decided to set up demonstration pilots and establish evaluation systems for industrial parks in specific areas of the construction of a green, low-carbon and circular economy. The systems of this type that have been set in place currently include evaluation of the comprehensive development level of national economic development zones, and the establishment and evaluation of national eco-industry demonstration parks, recycling transformation demonstration pilot parks, pilot low-carbon industrial parks, green parks, and other demonstration pilot parks separately or jointly promoted by the National Development and Reform Commission, the Ministry of Commerce, the Ministry of Ecology and Environment, the Ministry of Industry and Information Technology and other ministries and commissions. The methods followed in the establishment and evaluation of the various demonstration pilot projects have their own areas of emphasis and vary in terms of the indicators applied, the evaluation methods followed, and the number of national economic development zones involved.

As of 2018, a total of 54 parks have been named as national eco-industrial demonstration parks, of which 33 are national economic development zones, accounting for 61 per cent of the total number of named parks; 39 parks have been approved for the establishment of national eco-industrial demonstration parks. A total of 129 parks have been accepted as the national recycling transformation demonstration pilot parks, including 57 national economic development zones, 9 national high-tech zones, and 63 other parks. A total of 55 parks have been accepted as the national pilot low-carbon industrial parks, including 17 national economic development zones, 20 national high-tech zones, and 18 other parks. A total of 79 parks have passed the green park evaluation, including 34 national economic development zones, 16 national high-tech zones, and 29 other industrial parks.

Table 1-1 Establishment of demonstration pilot projects and evaluation indicators for industrial parks in China

Evaluation method	Evaluation content	Promotion entity	Indicators
Evaluation of the comprehensive development level of the national economic development zone	Comprehensive evaluation of the development level of national economic and technical development zones	Ministry of Commerce	53 indicators in five sectors: industry, science and technology, regional driving, eco-environmental protection and administrative energy efficiency, and nine eco-environmental protection indicators
Evaluation of national high-tech industrial development zone	To reveal the longitudinal development trend of innovation capability of national high-tech zones and the horizontal status comparison within the queue of national high-tech zones	Ministry of Science and Technology	25 level-2 indicators in five sectors: innovation resource congregation, innovation and entrepreneurship environment, innovation activity performance, innovation internationalization, innovation-driven development
National eco-industrial demonstration park	To measure the resource and energy utilization efficiency, waste and pollutant emission reduction in the industrial production process	Ministry of Ecology and Environment, Ministry of Commerce, and Ministry of Science and Technology	32 indicators (including optional ones) in five sectors: economy, industrial symbiosis, resource conservation, environmental protection, and information disclosure
Recycling transformation demonstration pilot park	To measure the reduction, reuse and resource utilization level of the circular economy and the construction of the circular economy industrial chain	National Development and Reform Commission and Ministry of Finance	Reference indicators in six sectors: resource output, resource consumption, comprehensive utilization of resources, waste emission, other indicators, and characteristic indicators

Evaluation method	Evaluation content	Promotion entity	Indicators
Pilot low-carbon industrial park	To measure the carbon productivity, industrial carbon emission reduction and greenhouse gas emission control level of the industrial parks, and to measure the R&D and application of low-carbon technologies, low-carbonization transformation of traditional industries, and fostering of low-carbon strategic emerging industries	Ministry of Industry and Information Technology and Ministry of Ecology and Environment	Reference indicators composed of 21 level-2 indicators in six sectors: comprehensive evaluation indicator for parks, industry low-carbonization indicator, energy low-carbonization indicator, management low-carbonization indicator, infrastructure low-carbonization indicator and comprehensive utilization indicator of resources
Green park	To evaluate the green level of the parks at the aspects of energy utilization, resource utilization, infrastructure, industrial development, eco-environment, operation and management	Ministry of Industry and Information Technology	31 reference indicators (including optional ones) in six sectors: green energy use, green resource utilization, green infrastructure, green industry, green eco-environment, green operation, and management

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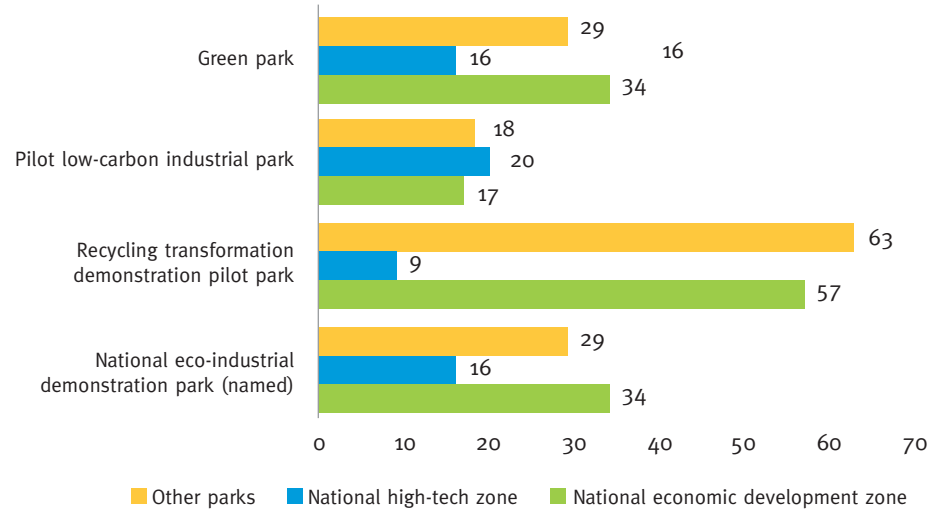


Figure 1-1 Establishment of demonstration pilot industrial parks in China

1.4 Purpose of the study

1.4.1 Long-term goal

The overall purpose of this study is to support the specific implementation and application of the International Guidelines for Industrial Parks. Based on the Guidelines, comparative studies and analyses of applicable current policies, regulations and standards governing different types of industrial parks in China have been carried out. On this basis, the expert group has put forward some valuable recommendations to help the sustainable development of industrial parks in China and other countries.

On a broader scale, the study will support UNIDO in expanding the relevant knowledge base and application tools for applying the Guidelines in developing countries and middle-income countries. The knowledge gained in the study will be shared with Member States of UNIDO and relevant stakeholders through various means.

1.4.2 Short-term goal

The study pursues the following three goals:

First, to analyse the existing policies, regulations and standards applicable to different types of industrial parks in China, and to summarize the successful experience and existing problems;

Second, to make an in-depth comparative study on China's experience and on the experience and relevant indicators outlined in the Guidelines based on the case study, including economic, social and environmental indicators and risk management measures;

Third, to develop a set of quantifiable localized indicators based on a comparative study covering economic, social and environmental indicators and risk management measures as a tool for implementing international guidelines in China; on this basis, to propose technical recommendations for the purpose of the more effective application of the Guidelines and applicable quantitative standards in industrial parks in the future.

2. Study Content and Method

2.1 Study content

Preliminary investigations of the application of the Guidelines to industrial parks in China show that the indicator system as set out in the Guidelines is more comprehensive than the existing indicator systems used for industrial parks in China. When adopted in China, however, there might well be some indicators in these Guidelines that are difficult to quantify and some evaluation aspects and specific indicator weights need to be adjusted according to the particular conditions of industrial parks in China.

The expansibility and adaptability of the standard system to various industrial parks in different countries, and the ability to adapt the Guidelines to local conditions, call for a comparative analysis between the evaluation indicator system in the Guidelines and the evaluation indicators in various guidance documents currently used in industrial parks in China.

The benchmark indicator system includes evaluation methods for the comprehensive development level of green parks, low-carbon industrial parks, recycling transformation parks, eco-industry demonstration parks and national economic and technological development zones under the Ministry of Commerce, and evaluations of the national high-tech industrial development zone of the Ministry of Science and Technology.

Comparisons are made against the indicator framework structure, evaluation aspects, key indicators, availability of basic data, etc., focusing on the analysis of the similarities and differences between the indicator system in the Guidelines and the benchmark indicator system. Based on a thorough analysis of the comparison results and based on the indicator system in the Guidelines, a reference indicator system and applicable recommended quantitative indicators suitable for its implementation in industrial parks in China are proposed. A comparative study is drawn up for the indicator system in the Guidelines, providing a theoretical basis and reference for subsequent research, pilot projects, international cooperation of industrial parks and other specific exercises.

This report includes four main chapters:

Chapter 1: This chapter sets out an overview of the background, development history, current construction status and management mode of industrial parks in China. It looks at the existing principal evaluation indicator systems for the green development of industrial parks in China, based on which the significance of localization of the Guidelines and the expected goals of this report are explained.

Chapter 2: The present chapter introduces the content of this report, listing the research and analysis methods applied in the comparative analysis of indicators in subsequent chapters, the localization recommendations for the Guidelines, a road map for the preparation of the study and other core elements of the report.

Chapter 3: This chapter describes a transverse comparison between the Guidelines and the main evaluation indicator system of industrial parks in China, including green parks, low-carbon parks, recycling transformation parks and eco-industrial demonstration parks, in relation to the main evaluation goals, framework structure, level-1 indicator setup and other aspects. On this basis, key points are identified for localized promotion of the Guidelines, the localized indicator framework and content are proposed, and typical industrial parks in China are selected for trial calculation and verification of indicators.

Chapter 4: The final chapter sets out recommendations on the setup of a localized indicator system in the Guidelines and its promotion in industrial parks in China.

2.2 Technical road map

The following figure presents a technical road map for the preparation of the study.

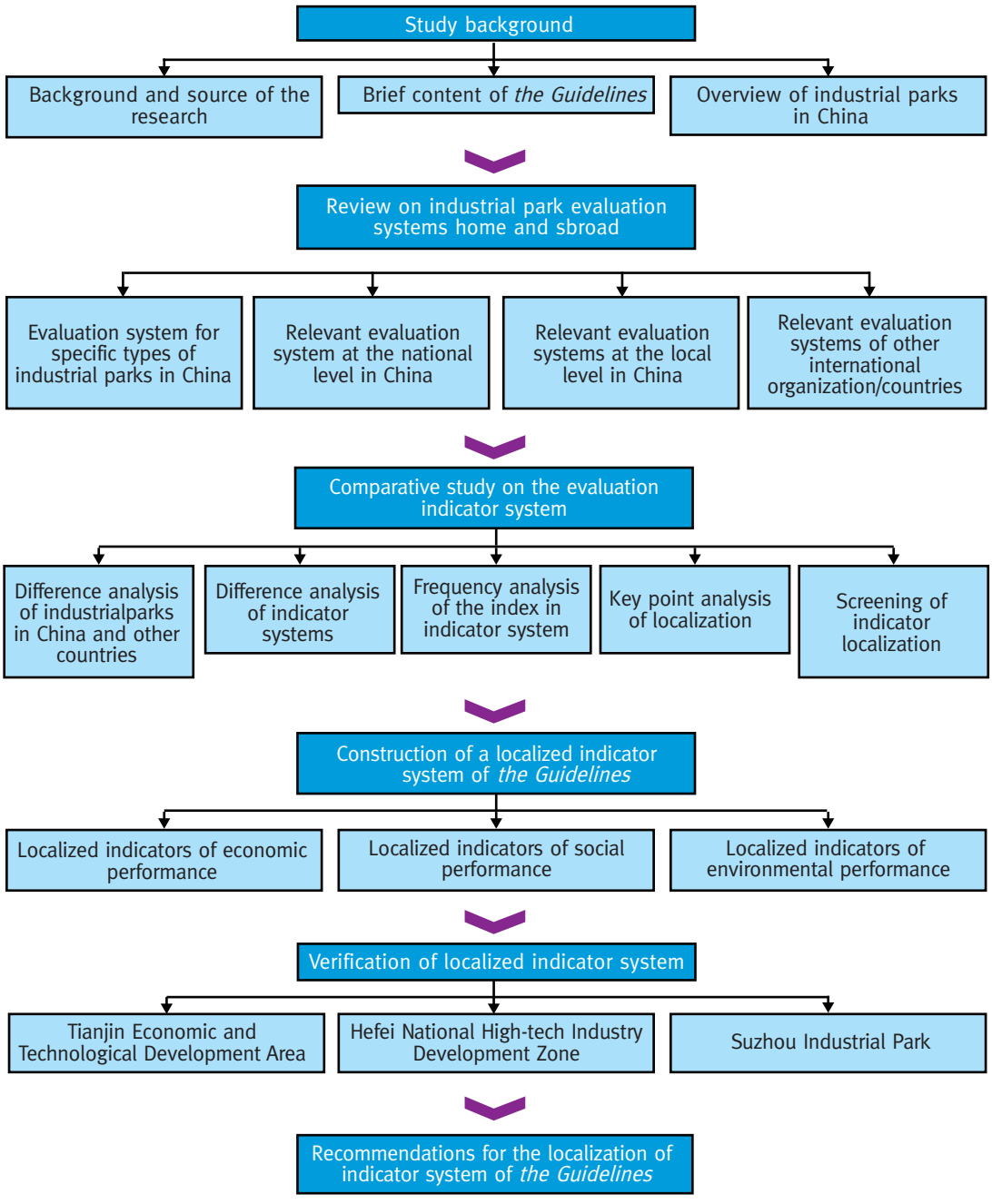


Figure 2-1. Technical road map for the study

2.3 Study methodology

In preparing the study, the study team employed the following methods.

Literature review: Relevant academic journals, monographs, dissertations and research work carried out in China and abroad were retrieved and collected by network search and file retrieval, etc. The literature was analysed and the outcomes, theories, and methods followed in authoritative literature summarized and used for reference.

Case study: Field investigations and interviews were conducted on typical industrial park cases in China, statistical data collected, interviews conducted and graphics and text information compiled for systematic analysis, to verify the soundness of the performance evaluation indicator systems in the Guidelines with regard to economy, society and environment.

Questionnaire survey: In line with the performance evaluation indicator system in the Guidelines, questionnaires were designed and interviews conducted with various stakeholders in typical industrial parks in China. The questionnaire results were analysed and comments and recommendations gathered from stakeholders on the development performance evaluation of the parks.

Comparative research: By constructing a comparative research and analysis framework, the applicable evaluation indicator systems for the development of industrial parks in the Guidelines and relevant domestic policy and measures files in China were compared from a range of perspectives with a view to exploring similarities and differences between the indicator system in the Guidelines and relevant evaluation indicator systems in China.

Policy analysis: Policy documents related to an evaluation of the development of industrial parks at home and abroad were analysed and interpreted by a qualitative and quantitative analysis, including policy evaluation and text analysis. A policy interpretation framework was constructed for purpose of standard systematic analysis on the applicable policy documents covered in the comparative study.

Expert consultation: Interview were conducted with the experts, scholars, government officials and park practitioners in the development, planning, construction and operation of industrial parks at home and abroad in order to obtain their comments and recommendations on the evaluation of development performance of industrial parks and the localized application of the Guidelines.

3. Localization of the International Guidelines for Industrial Parks

3.1 Assessment of various indicators of the parks of China

3.1.1 Green parks

Purpose of assessment

The purpose of this assessment is to review the "Made in China 2025" undertaking and the application of the "Project Implementation Guidance on Green Manufacturing (2016-2020)", designed to speed up the promotion of green manufacturing in order to boost green development throughout the whole industry chain and over the entire life-cycle of the product. This is to be achieved by taking enterprises as the main construction body and relying on an open and transparent third-party evaluation mechanism and standard system, which will ensure the standardized and unified construction of the green manufacturing system that comprises green factories, green products, green industrial parks and the green supply chain.

This assessment also aims to strengthen the guidance of the government and supervision by the public, boost the engagement and initiative of the local government, optimize the policy environment and give full play to financial incentive policy as an energizing force. The assessment makes reference to the pilot project as guidance and uses the green manufacturing service platform as support. Its aim is to advance the professional and market-oriented public service capabilities of green manufacturing and promote the formation of market-oriented mechanisms, so that a highly efficient, clean, low-carbon, circular, and green manufacturing system can be built, which will become the demonstration benchmark for green transformation and the upgrading of the manufacturing industry, and a leading force to participate in international competition.

Application

A number of national and provincial industrial parks with a strong industrial foundation and infrastructure and a high level of green development will be selected, with the aim of strengthening economical and intensive land utilization, promoting the joint construction and sharing of infrastructure and strengthening the recovery and reuse of by-product heat and pressure. Further subjects of application include the recycling of exhaust heat and water resources in the park, building the intelligent microgrid in the park, promoting the exchange and recycling of waste resources by enterprises in the park, completing and improving the green chain of industries in the park, promoting the construction of information and technical service platform in the park, encouraging enterprises in the park to develop green products, and encouraging industries to build green factories. Enterprises will be motivated to build a green supply chain so as to realize the overall green development of the park.

Evaluation dimensions

The evaluation dimensions include six aspects: greening of energy utilization, greening of resource utilization, greening of infrastructure, greening of industries, greening of the environment, and greening of operation and management.

Indicator system structure

The green park evaluation indicator system includes six primary indicators: greening indicator of energy utilization, greening indicator of resource utilization, greening indicator of infrastructure, greening indicator of industries, greening indicator of the environment, and greening indicator of operation and management. There are also 31 secondary indicators.

Greening indicators of energy utilization include three mandatory indicators: energy yield, renewable energy usage ratio, and clean energy utilization rate.

Greening indicators of resource utilization include four mandatory indicators: water resource yield, land resource yield, comprehensive utilization rate of industrial solid waste, and industrial water reuse rate, as well as two indicators chosen from four optional indicators: reclaimed water reuse rate, by-product heat recovery rate, exhaust gas recovery rate, and renewable resource recovery rate.

Greening indicators of infrastructure include one mandatory indicator for centralized sewage treatment facilities, one of two optional green building indicators (the proportion of green buildings in the newly built industrial buildings or the proportion of green buildings in the newly built public buildings), one of two optional transportation indicators (the coverage of 500-metre bus stops or the proportion of energy-saving and new energy buses).

Greening indicators of industries include two mandatory indicators: the ratio of the output value of high-tech industries to the total output value of industries in the park, the ratio of the added value of green industries to the added value of industries in the park, and also one of two optional indicators: the industry value added per capita and the ratio of the modern service industry.

Greening indicators of the environment include six mandatory indicators: the disposal and utilization rate of industrial solid waste (including hazardous waste), the depletion rate of carbon emission per 10,000 yuan industrial added value, sewage water emission per unit of industrial added value, the elasticity coefficient of major pollutants, and the excellent rate of air quality of the park, and also one indicator selected from two optional indicators: the shading ratio of roads and the shading ratio of open-air parking lots.

Greening indicators of operation and management include three mandatory indicators: the completion degree of the standard system of green park, the compilation of green park development plan, and the degree of perfection of green park information platform.

Evaluation calculation methods

The green indicator for industrial parks is calculated by the following formula:

$$GI = \frac{1}{24}\left[\sum_{i=1}^{3}\frac{EG_i}{EG_{bi}} + \sum_{j=1}^{6}\frac{RG_j}{RG_{bj}} + \sum_{k=1}^{3}\frac{IG_k}{IG_{bk}} + \sum_{f=1}^{3}\frac{CG_f}{CG_{bf}} + \sum_{l=1}^{6}\frac{HG_l}{HG_{bl}}\left(or\frac{HG_{bl}}{HG_l}\right) + \sum_{p=1}^{3}\frac{MG_p}{EG_{bp}}\right] \text{ x } 100$$

In the formula:

GI is the green indicator for industrial parks.

EG_i is the i greening indicator value of energy utilization; EG_{bi} is the leading value of energy utilization for the i greening indicator.

RG_i is the i greening indicator of resource utilization and RG_{bi} is the leading value of resource utilization for the i greening indicator.

IG is the i greening indicator value of infrastructure and IG_{bi} is the leading value of infrastructure for the i greening indicator.

CG_i is the i greening indicator value of industries and CG_{bi} is the leading value of industries for the i greening indicator.

HG_i is the i greening indicator value of the environment and HG_{bi} is the leading value of the environment for the i greening indicator.

MG_i is the i greening indicator value of OandM and MG_{bi} is leading value of OandM for the i greening indicator.

Evaluation comparison scope

The provincial-level industrial and information technology authorities should develop and issue the construction and implementation proposal of the green manufacturing system of this region in accordance with the industrial foundation and characteristics of the region, the development plan and other practical situations. Once they have met the application conditions, those parks can start the building work based on the relevant standards of the green manufacturing system and conduct self-assessment accordingly.

If the parks meet the standards of green park, they can entrust a third-party evaluation agency to carry out on-site appraisal according to the corresponding evaluation standards, and the qualified park can submit a summary report of

the green manufacturing system demonstration to the provincial authorities in accordance with the requirements and procedures of the implementation scheme of the green manufacturing system in their region. The performance of the green manufacturing system constructed by the industrial parks will be compared with the standard of the region, and those parks superior to others will be recommended in priority.

Data availability

The parks can initiate the building work based on the relevant standards of the green manufacturing system and conduct self-assessment. The data are self-reported by the park and should be easily accessible.

Binding rules of assessment and evaluation

The assessment and evaluation of green parks are achieved through a supervision system comprising the following steps: "local government to evaluate and recommend"—"expert to verify"—"central government to certify and announce to the public"—"spot check for supervision". The provincial authorities in charge of the evaluation and assessment are responsible for organizing the evaluation and confirmation of the declared parks, and recommending the list of parks to the Ministry of Industry and Information Technology. The list of national green parks will be determined after verification by experts, announcement to the public, on-site spot checks and other steps. Indices of green manufacturing level and advanced experience of the green manufacturing demonstration zones are regularly publicized on the green manufacturing public service platform. Random checks of self-declared information provided by the parks are carried out at random intervals, and parks that do not meet the green manufacturing demonstration requirements will be removed from the demonstration list, while those that meet the requirements in three consecutive random checks will be exempted from random checks for the next five years.

Box 5: Air quality three-dimensional monitoring technology and application

Step-like vertical radial air monitoring technology was employed in different areas of chemical industrial parks. Several stereo infrared monitoring stations and meteorological stations were set up 500–2,000 metres away from the discharge source and at different heights of between 10 and 50 metres. Within a radius of 1,000 metres, infrared rays were emitted to the mirror surface at different heights of 3–100 metres by using the FTIR spectrometer. In addition, infrared monitoring loops of different height and different façades were formed, followed by a set of one-point multi-surface stereo infrared monitoring systems and meteorological data acquisition systems. In combination with a newly developed air diffusion model, automatic, timely, continuous, three-dimensional monitoring was carried out, giving accurate traceability of the pollution factors emitted and timely traceability of the exhaust gas diffusion cloud at different heights in the region.

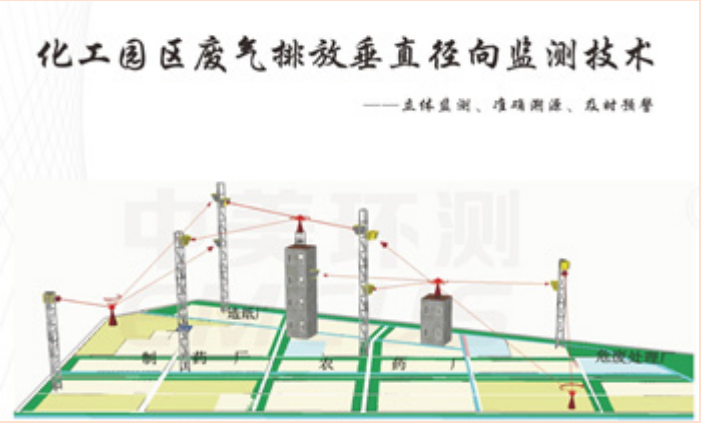
Technical features:

- The first OP-FTIR spectrometer certified by the Environmental Protection Agency (EPA);
- Ability to scan and monitor at one time hundreds of toxic, harmful, flammable and explosive compounds;

- Extension of the infrared monitoring optical path range to the minimum detection limit of PPB (one part per billion) level;
- Accomplishment of 24 hour automatic, multi-directional, multi-optical automatic scanning;
- Setting with flexibility of warning limit of pollutant concentration, which can detect in a timely fashion when the limit of chemical factors in the whole light path is exceeded, and give a prompt pre-warning to avoid catastrophic accidents;
- Ability through the use of supporting traceability and pre-warning software, mobile monitoring and measurement equipment, to trace the source and analyse the composition and diffusion law of exhaust gases, and also their impact on the atmospheric environment in the surrounding area.

Application:

This fixed and mobile monitoring technology could be widely used in industrial parks, airports, ports, petrochemical plants, pesticide plants, pharmaceutical plants, paper mills, thermal power plants, hazardous waste disposal sites, hazardous chemical transportation and other industries.



3.1.2 Low carbon parks

Purpose of assessment

The purpose of this assessment is to follow up on the national carbon emission targets and the greenhouse gas emission control targets of 2020 and the Twelfth Five-Year Plan, explore the low-carbon development model for China's industries, reduce carbon emissions per unit of industry value added and enhance industrial competitiveness. By promoting the support provided by the innovation and application of low-carbon technology, enhancing the carbon management capabilities of industrial parks and enterprises and ensuring the comprehensive integration of policies and system innovation, this assessment also aims to give full play to the role of government guidance and the operation of enterprises in accelerating the transformation and upgrading of traditional industries and the development of new low-carbon industries. This will help to raise the overall technical level and innovation capacity of China's industry and is in line with the low-carbon industrial development road with Chinese characteristics.

A number of industrial parks established in accordance with the law, which have strong foundations and distinct characteristics and are highly representative, will be selected for pilot construction. In this process, the adoption of renewable energy will be strongly promoted to speed up the low carbon transformation of key industries with large consumption of energies, such as iron and steel, building materials, nonferrous metals, petrochemical and chemical industries.

A number of low carbon enterprises will be selected and groomed to promote the low carbon management model which suits China's national conditions. The carbon emission intensity of the pilot parks will be reduced to the lowest level in China so as to guide and drive the low carbon development of industries.

Application

The selected units must be new national industrialization demonstration bases, or industry-oriented economic and technological development zones, or high-tech development zones on the China development zone audit announcement list.

The parks should have a strong working foundation and have scored notable achievements in energy conservation, emission reduction, comprehensive utilization of resources, clean production and other areas. They should have a strong innovative capability in low-carbon technology and have some foundation in the transformation and upgrading of traditional industries or in the development of low-carbon emerging industries.

The parks should have clear targets and working methods in low-carbon development, and shall guarantee that the implementation plan will be carried out and completed.

Evaluation dimensions

The evaluation dimensions include six aspects: comprehensive indicators, low carbonization of industry, low carbonization of energy, low carbonization of management, low carbonization of infrastructure, and integrated resource utilization.

Indicator system structure

The evaluation system of low carbon zone comprises six primary indicators: comprehensive indicator, industrial low carbonization indicator, low carbonization indicator of energy, low carbonization indicator of management, low carbonization indicator of infrastructure, and comprehensive resource utilization indicator. There are also 21 secondary indicators as shown in the table below.

Table 3-1 Evaluation indicator system of low carbon parks

Primary indicator	Secondary indicator	Unit
Comprehensive indicators	Carbon dioxide emissions per unit of GDP	Ton/10,000 yuan
	Energy consumption per 10,000 yuan GDP	Kilograms of standard coal/ 10,000 yuan
	Carbon dioxide emission per unit of industrial added value	Ton/10,000 yuan
	Energy consumption of industry value added per 10,000 yuan	Kilograms of standard coal/ 10,000 yuan
	Carbon productivity	10,000 yuan/ton CO

Primary indicator	Secondary indicator	Unit
Industrial low carbonization indicators	Value added proportion of tertiary industry	%
	Proportion of output value of high-tech industries to total industrial output value	%
	Ratio of the output value of strategic new industries to total industrial output value	%
Low carbonization indicators of energy	Proportion of coal to the primary energy	%
	Proportion of natural gas to the primary energy	%
	Proportion of renewable energy to the primary energy	%
	Carbon emission intensity of primary energy	CO2/standard coal per ton
Low carbonization indicator of management	Audit and Implementation Rate of Cleaner Production of Key Enterprises	%
	Number of companies conducting energy audits and energy consumption diagnostics	/
	Number of companies conducting carbon emission reporting	/
	Number of companies calculating carbon footprint	/
Low carbonization indicators of infrastructure	Proportion of new public buildings certified as green buildings	%
	Building area of newly started green buildings	10,000 square metres
Comprehensive resource utilization indicators	Comprehensive utilization rate of industrial solid waste	
	Industrial water reuse rate	%
	Recycled water utilization rate	%

Evaluation calculation methods

These are not specified in the relevant documents.

Evaluation comparison scope

A comprehensive evaluation will be made of the level of energy conservation and emission reduction, comprehensive resource utilization, clean production, low carbon technology innovation, transformation and upgrading of traditional industries, and development of low carbon emerging industries of the national new industrialization demonstration bases, industry-oriented economic and technological development zones, and high-tech development zones.

Data availability

The parks will self-declare and submit the reporting materials to the provincial-level industrial and information authorities according to requirements. The data shall be self-reported by the park and should be easily accessible.

Binding rules of assessment and evaluation

The provincial-level industrial and information authorities, development and reform authorities will jointly conduct a preliminary selection, determine a recommendation list of two or three units, and submit the recommendation list and relevant declaration materials to the Ministry of Industry and Information Technology, and the National Development and Reform Commission. The experts will evaluate the declaration materials of the reporting units and give their opinions on the selection and recommendations in order to determine the list of pilot low-carbon industrial parks. The pilot unit prepares the pilot work plan, and the Ministry of Industry and Information Technology and the National Development and Reform Commission will jointly organize experts to verify the pilot implementation plan and approve the implementation plan that has passed the verification.

The pilot industrial park, having obtained the approval, will be listed as a "Pilot Unit of the National Low Carbon Industrial Parks", and may officially launch the pilot work and organize the implementation of the pilot work plan. If it passes the inspection, the pilot unit will be awarded the title of "National Low Carbon Industrial Park", and if it fails the regular inspection, the title of "National Low Carbon Industrial Park" will be withdrawn and the corresponding preferential policy will be removed.

3.1.3 Circular transformation of the parks

Purpose of assessment

The circular transformation of industrial parks can highly improve the yield of their major resources and land, significantly increase the utilization rate of solid waste resources, the water recycling rate and the utilization rate of household garbage, significantly lower the emission rate of major pollutants and move towards zero emissions. At the same time, the aim of this assessment is to encourage the development of hundreds of national circular transformation demonstration parks, to demonstrate and promote a number of circular transformation formulas and management models that are suitable for the national conditions of China, and to set examples for various types of industrial parks to realize transformation and development through the development of the circular economy.

Application

The assessment is applied to various types of industrial parks, including economic and technological development zones, high-tech industrial development zones, bonded zones, export processing zones and various specialized parks.

Evaluation dimensions

The evaluation dimensions cover six aspects: resource output, resource consumption, comprehensive resource utilization, waste emission, other indicators, and characteristic indicators.

Indicator system structure

The reference indicators of the circular transformation of industrial parks include six primary indicators and some 20 secondary indicators (including compulsory options). The indicator system structure is shown in the following figure.

Table 3-2 Reference indicators of the circular transformation of parks

Categories	Name of indicators	Unit
Resource output indicators	Park GDP	10,000 yuan
	*Principal resource yield	Yuan/ton
	*Energy yield	10,000 yuan/ton standard coal
	*Construction land yield	10,000 yuan/ hectare
	*Water resource yield	Yuan/ton
Resource consumption indicators	*Total energy consumption	Tons of standard coal
	Total water consumption	Ton
	Main product 1: unit energy consumption	Tons of standard coal/ton
	Main product 1: unit water consumption	Cubic metre/ton
Comprehensive resource utilization indicators	Integrated utilization volume of general industrial solid waste	10,000 tons
	* Integrated utilization rate of general industrial solid waste	%
	*Water reusing rate in industrial enterprises above designated scale	%
Waste emission indicators	*Sulphur dioxide emission	10,000 tons
	*Chemical oxygen demand (COD) emission	10,000 tons
	*Ammonia nitrogen emission	10,000 tons
	*Ammonia-nitrogen compound emission	10,000 tons
	*CO_2 emission per unit of GDP	Ton/ 10,000 yuan
	Industrial solid waste disposal	10,000 tons
	Industrial wastewater discharge	10,000 tons
Other indicators	*Proportion of non-fossil energy to primary energy consumption	%
	Proportion of renewable energy	%
Characteristic indicators		

*Note: Items marked * are key indicators and are compulsory options.*

Evaluation calculation methods

This was not clarified in the relevant documents.

Evaluation comparison scope

The following aspects of the parks will be comprehensively evaluated on the basis of material flow analysis and quantifiable indicators: economic development, social development and infrastructure, industrial structure adjustment, industry correlation, energy and resource conservation and recycling, pollution control and management, and environmental quality improvement. The economic, environmental and social benefits of the circular transformation will be analysed and evaluated, and a preliminary comprehensive and systematic accounting of the costs and gains of the circular transformation will be conducted to assess the results of the circular transformation of the industrial parks.

Data availability

The local department responsible for the integrated management of circular economy development, the financial department and other relevant departments will formulate work schemes to promote the circular transformation of local parks, determine the transformation goals, key tasks and improvement measures, and promote and guide the efforts of various types of parks in formulating proposals for the implementation of circular transformation. The National Development and Reform Commission, together with relevant departments, will form an expert team to provide technical service guidance to the industrial parks in the process of carrying out their circular transformation. Data accessibility is at a relatively high level.

Binding rules of assessment and evaluation

In accordance with the Circular Economy Promotion Law, the local department responsible for the integrated management of circular economy development will urge various types of industrial parks to organize enterprises within the parks for resource utilization in order to promote the development of the circular economy. The National Development and Reform Commission and the Ministry of Finance, together with relevant departments, will supervise the work of promoting the circular transformation of industrial parks in various regions and evaluate the results of the circular transformation. The National Development and Reform Commission and the Ministry of Finance will give priority to those regions that have made better achievements in terms of circular transformation demonstration projects and the formulation of key projects and other outcomes, and the parks that have made notable progress in circular transformation will be designated “National Circular Economy Demonstration Parks” with the associated priority, and efforts will be stepped up to issue promotional materials and publicity on these parks.

3.1.4 Eco-industrial demonstration parks

Purpose of assessment

The purpose of this assessment is to promote ecological awareness in the industrial field, push forward the implementation of environmentally sound modes of industrial , organization and development in industrial parks, promote the green, low carbon and circular development of industrial parks, and standardize the construction of national ecological industrial demonstration zones.

Application

National eco-industrial demonstration zones are various types of industrial parks with a distinct legal definition, clear regional scope and centralized regional management or service agencies. The zones are established with the approval of people’s governments at or above the provincial level. The National Eco-Industrial Demonstration Park standard is applied to the construction and management of national eco-industrial demonstration parks, and serves as a basis for the evaluation of such parks, providing a technical basis for the compilation of construction plans and evaluation of construction results, and also a reference basis for other related consulting activities on eco-industrial construction.

Evaluation dimensions

The National Eco-Industrial Demonstration Zone standard is used to evaluate an industrial park in five dimensions: economic development, industrial symbiosis, resource conservation, environmental protection, and information disclosure.

Indicator system structure

The evaluation indicators of the National Eco-Industrial Demonstration Park standard include mandatory and optional indicators and comprise 5 primary indicators and 32 secondary indicators, which together form a complete indicator system.

Evaluation calculation methods

The evaluation method is based on a "one-vote veto system", with 23 indicators, 17 of which are mandatory and 6 optional, and if any of the indicators are not met, the evaluation will be regarded as not passed.

Evaluation comparison scope

This standard includes a horizontal comparison between the performance of the national eco-industrial demonstration zone in terms of its economic development, industrial symbiosis, resource conservation, environmental protection, information disclosure, and other parameters, and the national performances of zones other than the demonstration zones. For example, the ratio of the industrial output value of high-tech enterprises to the total industrial output value of the zone must be not less than 30 per cent. It also includes a longitudinal comparison of the performance of the same national eco-industrial demonstration zone over a period of time. For example, the average annual depletion rate of carbon dioxide emissions per unit of industrial added value must not be less than 3 per cent.

Data availability

The park management authority shall designate or set up a specific functional department responsible for the investigation, collection and summary of data related to the evaluation indicators, and carry out further relevant work in coordination with the units concerned.

Relevant data required for the measurement of evaluation indicators shall be obtained through statistical channels or from statistical documents specified in law as possible sources, and if the data are not available, the park management authority shall establish a corresponding working mechanism for data collection and statistics.

Binding rules of assessment and evaluation

The park management authority is responsible for the designation, construction and management of the demonstration zones. Before initiating the construction work, the industrial parks shall compile a plan and technical report (hereinafter collectively referred to as "construction plan") for the construction of the national eco-industrial demonstration zone. The Construction Plan shall be prepared in reference to the Guide for the Planning of Eco-Industrial Parks (HJ/T409-2007). The park management authority may prepare the construction plan on its own or entrust a third party agency to do so. In compliance with the National Eco-Industrial Demonstration Zone standard, the construction plan shall specify the assessment indicators for inspection and the key support projects.

An application for the establishment of a demonstration park shall be submitted to the provincial administrative departments responsible for environmental protection, commerce, and science and technology where the park is located, and after approval is granted by the three departments, the environmental protection department shall report to the Leading Team Office responsible for the construction and coordination of the national eco-industrial demonstration parks (hereinafter referred to as "the Office").

Once the construction plan of the demonstration park has passed its verification, the member units of the leading group will jointly issue a document approving the conduct of construction work by the industrial park. After the completion of the

construction work, an inspection and technical verification will be carried out. Upon successful completion of the inspection, the Office will publicize relevant information about the industrial parks that have passed the inspection and been granted the title of "demonstration park" on the government website of the Ministry of Environmental Protection and other media, with a view to subjecting them to public scrutiny. Where reports are submitted by the public and prove to be true, the acceptance of the demonstration parks will be deemed invalid, and the title of "demonstration park" will be withdrawn.

In the case of industrial parks that fail the inspection for five years following approval of their construction, their construction will be deemed to be incomplete and the parks will no longer be included in the list of construction zones. Industrial parks that have been approved for the construction of demonstration parks and granted this title shall conduct self-evaluations every year on the performance of their eco-industrial construction, with the submission of an annual evaluation report to the Office. A review shall be conducted every three years from the date of their being granted the title of industrial demonstration park.

In the event of any of the following circumstances, the leading team will revoke the title of demonstration park, and parks still in the construction stage will be removed from the approval list. In the event of circumstances (a) and (b), the parks will not be able to apply for approval of construction again for another three years: (a) a serious environmental pollution event, or a major or particularly serious environmental accident; (b) falsification of data and information; (c) failure to pass the review and failure to meet the requirements after rectification; (d) failure to submit the annual evaluation report on time and in accordance with the requirements; (e) significant changes made after the park management department has submitted the application which render the park unable to meet the relevant standards and requirements; (f) other conditions that necessitate further verification.

3.1.5 Assessment and evaluation measures for the comprehensive development of State-level economic and technical development zones

Purpose of assessment

The purpose of this assessment is to guide the State-level economic and technical development zones in efforts to further clarify their level of development, encourage local and State-level economic and technical development zones to accelerate transformation and upgrading to achieve innovation-driven development, set countrywide examples and identify models of State-level economic and technical development zones, and provide a point of reference for decision-making by management departments at all levels.

Application

The assessment and evaluation are applied, among other subjects, to State-level economic and technical development zones that have been approved by the State Council, and provincial economic and technical development zones that have applied for status as, or have been upgraded to, State-level economic and technical development zones.

Evaluation dimensions

A comprehensive evaluation of the development level of State-level economic and technical development zones will be conducted in seven dimensions, namely: economic development, opening-up, scientific and technological innovation, industrial development, regional contribution, environmental protection, and administrative efficiency.

Indicator system structure

The assessment and evaluation indicator system includes five primary indicators: industrial base, scientific and technological innovation, regional drive, environmental protection and administrative efficiency. In addition, there are 53 secondary indicators. Principal among these are the following:

"industrial base", which covers 13 indicators, mainly reflecting economic development, opening-up, tax revenues, industrial agglomeration, unit land output intensity, infrastructure and other aspects; "scientific and technological innovation", covering 15 indicators, reflecting the investment environment of the State-level economic and technical development zones in terms of their scientific and technological platform, scientific and technological resources, scientific research capability and level of talent availability; "regional contribution", covering 12 indicators, mainly evaluating the dissemination and driving effects of State-level economic and technical development zones, and also reflecting the level of contribution and support provided by the State-level economic and technical development zones to the real economy of the region; "environmental protection", covering nine indicators, reflecting the environmentally sound construction, energy consumption per output unit, and emission of major pollutants; and "administrative efficiency", covering four indicators, reflecting the efficiency of the administrative management by government departments in the development zones.

Evaluation calculation methods

Under the guidance of the Ministry of Commerce of China, each provincial-level commercial authority will carry out a preliminary assessment and evaluation, and an expert group or third-party organization will conduct quantitative assessment and evaluation in accordance with the category-based approach. In consideration of the differences in the level of development, nature, and management system of the state-level economic and technical development zones, different weights will be added to different indicators.

Evaluation comparison scope

Taking into consideration the regional differences between the State-level economic and technical development zones in east, central and west China, and the differences in the nature of the parks, the Ministry of Commerce will set different weights on the first-level and second-level indicators of each main category, which will be clarified in the year when the assessment and evaluation are conducted in order to guide the subsequent evaluations to ensure that they objectively reflect the differences between regions, stages of development and nature of the parks.

Data availability

The data in the assessment and evaluation indicator system derive from the relevant departments of the regions where the state-level economic and technical zones are located, and the provincial commercial departments are responsible for organizing the information collection and preliminary review of the assessment and evaluation of the State-level economic and technical development zones under their administrative purview. Each State-level economic and technical development zone shall, before 30 June of each year, fill in the assessment and evaluation data and relevant auditing materials on the "information integration platform of economic and technical development zones". In the preliminary evaluation, the department in charge will review the timeliness, completeness, accuracy and coherence of the data to ensure that the assessment and evaluation data and the audit materials are authentic and effective.

Binding rules of assessment and evaluation

Those provincial-level economic and technical development zones in respect of which applications have been submitted for their new creation or upgrading to State-level economic and technical development zones will be accorded a two-year fostering period. Upon termination of this fostering period, the park will receive a site inspection, during which specialists will assess and evaluate the park with reference to this approach. If the indicators of the fostered economic and technical development zones are higher than those of other fostered zones, the upgrading process can be initiated.

In order to strengthen the constraint and coercion mechanism, a list will be drawn up of State-level economic and technical development zones to be interviewed or notified or whose withdrawal is suggested, in accordance with the assessment

and evaluation results of the evaluating year, and proposals will be made for further action. Those State-level economic and technical development zones whose assessment results are among the lowest 10 assessments of the evaluating year will be notified and interviewed; key issues and weaknesses in their development will be identified which they will be required to rectify. Where the assessment results of zones lie among the lowest five in the assessment for two consecutive years, it will be suggested that those zones are downgraded to provincial-level economic and technical development zones, and this proposal will be reported to the State Council for approval according to the prescribed procedure.

Table 3-3 Assessment and evaluation indicator system on the comprehensive development level of State-level economic and technical development zones

Primary indicators	Code	Secondary indicators	Unit
Industry base	1	Regional gross domestic product (regional GDP)	10,000 yuan
	2	Total export volume	10,000 US dollars
	3	Of which: total export volume of high-tech products	10,000 US dollars
	4	Total import volume	10,000 US dollars
	5	Of which: total value of high-tech import products	10,000 US dollars
	6	Actual amount of foreign investment used	10,000 US dollars
	7	Output intensity of GDP per unit land	10,000 yuan/square kilometre
	8	Labour productivity	yuan/person*year
	9	Number of manufacturing companies with main business revenues of 3 billion yuan (for eastern China) or 1.5 billion yuan (for midwestern China) or more	number
	10	Number of R&D centres and headquarters of Fortune 500 companies on the list	number
	11	Number of listed companies	number
	12	Supporting capacity of urban underground utility tunnels	km/sq km
	13	Fibre route miles per square kilometre	km

Primary indicators	Code	Secondary indicators	Unit
Scientific and technological innovation	14	Actual amount of spending on science, technology and innovation	10,000 yuan
	15	Proportion of R&D expenditures of industrial enterprises above designated size to their main business revenues	%
	16	Number of vocational training institutions	Number
	17	Number of incubators and co-work spaces	Number
	18	Total number of R&D institutions of provincial-level and above	Number
	19	Number of enterprises with famous brand products of provincial-level and above	Number
	20	Number of high-tech enterprises	Number
	21	Proportion of the main business revenue of high-tech enterprises to the main business revenue of the region's so-called "four above" enterprises	%
	22	Ratio of the number of talents with a master's degree and above	%
	23	Ratio of professional and technical personnel with senior titles	%
	24	Ratio of highly skilled talents	%
	25	Number of invention patents per 10,000 people	Pieces/ 10,000 people
	26	Annual PCT patent application	Piece
	27	Annual amount of invention patent grants	Piece
	28	Technical contract transactions	10,000 yuan
Regionally driven	29	Proportion of regional GDP to the regional GDP of the prefecture-level city in which it is located.	%
	30	Proportion of public fiscal budget revenue to the public fiscal budget revenue of the prefecture-level city in which it is located.	%
	31	Proportion of tax revenue to the tax revenue of the prefecture-level city in which it is located	%
	32	Proportion of actual use of the foreign fund to the actual use of foreign fund of the prefecture-level city in which it is located	%

Primary indicators	Code	Secondary indicators	Unit
	33	Proportion of high-tech manufacturing output value to the output value of high-tech manufacturing at the prefecture-level city where it is located	%
	34	Proportion of the added value of the tertiary industry to the added value of the tertiary industry at the prefecture-level city where it is located	%
	35	Number of industrial guidance funds, venture capital funds or other policy supporting funds established	Number
	36	Growth rate in the number of firms	%
	37	Number of parks established in cooperation with other State-level economic and technical development zones	Number
	38	Number of parks established in cooperation with other regions (inter-provincial cooperation parks recognized by provincial or higher governments)	Number
	39	Number of cooperation zones in counterpart assistance arrangements with Xinjiang, Tibet and the border regions	Number
		Land development and utilization rate	%
Eco-friendly	41	Energy consumption per unit gross domestic product	Ton of standard coal/10,000 yuan
	42	Water consumption per unit gross domestic product	Cubic metre/ 10,000 yuan
	43	Chemical oxygen demand (COD) emission per unit GDP	Kilograms/ 10,000 yuan
	44	Sulphur dioxide emissions per unit gross domestic product	Kilograms/ 10,000 yuan
	45	NO_x emissions per unit gross domestic product	Kilograms/ 10,000 yuan
	46	Ammonia emissions per unit gross domestic product	Kilograms/ 10,000 yuan
	47	Number of ISO14000 certified companies	Number
	48	Comprehensive utilization rate of industrial solid waste	%
	49	Recycled water (reclaimed water) reuse rate	%

Primary indicators	Code	Secondary indicators	Unit
Administrative efficiency	50	Online approval rate of (one-stop) government service centres	%
	51	Proportion of public service expenditures to the public fiscal budget expenditures	%
	52	Whether an independent safety production organization is set up	Yes/No
	53	Whether it has passed ISO9001 quality certification	Yes/No

3.1.6 Evaluation indicator system of national high-tech industrial development zones

Purpose of assessment

The purpose of this assessment is to guide the State-level economic and technical development zones to further clarify their development positioning, encourage the local and State-level economic and technical development zones to accelerate their transformation and upgrading to achieve innovation-driven development, set countrywide examples and represent models of State-level economic and technical development zones, and also to provide a point of reference for decision-making by management departments at all levels.

Application

The assessment and evaluation are applied, among other subjects, to State-level economic and technical development zones which have been approved by the State Council, and the provincial economic and technical development zones that have applied to become or be upgraded to State-level economic and technical development zones.

Evaluation dimensions

The evaluation indicator system in the national high-tech industrial development zone evaluation method emphasizes the notion of "policy evaluation" and the degree to which nation-driven objectives have been realized by the national high-tech industrial development zone. The evaluation is conducted from different standpoints, such as support, input, and output, with an emphasis on independent innovation, entrepreneurial environment, endogenous growth, and effective utilization of resources, to guide the development direction of high-tech zones.

Indicator system structure

The evaluation indicator system consists of four primary indicators: knowledge creation and innovation capacity; industrialization and capability to build a scale economy; internationalization and global competition capability; and the sustainable development capability of high-tech zones, under which 44 secondary indicators are introduced, including 39 quantitative indicators and 5 qualitative indicators. A review of the evaluation indication system in the national high-tech industrial development zone evaluation methods shows relatively few evaluations of the social performance of high-tech zones: there are only a few mentions in the evaluation of the sustainable development capability of high-tech zones. Relevant indicators include, first, evaluation of the regional dissemination and driving ability of high-tech industries; second, the total tax revenue per capita; third, average annual income of scientific and technical personnel; fourth, evaluation of the mechanism and the institutional innovation of the high-tech zone management committee; and, fifth, evaluation of human settlement environment.

Evaluation calculation methods

The comprehensive evaluation score is the sum of the weighted scores of the primary indicators. The primary indicator score is the sum of the weighted scores of the secondary indicators. The secondary indicator score is calculated from the actual value of the index and its ranking by comprehensive weighting. Qualitative indicators will be evaluated by directed public questionnaires. The Torch Centre of the Ministry of Science and Technology will fine-tune the statistical indicators and evaluation indicators every two years and will conduct a comprehensive revision and adjustment every six to eight years.

Evaluation comparison scope

When setting the evaluation indicators, the differences in land area, development foundation, and supporting environment of each high-tech zone are taken fully into consideration. Indicators such as “per capita”, “ground average” and others will be adopted, and “regional measurement” indicators introduced. Scale indicators such as the total amount and others will not be used, since they might be influenced by unbalanced objective conditions, thus ensuring that the evaluation results and ranking are scientific, fair and reasonable.

The evaluation index should be able to match the international common indicators as far as possible, so it can be accepted internationally. According to the OECD Science, Technology and Industrial Scoreboard, an evaluation scoreboard will be created for the hi-tech industrial development zones. Through long-term observation and analysis of the statistical index of a large sample, more scientific evaluation indicators can be continuously screened out, thereby improving the statistical and evaluation indicators of the zones, and at the same time ensuring the dynamic monitoring of the development status of each such zone.

Data availability

The annual evaluation is organized by the Torch Centre of the Ministry of Science and Technology, and the data involved in the evaluation comes from the annual statistical survey of national high-tech zones approved by the National Bureau of Statistics of China and implemented by the Torch Centre. During the process of setting indicators, it is proposed to adopt statistically quantifiable indicators as far as possible, and to select a small number of indicators that are simple and easy to operate, so that the availability of indicator data is relatively high.

Binding rules of assessment and evaluation

The national high-tech industrial development zones are adopting dynamical management under competition mechanism. The State Science and Technology Commission has formulated the Assessment Standards and Measures of National High-tech Industrial Development Zones, with a view to conducting regular assessments of the development zones. Those development zones which have been assessed and found to have achieved excellent performance in work will be duly rewarded. The development zones found to be poor in management and slow in development will be required to rectify this situation within a specified deadline; and if the rectification is ineffective, a report will be submitted to the State Council to cancel the zone’s title of State-level high-tech industrial development zone.

Table 3-4 Evaluation Indicator System of National High-Tech Zone (2013 Revision)

Primary indicators	Secondary indicators
Knowledge creation and technological innovation capabilities	1.1 Number of people with a bachelor's degree or above per 10,000 members of the population
	1.2 Expenditure on R&D as a proportion of enterprise sales revenue (in units of 10,000 yuan)
	1.3 Number of national R&D institutions
	1.4 Number of national incubators
	1.5 Number of new patent grants per 10,000 heads of domestic holding companies of the year
	1.6 The amount of investment in science and technology of the financial expenditure of the management committee of the year
	1.7 Technological contract turnover per capita
	1.8 Industrial added value rate
	1.9 Corporate profit rate
	1.10 Evaluation of the institutional innovation and effective operation of the park management committee
	1.11 Park development in line with country-oriented evaluation
Industrial upgrading and structural optimization capabilities	2.1 Number of high-tech enterprises with revenues exceeding 3 billion yuan
	2.2 Proportion of service revenue as to total revenues
	2.3 Value added per capita
	2.4 Proportion of high-tech enterprises to the total number of enterprises
	2.5 Number of national industrial service promotion agencies
	2.6 Number of new intellectual property rights (including registered trademarks) per 10,000 people within one year
	2.7 Number of public listed companies per 10,000 people
	2.8 Profit rate of corporate net assets
	2.9 Proportion of per capita wage income of employee to the per capita added value
	2.10 Evaluation of the science technology and finance development of the park
	2.11 Evaluation of the cultivation and development of strategic emerging industries and innovative clusters in the park

Primary indicators	Secondary indicators
Internationalization and ability to compete globally	3.1 Proportion of employees who have studied overseas and foreign resident workers to the total number of employees
	3.2 Proportion of export volume of high-tech enterprises to the park's business revenues
	3.3 Proportion of technical services export volume to the total export volume
	3.4 Number of foreign branches established by the enterprise
	3.5 Newly registered European, American and Japanese trademarks per 10,000 people within one year
	3.6 Number of new European, American and Japanese patents granted per 10,000 heads of the year
	3.7 Aggregate number of industrial international standards that the enterprises have participated in their development
	3.8 Amount of overseas direct investment by domestic holding companies during the year
	3.9 Performance evaluation of the implementation of talent strategies and policies by the parks
	3.10 Evaluation of the liveability and the completeness of urban service functions of the park
Sustainable development capability of the high-tech zones	4.1 Growth rate of the number of employees
	4.2 Proportion of employees with master's and doctoral degrees
	4.3 Growth rate of the number of enterprises
	4.4 Growth rate of total taxes paid by enterprises
	4.5 Total amount of new investment by enterprises in the year
	4.6 Comprehensive energy consumption per unit of added value
	4.7 Evaluation of the interaction among government, enterprises, universities, research institutions, capital institutions, intermediary institutions, and market users and the protection of intellectual property of the park
	4.8 Evaluation of the objectivity, accuracy, and completeness of the data reported by the park during its participation in the evaluation.

3.1.7 Corporate social responsibility evaluation indicator system of Chinese industries

Purpose of assessment

The indicator system is designed to reflect and measure the effects and efficiency of the management of Chinese industrial enterprises, including their impact on stakeholders and the environment and the extent to which they can provide basic support for Chinese industrial enterprises to conduct self-assessment, carry out the star rating on their social responsibilities, and fulfil the compilation of social responsibility indicators, and so forth.

Application

It is applicable to industrial enterprises represented by coal, machinery, iron and steel, petrochemical, light industry, textile, building materials, nonferrous metals, electric power, mining, and other industries.

Evaluation dimensions

In line with the practical need of enterprises to transform their traditional production mode and management mode, the Evaluation Indicator System clarifies the scope and basic principles of the corporate social responsibility evaluation indicator system and proposes a three-level indicator system based on the triple bottom line model, stakeholder theory, and sustainable development theory.

Indicator system structure

The indicator system includes five primary indicators: social responsibility value and strategy, social responsibility promotion management, economic impact, social impact and environmental impact; 22 secondary indicators; and 98 tertiary indicators. The evaluation indicators are classified according to the attributes and standardized processing technical requirements of the indicators and based on the three indicator attributes: bottom-line indicators (A1), key indicators (A2), and basic indicators (A3). They also cover the standardized processing technical requirements as quantitative continuous indicators (B1), quantitative dispersion indicators (B2), and qualitative indicators (B3). In the evaluation indicator system, there are a total of 60 tertiary indicators related to corporate social performance.

Table 3-5 Number of indicators by level in the Chinese industrial Corporate social responsibility evaluation index system

Primary indicator	Number of secondary indicators (unit)	Number of tertiary indicators (unit)
Social responsibility values and strategies	2	2
Social responsibility promotion management	5	14
Economic impact	6	24
Social impact	5	37
Environmental impact	4	21
Total	**22**	**98**

Evaluation calculation method

The evaluation follows the steps: scoring the indicator—dynamic allocation of weights of the indicator—calculating the final score of the indicator—calculating the final score of the enterprise.

Indicator scoring: In the indicator scoring stage, for each participating enterprise, the qualitative evaluation of tertiary indicators is scored by experts according to the scoring reference method, and the quantitative evaluation is calculated by the measurement model after the raw data of indicators have been processed by the dimensionless method and at the same order of magnitude.

Indicator dynamic allocation of weights: The measurement model is used to calculate the dispersion of the scores of all participating companies for the same indicator, and the weight of the indicator is determined according to the magnitude of the dispersion.

Calculating the final score of the indicators: The final score of the indicators is calculated by multiplying the scores of tertiary indicators with the dynamic weights.

Calculating the final score of enterprises: Among all the indicators, the weight of the total key indicators is 40 per cent, and that of the total basic indicators is 60 per cent. The indicators are categorized as A2 for key indicators and A3 for basic indicators, and the final scores of the enterprises calculated by summing up scores of the same category of indicators, which are multiplied by respectively assigned weights.

Evaluation comparison scope

The evaluation will be conducted annually. According to attributes of the indicators, they are divided into bottom-line indicators, key indicators and basic indicators; and according to the technical requirements for standardized processing of the indicators, they are divided into quantitative continuous indicators, quantitative dispersion indicators and qualitative indicators. The application section of the Evaluation Indicator System introduces such basic evaluation procedures and basic working contents of Chinese industrial enterprises as conducting self-evaluation, star-rating evaluation of the fulfilment of social responsibilities, and compilation of social responsibility indices, among others.

Data availability

The indicator data are drawn from the participating enterprises. When selecting indicators, the Evaluation Indicator System applies the principle of combining practicality and being forward-looking, meaning that the indicator data can be obtained from the daily operation of enterprises and are feasible in terms of technical, financial and time requirements. There are, however, a large number of indicators in the Evaluation Indicator System, and these are not compulsory statistical indicators, which makes the data difficult to obtain.

Binding rules of assessment and evaluation

Industrial enterprises can adopt this evaluation indicator system to carry out a self-assessment of their responsibilities. Through this assessment, enterprises can better coordinate their strategy with the requirements of the economic and social environment to achieve sustainable development. At the same time, through self-assessment, enterprises can identify the gaps between them and can take the evaluation results as directional guidance for further improving their management and social responsibility performances.

Table 3-6 Social responsibility evaluation indicator system for Chinese industrial enterprises

Primary indicators	Secondary indicators	Tertiary indicators
Indicators of Social Responsibility values and strategies	Social Responsibility values	Social responsibility values
	Social responsibility strategic planning	Social responsibility strategic planning
	Promoting management systems	Governance structure
		Organizational structure
		Management mechanism
	Building social responsibility capability	Social responsibility training
		Social responsibility knowledge management
	Socially responsibility communication and engagement	Daily disclosure of social responsibility Information
		Publishing social responsibility reports
		Stakeholder communication activities
		Stakeholder engagement mechanisms
		Social responsibility crisis management mechanism
	Comprehensive risk management/ internal control management	Comprehensive risk management system
		Internal control management system
	Stakeholder evaluation	Stakeholder satisfaction survey
		Social responsibility awards
Economic Impact Indicators	Operation in conformity with the law	Fair competition
		Taxation in conformity with the law
		Respect intellectual property
		Anti-corruption and building a clean government
	Corporate governance	Three meetings, one management level
		Independent directors
		Scientific decision-making mechanisms

Primary indicators	Secondary indicators	Tertiary indicators
	Technology innovation	R&D investment ratio
		Patents per thousand people
		Innovation conversion rate
		Innovation awards
	Integration of informatization and industrialization	Ratio of information equipment installation
		E-commerce adoption rate in the purchasing and sales section
	Investor returns	Revenue growth rate
		Net profit growth rate
		Economic value added per capita
		Rate of return on net assets
		Appreciation rate of asset retention
		Assets liability ratio
		Dividend payout rate
		Investor relations management
		Responsible investment
	Driving industry development	Participation in the establishment of industry standards
		Participation in events organized by industry associations
Social impact indicators	Safe production	Safe production management system
		Number of accidents in production safety
		Death rate per one thousand people
		Injury rate per one thousand people
	Employee rights	Equality and career development
		Labour contract signing rate
		Contributions to social security and provident fund
		Prohibition of child labour
		Anti-forced labour

Primary indicators	Secondary indicators	Tertiary indicators
		Democratic management
		Trade union organization
		Collective consultation
		Employee compensation
		Staff training
		Incidence rate of occupational disease
		Physical examination rate
		Occupational health and safety protection investment per capita
		Employee leave
		Employee care
		Labour disputes
		Employee satisfaction survey
	Customer satisfaction	Sustainable design
		Product quality
		Product safety
		Customer service
		Customer privacy protection
		Advocating responsible consumption
		Customer satisfaction survey
	Partnerships	Responsible sourcing
		Advancing business partner social responsibility
		Supplier satisfaction survey
	Community development	Number of jobs per output of 10,000 yuan
		Employee volunteers
		Community investment
		Public welfare donations
		Protection of specific groups
		Community and public welfare awards

Primary indicators	Secondary indicators	Tertiary indicators
Environmental Impact Indicators	Environmental management	Environmental management system
		Assessment of project environmental impact
		Response mechanisms of an environmental incident
		Number of environmental pollution and damage incidents
		Recognition gained relevant to environmental protection
	Clean production	Reduction rate of toxic and hazardous raw material per 10,000 yuan output value
		Industrial water-recycling rate
		Comprehensive recycling rate of industrial "three wastes"
		Rate of product packaging material recycling
		Economic use of raw materials
		Environmentally friendly products
	Energy conservation and emissions reduction	Situation of outdated production capacity, equipment, and technology
		Comprehensive energy consumption per 10,000 yuan output value
		Sulphur dioxide emission volume per 10,000 yuan output value
		NO_x emission volume per 10,000 yuan output value
		COD emission volume per 10,000 yuan output value
		Solid waste emission volume per 10,000 yuan output value
		Hazardous waste disposal rate
		Intensity reduction rate of carbon emission
	Ecological protection	Ecological conservation investment per 10,000 yuan output value
		Coverage rate of plant greening

3.1.8 Methods for the assessment, evaluation and appraisal of representative provinces, cities, parks and enterprises

In addition to the State-level assessment and evaluation carried out for development zones and high-tech zones, the local governments' policies and methods for evaluating the development performance of various industrial parks are also worth noting. Local evaluation policies and measures often take into account the local development base and the development phase of industrial parks, and their evaluation models and indicator systems are appropriate for local application. At the local level, the main bodies in charge of the development performance of industrial parks and enterprises include government, industrial parks and enterprises, so this study will sort out the policies and documents related to social performance evaluation of industrial parks from these three levels: government, industrial parks and enterprises.

Among these, the main search objects at the government level include provincial and municipal departments of commerce, departments of development and reform, and departments of science and technology; the main search objects at the park level include relevant departments under the management committee of the industrial park, such as the publicity department, planning and construction bureau, social development bureau, social business bureau, education bureau, performance evaluation bureau and others; and the main search objects at the enterprise level include the official website and relevant departments within the enterprise. The retrieval of relevant documents at the government level should take into account the regional differences in China's domestic development level, while the retrieval of relevant documents at the park and enterprise level should take into account the internal and external influences on the development of the park and enterprise.

Table 3-7 Evaluation summary of representative local parks

Search hierarchy	Related functional departments	Document type
Government level	Provincial and municipal level departments of commercial, development and reform, and science and technology, etc.	
Park level	Relevant departments under the park management committee, such as the publicity department, planning and construction bureau, social development bureau, social business bureau, education bureau, performance evaluation bureau, etc.	Policy documents such as assessment, evaluation and appraisal methods, annual development reports of the park, annual work summaries of the department, etc.
Enterprise level	Related departments within the enterprise	Annual corporate development reports, summary reports, evaluation methods, etc.

Evaluation of Zhejiang Provincial Scenic Industrial Parks (development zones)

Zhejiang Province is one of China's most economically developed provinces, with the most dynamic economy and the highest growth rate. According to the 2019 assessment and evaluation of the overall development level of national economic and development zones in China released by the Ministry of Commerce, 13 of the top 100 zones are located in Zhejiang Province, including three of the top 20 zones (Jiaxing Economic Development Zone, Hangzhou Economic Development Zone and Ningbo Economic Development Zone). Meanwhile, in terms of the proportion of its national economic development zones that use foreign investment, Zhejiang ranks first in China. In terms of the amount of utilized foreign investment, Jiaxing Economic Development Zone ranks fifth and Ningbo Economic Development Zone ninth in China. In terms of import and export volume, Ningbo Economic Development Zone is ranked eighth.

In 2019, in order to further enhance the strength of the parks in technology innovation, system coverage, service optimization and development of an agreeable environment, on the basis of the hard power of economic output, the Department of Commerce, the Development and Reform Commission, the Department of Economy and Information Technology, and the Department of Science and Technology of Zhejiang Province jointly issued their Notice on the Issuance of the Implementation Plan for the Development of Scenic Industrial Parks in Zhejiang Province, to establish an evaluation indicator system for scenic industrial parks, and to realize the harmonized development of the business environment, natural environment, culture, tourism and other aspects of the park. The plan is to push forward the construction of scenic industrial parks throughout the province within 5 years and selects 20 industrial parks in the first phase as models of the development of scenic industrial parks.

The indicator system formulated by the plan for the evaluation of scenic industrial parks (development zones) includes 6 primary indicators and 48 secondary indicators in accordance with the requirements of each task. The scope of the assessment covers all aspects of the investment environment of the zones, which are: openness and vitality, production and living standards, green environment, digital information and intelligence, high-end innovative structure and business environment and services.

Table 3-8 Evaluation indicator system of Zhejiang scenic industrial parks (development zones)

Primary indicators	Secondary indicators	Unit	Weight (points)
Openness and vitality (20 points)	Amount of utilized foreign investment	10,000 US dollars	5
	Total import and export volume	10,000 US dollars	3
	Number of international industrial cooperative parks (provincial or municipal level)	unit	6
	Growth rate of utilized foreign investment	%	3
	Growth rate of total import and export	%	3

Primary indicators	Secondary indicators	Unit	Weight (points)
Production and living standards (20 points)	Featured town (provincial or municipal level)	Yes/No	2
	Number of tourism resort established	unit	2
	Infrastructure investment amount	10,000 yuan	3
	Number of well-known brands (trademarks)	unit	2
	New product output ratio	%	1
	Number of “four-up” companies	unit	1
	Average net assets of “four-up” enterprises	10,000 yuan	1
	Main business income of “four-up” enterprises	10,000 yuan	1
	Growth rate of the main business income of the “four-up” enterprises	%	1
	Tax revenue	10,000 yuan	1
	Industrial concentration	%	1
	Industrial agglomeration rate	%	1
	Land utilization rate	%	1
	Industrial land investment intensity	10,000 yuan/ acre	2
Green environment (15 points)	Comprehensive environmental improvement of small towns in the province that has reached the standards and provincial demo towns (in the development zone)	Yes/No	4
	Decrease rate of industrial added value energy consumption	%	2
	Percentage of firms that pass clean production evaluation	%	2
	Upgrading for circular economy transformation	Yes/No	2
	Specialized ecological plans or environmental assessment reports	Yes/No	3
	ISO14000 environmental management system standard certification		2
Digital information and intelligence (15 points)	Construction of smart zone platform	Yes/No	3
	Digital property management	Yes/No	3
	Geographic information digitization	Yes/No	3

Primary indicators	Secondary indicators	Unit	Weight (points)
	Portal website and WeChat official account of the park (or app)	Yes/No	3
	Enterprise certified for the integration of informatization and industrialization; enterprise certified for information security	Yes/No	3
High-end innovative structure (15 points)	Number of high-tech enterprises	unit	1
	Number of new invention patent grants of the enterprises	unit	1
	Input rate of technological improvement	%	1
	Number of S and T activities per 10,000 people	person	1
	Intensity of expenditure on S and T activities	%	1
	Output ratio of high-tech enterprises	%	1
	National and provincial thousand talents	person	2
	Number of newly approved large, good and excellent projects	unit	1
	Number of R&D facilities	unit	1
	Land taxation yield	10,000 yuan/ acre	1
	Industrial land value-added yield	10,000 yuan/ acre	1
	Industrial labour productivity	10,000 yuan/ person	1
	Main business profit margin of industrial enterprises	%	1
	Tax revenue growth rate	%	
business environment and services (15 points)	Results of the “one-stop service” reform ranking in the county (city and district) where the evaluation is conducted in the year		10
	Integrated administrative service platform	Yes/No	2
	Credit rating of major development and construction enterprises belonging to development zone management agencies	Ratings	1
	Whether the development zone management agencies have passed other ISO system certifications besides ISO14000 standards	Ratings	2

Assessment and evaluation of Shaanxi High-tech Industrial Development Zone

In order to regularize the assurance management of provincial high-tech industrial development zones and promote the high-quality development of such zones in the province, the Department of Science and Technology of Shaanxi Province, based on such policy documents as the Interim Measures on Administration of National High-tech Industrial Development Zones, Regulations on the Development of High-tech Industries in Shaanxi Province and others, and after evaluating the development of Shaanxi Province, formulated the Assessment and Evaluation Management Measures for Shaanxi High-tech Industrial Development Zones. The assessment and evaluation management work is organized and carried out by the Department of Science and Technology of Shaanxi Province in conjunction with the Provincial Development and Reform Commission, the Department of Industry and Information Technology, the Department of Natural Resources, the Department of Ecology and Environment, the Provincial Bureau of Statistics and other bodies. The evaluation is normally carried out once a year. The assessment and evaluation work will be entrusted to a third party by the Department of Science and Technology of Shaanxi Province. National high-tech zones directly adopt the evaluation results of the Ministry of Science and Technology.

The evaluation indicator system of Shaanxi Provincial High-tech Zone includes five primary indicators: park development capability; technical innovation capability; industrial development capability; sustainable development capability; and open cooperation and dissemination and driving effects, and 38 secondary indicators. The total score of the evaluation indicators is 100 points, including 80 points for quantitative indicators and 20 points for qualitative indicators. The scores allocated against the five primary indicators are 10, 30, 30, 15 and 15 points, respectively, and the primary indicators scores are further distributed to secondary indicators.

The evaluation will adopt relevant statistics and materials from the previous year. The evaluation method is based on the efficiency coefficient method, which calculates the comprehensive weighted sum to arrive at a comprehensive development score for each provincial high-tech zone, and the score is further calculated with the scores of the additions and subtractions to reach a final score. In the evaluation year, when the new high-tech zone is granted with national awards, additional points may be added accordingly, with a maximum of five points that can be added in a single evaluation year. If a major safety accident, or major environmental accident, or serious violation of the construction plan, or a major negative impact on society occurs in the evaluation year, the new high-tech zone will be graded as the last.

Table 3-9 Evaluation Indicator System of Shaanxi Provincial High-tech Zone

Primary indicators	Secondary indicators	Weights	Type of indicators
Park development capability (10%)	1.1 Cumulative development area	18%	Quantitative
	1.2 Number of registered businesses in the park	20%	
	1.3 Number of employees in the park	20%	
	1.4 Total industrial output value	22%	

Primary indicators	Secondary indicators	Weights	Type of indicators
	1.5 Evaluation of planning and infrastructure construction of the park	10%	Qualitative
	1.6 Evaluation of institutional innovation and effective functioning	10%	
Technological innovation capability (30%)	2.1 Proportion of people with a bachelor's degree or higher per 10,000 people	11%	Quantitative
	2.2 Proportion of corporate R&D expenditures to the main business income	13%	
	2.3 Proportion of new product sales revenue to the main business revenue	13%	
	2.4 Number of R&D institutions above the municipal level per 10,000 people	11%	
	2.5 Number of science and technology business incubators and co-work spaces above the municipal level	10%	
	2.6 Number of valid invention patents per 10,000 people	11%	
	2.7 Technology contract turnover per capita	11%	
	2.8 Interactions between government, enterprises, universities, research institutions, capital institutions, intermediary institutions, and market users, and evaluation of intellectual property protection in the park	10%	Qualitative
	2.9 Evaluation of policies introduced by the park and the local government to support the high-quality development of high-tech zones	10%	
Industrial Development Capability (30%)	3.1 Proportion of high-tech enterprises to the total number of enterprises	12%	Quantitative
	3.2 Business income per capita of the enterprises	11%	
	3.3 High-technology industry yield ratio	12%	
	3.4 Number of public listed companies per 10,000 people	10%	
	3.5 Number of science and technological SMEs per 10,000 people	11%	
	3.6 Gross output value per unit of land	13%	
	3.7 Industrial added value rate	11%	

Primary indicators	Secondary indicators	Weights	Type of indicators
	3.8 Evaluation of the progress of establishing a sound science, technology and innovation service system in the park	10%	Qualitative
	3.9 Evaluation of the development of high-tech industries (including strategic emerging industries) and the cultivation of innovation clusters in the park	10%	
Sustainable development capability (15%)	4.1 Growth rate in the number of enterprises	15%	Quantitative
	4.2 Growth rate of high-tech enterprises	15%	
	4.3 Proportion of enterprises with revenues exceeding 0.1 billion yuan to the total number of enterprises	18%	
	4.4 Taxation per unit of land	14%	
	4.5 Integrated energy consumption output ratio	18%	
	4.6 Evaluation of the performance of the park in implementing talent strategies and policies	10%	Qualitative
	4.7 Evaluating the liveability and the completeness of urban service functions of the park	10%	
Openness, cooperation and dissemination-driven role (15%)	5.1 Ratio of the total industrial output value of the high-tech zone to the total industrial output value of the city where it locates	17%	Quantitative
	5.2 Proportion of fixed assets investment of high-tech zones to the fixed assets investment of the city where it locates	17%	
	5.3 Proportion of the export value of high-tech zones to the export value of the city where they are located	16%	
	5.4 Proportion of Hong Kong, Macau, Taiwan and foreign-invested enterprises to the total enterprises in the high-tech zone	15%	
	5.5 Import/export volume	15%	
	5.6 Evaluation of support from local government	10%	Qualitative
	5.7 Evaluation of the demonstration, guiding and dissemination-driven effects of the park development on the city where it locates	10%	

The Evaluation Management Measures have established relevant mechanisms to ensure the effective promotion of the evaluation findings. An accountability system is established, under which the administrative committee of each high-tech zone is responsible for the authenticity, timeliness and validity of statistical data and related materials. In the event of false reports, no reports, or no submission of the required relevant materials, the evaluation score will be deducted accordingly and, in minor cases, the wrongdoings will be publicized; in more serious cases, the person in charge will be investigated. The reward and penalty mechanism is strengthened.

According to the results of the annual evaluation, a certain number of comprehensive incentives will be given mainly to the national high-tech zones that have improved notably in the national ranking, and the provincial high-tech zones ranked top of the overall ranking. Two provincial high-tech zones that ranked at the bottom and the last 10 national high-tech zones that ranked at the bottom in the national evaluation will be criticized publicly and required to rectify at due dates. In addition, in line with the principle that construction drives promotion, and based on the findings of the evaluation, provincial high-tech zones with a strong foundation and large scale, leading industries, remarkable innovation capacity and significant regional superiority will be chosen to promote and upgrade national high-tech zones.

Comprehensive evaluation of the Shanghai development zones

Since 2010, in order to encourage the Shanghai development zones to speed up their transformative development and encouragement of innovation, taking new industrialization as the main line of developing, and in accordance with requirements of the twelfth five-year plan of Shanghai industrial district, the Shanghai Municipal Economic and Information Technology Commission entrusted industrial associations with the regular conduct (once per year) of comprehensive evaluations of the city's development zones (parks) from the following standpoints: industrial development, resource utilization, innovation and development, and investment environment, in order to promote the sustainable development and refine the management of the zones.

Over the past ten years, under the guidance of the Shanghai Municipal Economic and Information Commission, the Shanghai Development Zone Association has cooperated with Listen (China) Industrial Park Think Tank in conducting a comprehensive evaluation of Shanghai development zones. According to the Measures for the Comprehensive Evaluation of Shanghai Development Zones (2017 edition), a total of 108 development zones, industrial bases and district and township industrial parks above the municipal level have been involved in the comprehensive evaluation of the Shanghai development zones in 2019, and the data for the evaluation are drawn from the annual statistical report of the industrial parks submitted by each zone in 2018.

The comprehensive evaluation of the Shanghai development zones is based on the working principle of a targeted, scientific and comprehensive approach, and the subjects of the evaluation are all relevant development zones in the city (other industrial bases, industrial blocks and industrial concentration zones will be evaluated as a cross-reference). The comprehensive evaluation indicator system comprises four indices of industrial development, resource utilization, innovation development and investment environment, 11 sub-item indices and 68 single-item evaluation indices. The comprehensive evaluation and ranking of development zones will be carried out by setting indicator weights and scoring benchmarks, respectively, and counting the comprehensive evaluation index and sub-index. Among them, the evaluation indicators related to social performance are shown in the table below.

Table 3-10 Weights of the social performance evaluation indicators for Shanghai development zones

Index	Weights	Sub-indices	Weights	Single indicator	Weights
Industrial development (1)	0.35	Economic scale (1.1)	0.4	.....	.....
		Development speed (1.2)	0.3	.....	.....
		(1.3) Development quality (1.3)	0.3	Sales profit margin of the park (1.3.1)	0.25
				Labour productivity per capita (1.3.2)	0.2
				Degree of agglomeration of leading industries in the park (1.3.3)	0.35
				Average labour compensation of employees (1.3.4)	0.2
Resource Utilization (2)	0.25	Intensive land use (2.1)	0.5	.....	.....
		Energy saving and emission reduction (2.2)	0.3	.....	.....
		Environmental protection (2.3)	0.2	.....	.....
Innovative development (3)	0.25	Strategic emerging industries and high-tech industrialization (3.1)	0.55	.....	.....
		(3.2) Science and technology innovation (3.2)	0.35	Number of patents owned by enterprises in the park (3.2.1)	0.15
				Proportion of R&D expenditure to main business income (3.2.2)	0.2
				Weighted total number of personnel selected for relevant national and municipal talent programmes (3.2.3)	0.3
				Proportion of employees with a college education or above (3.2.4)	0.1

Index	Weights	Sub-indices	Weights	Single indicator	Weights
				Proportion of R&D personnel (3.2.5)	0.05
				Number of R&D centres (institutions) (3.2.6)	0.1
				Number of technologically advanced service enterprises (3.2.7)	0.1
		(3.3) Innovation platform (3.3)	0.1	Whether a high-tech business incubator is established (3.3.1)	0.4
				Whether the SME financing promotion platform is established (3.3.2)	0.3
				Whether the capital service institution for new business is established (3.3.3)	0.3
Investment environment (4)	0.15	Industrial development environment (4.1)	0.4	Weighted total number of group headquarters and regional headquarters of Fortune 500 companies and listed companies in the park (4.1.1)	0.3
				Number of Fortune 500 companies in the park (4.1.2)	0.3
				Whether the park has an international open port (4.1.3)	0.1
				Infrastructure investment per unit area of the park (4.1.4)	0.3
		Management Service Environment (4.2)	0.6	Whether the park has completed the preparation of the regulatory detailed planning of the region where it is located (4.2.1)	0.1

Index	Weights	Sub-indices	Weights	Single indicator	Weights
				Whether it is certified as a national demonstration base for new industrialization industry (4.2.2)	0.2
				Whether it is a national development zone (4.2.3)	0.2
				Whether it is recognized as Shanghai famous brand park (4.2.4)	0.05
				Whether it is recognized as a functional district of Shanghai production-oriented service industry (4.2.5)	0.05
				Whether it is recognized as another type of national or municipal functional park (4.2.6)	0.05
				Whether the park management organization received ISO14000 and ISO9001 certification (4.2.7)	0.05
				Whether the park has set up a special development fund (4.2.8)	0.2
				Accumulated safe production time (4.2.10)	0.1

The full mark of the evaluation is 1,000, and each development zone is scored based on the calculation method set out below, where i represents a single indicator, j represents a development zone, X is the value of the indicator, A1, A2, A3, A4 represent full score, excellent value, general value, and zero scores corresponding to each indicator. bi is the weights of the indicator, Zij is the single indicator score of each development zone, and Zj is the total index score of each development zone.

Positive indicator Xi: that is, the higher the value of the indicator, the higher the score.

If Xi › A1, Zij=bi×1000

If A2 ‹ Xi ‹ A1, Zij={[(Xi-A2) / (A1-A2)]×0.2+0.8}×bi×1000

If A3 ‹ Xi ‹ A2, Zij={[(Xi-A3) / (A2-A3)]×0.2+0.6}×bi×1000

If A4 ‹ Xi ‹ A3, Zij={[(Xi-A4) / (A3-A4)]×0.6}×bi×1000

If Xi ‹ A4, Zij=0

Inverse indicator Xi: that is, the smaller the value of the indicator, the higher the score.

If Xi ‹ A1, Zij=bi×1000

If A1 ‹ Xi ‹ A2, Zij={[(A2-Xi) / (A2-A1)]×0.2+0.8}×bi×1000

If A2 ‹ Xi ‹ A3, Zij={[(A3-Xi) / (A3-A2)]×0.2+0.6}×bi×1000

If A3 ‹ Xi ‹ A4, Zij={[(A4-Xi) / (A4-A3)]×0.6}×bi×1000

If Xi › A4, Zij=0

In the current comprehensive evaluation indicator system, only the following five indicators are inverse indicators: comprehensive energy consumption per unit of added value (2.2.1), comprehensive energy consumption per unit of GDP (2.2.2), tap water consumption per unit of GDP (2.2.4), sulphur dioxide emission volume per unit of GDP (2.3.3), and chemical oxygen demand (COD) emission volume per unit of GDP (2.3.4).

Segmental indicator Xi: In the current comprehensive evaluation indicator system, only “comprehensive building density (2.1.6)” is a segmental indicator. The calculation method of this indicator is as follows:

If 0.35‹Xi‹0.45, Zij=bi×1000;

If Xi‹0.35 and calculated by positive indicator, A2=0.3, A3=0.25, A4=0.

If Xi›0.45 and calculated by inverse indicator, A2=0.5, A3=0.55, A4=1.

Zij = bi × 1000 when 0.35 ‹ Xi ‹ 0.45.

Qualitative indicator Xi:

If Xi=A1, Zij=bi×1000;

If Xi=A2, Zij=0.8×bi×1000;

If Xi=A3, Zij=0.6×bi×1000;

If Xi=A4, Zij=0

Total indices: Zj=∑Zij

Comprehensive evaluation of the resource-intensive utilization of industrial enterprises in Suzhou Industrial Park

Suzhou Industrial Park is located in the core position of the Yangtze River Delta city cluster, the economically most developed and most industry-intensive area in China, and land resources are a tough constraint for the development of the park. Accordingly, the concept of high-quality development, namely following the development principle of "seeking benefits from quality, and resources from space, and striving to improve the quality of introduced projects, unit investment intensity and building area ratio", has underpinned the entire development process of Suzhou Industrial Park.

In order further to enhance the unit resource output rate and accelerate the elimination of low-end inefficient production capacity, the Comprehensive Evaluation Measures for the Intensive Utilization of Industrial Resources in Suzhou (Pilot) (hereinafter referred to as "the Measures") were officially published in 2017.

The Measures propose the conduct of an evaluation of industrial enterprises with an area of more than three acres, and the enterprises will be divided into four categories for control and management. This evaluation will be conducted once a year and classified according to the evaluation score into category A (to be accorded development priority, with a comprehensive evaluation score of the highest 20 per cent), category B (to receive development support, with a comprehensive evaluation score of the highest 20–50 per cent), category C (to receive development enhancement, with a comprehensive evaluation score of the highest 50–90 per cent), and category D (to be restricted, with a comprehensive evaluation score in the bottom 10 per cent).

The Measures were put into practice in the year when they were issued. In respect of the four categories of enterprises classified by the evaluation, the Suzhou Industrial Park Management Committee has taken the following measures: for category A enterprises, key support has been provided for them to continue to improve their development quality; for category B enterprises, their production process innovation, transformation and upgrading have been supported; for category C and D enterprises, their transformation and upgrading have been supported; for category D enterprises ranked in the bottom 5 per cent, arrangements have been made for the gradual implementation of differentiated prices of water, electricity and gas, sewage treatment fees, paid use and trading pricing of pollutant discharge right, and other services, to impel them to make the necessary technical rectifications or for them to face being shut down.

Table 3-11 Comprehensive evaluation indicator system of resource-intensive utilization of industrial enterprises in Suzhou Industrial Park

Indicators	Weights	Remarks
Taxation revenue per acre (Paid tax/ covering area)	30%	In order to avoid a single indicator under this category having excessive impacts on the comprehensive evaluation results of enterprises, the maximum score of every single indicator is capped at 1.5 times the benchmark score, and the minimum score is zero. If the data of this evaluation index are not available, this indicator is scored as zero. The evaluation score of this type of indicator of the participating enterprise is calculated by dividing the evaluation value by the benchmark value, and then multiplied by the benchmark score of this type of indicator.

Indicators	Weights	Remarks
Average sales per acre (sales revenue/covering area)	20%	Same as above
Total labour productivity (Value added/ average number of employees)	15%	Same as above
Proportion of R&D expenditure to sales volume (R&D expenditure/sales revenue)	15%	For enterprises having R&D expenditure data, the one with the highest value of "proportion of R&D expenditure to sales" indicator obtains the benchmark score, while other enterprises will be scored by dividing the value of "proportion of R&D expenditure to sales" by the highest value of this indicator and then multiplied by the benchmark score. Enterprises without R&D expenditure data will get zero points.
Value added per unit of energy consumption (Value added/ total energy consumption)	10%	The enterprise with the highest evaluation value of "value added per unit of energy consumption" indicator obtains the benchmark score, and other enterprises are scored by dividing the evaluation value of "added value per unit of energy consumption" indicator by the highest value of this indicator and then multiplied by the benchmark score. Zero points are given to those enterprises without sales data.
Value added per unit major pollutants (Value added/total equivalent of major pollutant emissions)	10%	For enterprises having equivalent data of major pollutants, the enterprise with the highest evaluation value of "added value per unit of major pollutant" indicator will get the benchmark score, and other enterprises will be scored by dividing the evaluation value of "added value per unit of major pollutant" indicator by the highest value of this indicator and then multiplied by the benchmark score. Enterprises without major pollutant equivalent data will obtain benchmark scores if having sales data, and if no sales data they will score as zero.

Analysis of the indicator system of Qingdao Sino-German Ecopark

The Sino-German Ecopark is the first sustainable development demonstration project jointly built by the Chinese and German Governments. Since the construction of the park started in July 2013 and focusing on the development vision of "an ideal environment, green development and a good life", the park has initiated pilot projects in environmentally friendly construction, green development, reform and innovation, and achieved remarkable results. So far, the park has been recognized as one of the first batch of low-carbon town pilots, the first comprehensive standardized demonstration park, an International Innovation Park of National Green Manufacturing, a National Smart City Pilot, a National Green Manufacturing International Innovation Park, a National Smart City Pilot, a National Green Ecological Demonstration City, one of the batch of National New Energy Demonstration Parks, one of the first batch of National Intelligent Manufacturing Lighthouse Parks, and other distinctions.

In 2012, the Sino-German Ecological Park established a set of indicators comprising 40 items in four categories: economy, society, environment and resources, which serves as a guide for the overall planning and construction of the park in order to attain an innovation-oriented management mode following a standardized approach. Grounded on the two key factors of ecology and demonstration, this set of indicators represents a quantitative indicator system used to promote the balanced development of the environment, society, resources and economy in four dimensions, and to ensure that the quantitative indicators of sustainable development are operating and reliable through practice.

After five years of tests during construction over more than 2 million square metres of the park, it was established proved that the indicator system is in line with the international and domestic trends of sustainable urban development and can be implemented, replicated and promoted.

In 2017, the management committee of the Sino-German Ecological Park set the goal of creating an international first-class park and gradually carried out the evaluation and upgrading of indicators, laying the foundation for green ecological construction.

Among the 40 evaluation indicators of the indicator system, there are 34 control indicators and 6 guiding indicators, among which the control indicators are divided into the four categories of economic optimization, environmental friendliness, resource saving and inclusive development. In addition to the control indicators, there are six guiding indicators: improvement of ambient air quality, high-level construction of the intelligent system in the park, prioritized development of emerging marine industries, symbiosis of local industries and comprehensive support, promotion of the green design approach and outstanding marine culture characteristics.

Table 3-12 Indicator system of the Qingdao Sino-German Ecological Park

Evaluation dimension	Primary indicators	Secondary indicators	Indicator values of 2020
Economic optimization indicators	Reduction of production emissions	Carbon emission intensity per unit of GDP	S180 tCo 2/million US$
		Audit implementation and the inspection acceptance rate of enterprise clean production	100%
		COD emission volume per unit of industrial added value	≤0.8kg / 10,000 yuan
	Improve utilization efficiency	Industrial waste energy recovery rate	≥50%
		Tap water consumption per unit of industrial added value	≤7 m3/10,000 yuan
		Industrial water reuse rate	≥75%
	Transformation of industrial structure	SME policy index	5
		Proportion of R&D investment to GDP	≥4%

Evaluation dimension	Primary indicators	Secondary indicators	Indicator values of 2020
Environmentally friendly indicators	Balance of suitable for living and industry	Green space area per capita	30 square metres/ person
		Rate of compliance with environmental quality standards for surface water in the district	100%
		Average value of regional noise	Daytime average value: 55dB(A) Night average value: 45dB(A)
		Rate of compliance of the city outdoor lighting functional areas	100%
	Reduce construction impact	Proportion of original landscape and texture protection within the park	40%
		Green construction ratio	100%
	Conservation of biodiversity	Proportion of plants of food source tree species for birds	35%
Resource conservation indicators	Promote source reduction	Proportion of green buildings	35%
		Daily domestic water consumption per capita	≤100L/ (person-day)
		Daily domestic waste generated per capita	≤0.8kg/ (person-day)
		Building contract energy management rate	100%
	Carry out the utilization of various resources	Proportion of distributed energy supply	≥60%
		Renewable energy use rate	≥15%
		Utilization rate of non-traditional water resource	≥50%
		Recycling rate of garbage	≥60%
	Improve the facility system	Proportion of green travel	≥80%
		Intelligence coverage of buildings and municipal infrastructure	100%
		Proportion of roads excavated in a time frame of at least five years	100%
		Decontamination rate of hazardous waste and household waste	100%

Evaluation dimension	Primary indicators	Secondary indicators	Indicator values of 2020
Inclusive development indicators	Shared happy community	People's happiness index	≥90 points
		Proportion of areas with complete and convenient public service facilities within walking distance	100%
		Proportion of residential areas with public green space within five minutes' walking distance	100%
		Proportion of affordable housing to the total housing stock	≥20%
		Social insurance coverage of local residents	100%
	Strengthened exchange and cooperation	Number of hours of vocational skills training for working-age population	≥25 hours/year
		Frequency of Sino-German international exchange activities	≥ once/year

Box 6: Literature reviewed and evaluating the social performance of industrial parks in China

Relatively systematic and abundant research has been conducted on the social performance and social impact of the development of industrial parks such as development zones and high-tech zones in China. In their research, Chinese scholars have looked, among other areas, at the impact of industrial park development and construction on urban and rural development, enterprise development and H development.

The industrial parks have multiple impacts on urban and rural development. The positive impacts include increased fiscal revenue, population growth, the advancement of urbanization, construction of public service facilities, development of education and science and technology, development of urban culture, and beneficial exploration of promoting comprehensive institutional reform, while the negative impacts include the accentuation of ethnic differences and the class divide in urban social systems.

Li Xiaodong, Qin Wenyan and others have analysed the current economic development of industrial parks in Nanning City and concluded that industrial parks have promoted the gradual growth of the revenues of national and autonomous regions, accelerated the pace of urbanization, driven the growth of employment, promoted the development of science and technology education, and provided conditions conducive to the furthering of comprehensive institutional reform.[1]

Li Yan believes that the agglomeration of population and settlements brought about by the development of such zones has accelerated the processes of urbanization, and the concentration of advanced talents in the zones has helped to create a scientific corporate culture and community culture, which has promoted the development of urban culture.[2] Based on a survey of communities around Shanghai Minhang Development Zone, Kong Xiang finds that the expansion of non-agricultural populations during the development of the zone has promoted the expansion of urban space and the development of an increasingly complex social space of communities around the zones. The social structure of these areas has been gradually transformed, and the original lifestyles of residents has been changed.[3]

Wang Hui has conducted an empirical study taking Xi'an city as an example, and concluded that the differences in the quality, composition and income levels of practitioners in the industries of the so-called "new economy" and in other industries in the development zones have brought about the accentuation of ethnic differences and the class divide in urban social systems, and the development and construction of residential buildings in the development zones have played a role in triggering and driving the segregation of the living space of social classes of different income levels.[4]

The influences of industrial parks on the development of enterprises mainly include providing training, scientific research services and talent support to enterprises. In an analysis of Changzhou Higher Vocational Education Park as an example, Jiang Xiaoming finds that the park not only provides a large number of employment positions and education for academic upgrading for the general public but also provides various types of training and scientific research services to enterprises[5]. For their part, Huang Hua, Zhang Wenxia and others believe that the introduction of high-end talents to meet the needs of the development zone has effectively promoted the development of enterprises in the zone.[6]

The influences of development zones on the development of individuals mainly include promoting growth in the income of practitioners and improving their skills, in such areas as providing employment guidance, employment training, teaching production skills and management methods, and enhancing the overall competitiveness of individuals in the market. In their research, taking Bamboo Science and Technology Park as an example, Shen Yueqin, Zhang Xiaoyan and others conclude that the social benefits of the park are demonstrated by its impact on increasing residents' income and narrowing the income gap.[7]

Huang Hua, Zhang Wenxia and others believe that the growth of the development zone has a positive driving effect on the surrounding residents, among which such factors as livelihood security and welfare of the people are specifically addressed in the construction of public service facilities, employment guidance, training and the absorption of rural populations in and around the area. Taking the agricultural science and technology park as an example, Jiang Heping and Cui Kai conclude that the park had improved the comprehensive market competitiveness of farmers by leading the surrounding farmers to apply new technologies to improve production efficiency, and by teaching production skills and management methods to these farmers.[8]

Where the evaluation of the social performance and social impact of the park is concerned, existing studies mostly construct evaluation indicator systems and conduct quantitative research with the use of analytical methods such as analytic hierarchical process and fuzzy comprehensive evaluation

methods. The existing studies mainly focus on the evaluation of the social benefits and sustainable development capacity of the park, the social benefits to enterprises and individual projects introduced into the park, and the evaluation indicators are primarily cover the following dimensions: the impact of the park development on urban and rural development, enterprise and industry development, and personal development.

Taking Guangdong Science and Technology Park as an example, Ning Ling, Ma Naiyi and others explore the system for the evaluation of the sustainable development capability of parks based on four dimensions: economic, technological, environmental, and social. In the social dimension, they select indicators of social aspects influencing the sustainable development capability of the science and technology parks, including human resources foundation, government support degree, the completeness degree of urban facilities and the degree of openness of the city.[9]

Taking Nanjing Chemical Park as an empirical case, Tao Jinguo, Gao Juemin and others construct an indicator system for evaluating the sustainable development capability of chemical park enterprises. The indicators of social sustainability include the four secondary indicators of product safety, ability to protect workers' rights and interests, community and social service capacity, and supply chain management.[10]

Based on the impact of chemical parks on farmers' welfare, Ge Jihong, Yang Sen and others have selected five aspects – family economic status, living environment status, health status, community public facility conditions and psychological status – to construct a functional activity set to express and evaluate farmers' welfare[11].

Xie Linghong and Lu Kaiyu construct the performance evaluation indicator system of agricultural science and technology parks from three dimensions: agricultural upgrading, rural development and farmers' improvement, among which rural development and farmers' progress are more relevant to the social performance of the parks. For example, in rural development, their evaluation focuses on the park's ability to drive rural economic development and infrastructure construction, and in farmers' improvement, it evaluates the park's effects in driving the rise in farmers' income and employment, and the results in improving farming quality through education and training and popularization of common science[12].

Yang Qiu-Lin believes that the social benefits of agricultural science and technology parks in China are mainly reflected in the training of farmers, dissemination and diffusion of new technologies, among other processes. For the evaluation of social benefits, he selects the number of annual technical items trained and the number of farmers trained, the number of trained farmers awarded scientific and technological qualification certificates, and the area of high-tech demonstration and promotion as the evaluation indicators[13].

In their analysis, Guo Yuntao and Jia Yong construct an evaluation indicator system for the project introduced into the science and technology parks in Shaanxi Province. From the dimension of project comprehensive benefits, their evaluation considers the project's social benefit and applies such evaluation indicators as social employment rate, industry competitiveness enhancement rate, and innovation demonstration effects.[14]

References (in Chinese only)

1. Research Group of Nanning National High-tech Industrial Development Zone, Li Xiaodong, Qin Wenyan and Peng Tong, "Industrial zones and the development of an urban economy society – a case study of the industrial zone economy in Nanning", Reformation and Strategy, 2008, No. 5, pp. 94–100.

2. Li Yan, "Study of the mechanism and degree of influence of the construction of the development zone on economic and social development in Changsha" dissertation, Hunan Normal University, 2011.

3. Kong Xiang, "Economic and technological development zone construction and suburban socio-spatial differentiation: based on the survey on Minxing District", Urban Problems, 2011, No. 5, pp. 51–57.

4. Wang Hui, Rise of new special development zones and polarization of socio-economic space in Xi'an", Acta Geographica Sinica, 2006, No. 10, pp. 1011–1024.

5. Jiang Xiaoming, "Exploration on the path of higher vocational colleges serving local social development – taking Changzhou Higher Vocational Education Park as an example", China Adult Education, 2014, No. 24, pp. 93–95.

6. Huang Hua, Zhang Wenxia and Cui Yani, "Evaluation and Countermeasures of Industrial and City Integration in Development Zones against the background of transformation and upgrading – taking Shaanxi as an example", On Economic Problems, 2018, No. 11, pp. 110–114.

7. Shen Yueqin, Zhang Xiaoyan and Wang Xiaoling, "Economic and social benefits of Bamboo Sci-tech Park – a case study of Zhejiang Province", Journal of Bamboo Research, 2012, vol. 31, No. 4, pp. 39–45.

8. Jiang Heping and Cui Kai, "Analysis of the principles of the agricultural science and technology park driving the construction of a new socialist countryside", Science and Technology and Economy, 2010, No. 23, pp. 61–65.

9. Ning Ling, Ma Naiyi and Zhao Fangyuan, "Evaluation of the capability of sustainable development of science and technology parks based on the AHP-FCE method – taking Guangdong science and technology park as an example", Science and Technology Management Research, 2017, vol. 37, No. 15, pp. 57–61.

10. Tao Jinguo, Gao Jue Min, Wang Xue and Du Zhen Zhen, "Study of the evaluation of enterprises' capability for sustainable development in the chemical industrial park – questionnaire-based survey of enterprises in Nanjing Chemical Industry Park", China Industrial Economics, 2013, No. 8, pp. 148–159.

11. Ge Jihong, Yang Sen and Xu Huijun, "Fuzzy evaluation of the impact of chemical parks on the welfare of farmers in surrounding areas – based on Sen's feasible capacity and multidimensional welfare measurement model", Jiangsu Agricultural Science, 2017, vol. 45, No. 10, pp. 312–315.

12. Xie Linghong, Lu Kaiyu and Xia Ying, "Performance evaluation and improvement direction of agricultural science and technology parks from the perspective of rural revitalization – taking 106 national agricultural science and technology parks as examples", Forum on Science and Technology in China, 2019, No. 9, pp. 162–172.

13. Yang Qiulin, "Proposal on establishing a quality and efficiency evaluation indicator system for agricultural science and technology parks in China", China Agricultural Comprehensive Development, 2003, No. 2, pp. 16–19.

14. Guo Yuntao, Jia Yong and Bai Sijun, "Research on the construction of an indicator system for the introduction of a project in the Science and Technology Park of Shaanxi Province", Science and Technology Management Research, 2017, vol. 37, No. 24, pp. 88–92.

3.2 Research into park performance evaluation indicators by other international organizations and countries

3.2.1 Evaluation indicator system of the eco-industrial park by international organizations

3.2.1.1 United Nations Industrial Development Organization

In 2017, to formulate the concept and international understanding of eco-industrial park, the World Bank, the United Nations Industrial Development Organization (UNIDO) and the German Agency for International Cooperation (GIZ) developed a general indicator system and jointly prepared their International Framework for Eco-Industrial Parks after evaluating conditions in a variety of regions, with a mission to improve the sustainability of industrial development and to provide guidance to industrial parks that aimed to transition into eco-industrial parks through the adoption of environmental and social targets beyond compliance with prevailing national regulations. Since such transitions would be viable for industrial parks that are financially sound, economic targets focused on expanding linkages with the broader industrial fabric and the communities where the parks are located. The guidelines were updated in 2021, with a version 2.0 available at https://www.unido.org/sites/default/files/files/2021-04/An%20international%20framework%20for%20eco-industrial%20parks%20v2.0.pdf. This document has used the indicators in version 1 issued in December 2017 (https://www.unido.org/sites/default/files/files/2019-09/An%20International%20Framework%20for%20Eco%20Industrial%20Parks.pdf)

(a) Qualitative criteria: prerequisites

It is clearly specified in the Framework that the construction of eco-industrial parks must meet certain prerequisites, mainly covering requirements at the park management, environmental construction, society and economy levels, before it can be subject to the quantitative indication evaluation.

Table 3-13 Prerequisites for construction of eco-industrial parks

Park management	Park management service	Park management entity
		Park property, common infrastructure and services
	Monitoring and risk management	Monitoring performance and risk prevention
		Understanding of applicable standards and specifications
	Regional planning	Master plan
Environmental construction	Management and monitoring	Environmental/energy management system
	Energy	Energy efficiency
		Exchange of waste heat energy
	Water	Water efficiency, reuse and recycling
	Climate change and the natural environment	Air and greenhouse gas emissions and pollution prevention
		Environmental assessment and ecosystem services
Society	Social management systems	Management team
	Social infrastructure	Primary social infrastructure
Economy	Employment generation	Type of employment
	Local businesses and SME promotion	Small and medium-sized enterprises (SME) development
	Economic value creation	Market demand for EIP services and infrastructure
		EIP meets the economic interests of the government

(b) Quantitative criteria - indicator evaluation

After the qualitative indicator evaluation is completed, the park is subject to the quantitative indicator evaluation. It is specified in the Framework that the development performance of an eco-park is also evaluated at the park management, environment, society and economy aspects. The development performance evaluation at the social level mainly includes the social management system, social infrastructure and extension of local community service.

Table 3-14 Specific quantitative indicators for construction of eco-industrial parks

Performance indicators	Level 1 indicator	Specific performance indicator requirements
Park management	Park management service	Proportion of firms in the industrial park to have signed a residency contract/park regulations/code of conduct
		Resident firms indicate satisfaction with regard to the provision of services and common infrastructure by the park
	Monitoring and risk management	Park management entity regularly monitors and prepares consolidated reports regarding the achievement of target values (as documented in the Framework) to encompass the following: environmental performance, social performance, economic performance, and critical risk management at the level of the park
Environment	Management and monitoring	Proportion of resident firms with more than 250 employees, which have an environmental/energy management system in place that is in line with internationally certified standards
	Energy	Proportion of level 1 energy consumption in comprehensive facilities and enterprises in the park
		Total renewable energy use in the park is equal to or greater than the annual national average energy mix
		Park management entity sets and works toward ambitious (beyond industry norms) maximum carbon intensity targets (maximum kilograms of carbon dioxide equivalent (kg CO2e) / kilowatt-hour (kWh) for the park and its residents
		Park management entity sets and works toward ambitious maximum energy intensity targets per production unit for the park and its residents
	Water	Total water demand from firms in the park has no significant negative impact on the local water sources or local communities
		Proportion of industrial wastewater generated by an industrial park and resident firms, which is treated to appropriate environmental standards
		Proportion of total industrial wastewater from firms in the park is reused responsibly within or outside the industrial park

Performance indicators	Level 1 indicator	Specific performance indicator requirements
	Water and material use	Proportion of solid waste generated by firms, which is reused by other firms, neighbouring communities, or municipalities
		Proportion of firms in the park, which appropriately handle, store, transport and dispose of toxic and hazardous materials
		Maximum proportion of wastes generated by firms in the industrial park which go to landfills
	Climate change and the natural environment	Minimum proportion of open space in the park used for native flora and fauna
		Proportion of firms in the park which have pollution prevention and emission reduction strategies to reduce the intensity and mass flow of pollution/emission release beyond national regulations
		Proportion of the largest polluters in an industrial park which have a risk management framework in place
Society	Social management system	Percentage of all firms in the industrial park with more than 250 employees that have a well-functioning occupational health and safety management system in place
		Percentage of grievances received by the park management entity which are addressed within 90 days
		Percentage of grievances received by the park management entity, which were brought to conclusions; percentage of all firms in the industrial park with more than 250 employees that have a code of conduct system in place to deal with grievances
		Percentage of all firms in the industrial park with more than 250 employees that have a harassment prevention and response system in place
	Social infrastructure	Percentage of surveyed employees' reporting satisfaction with social infrastructure in the park
		Percentage of reported security issues that are adequately addressed within 30 days
		Percentage of all firms in the industrial park with more than 250 employees with a programme for skills/vocational training and development
		Percentage of female workforce who benefit from available supporting infrastructure/programmes for skills development

Performance indicators	Level 1 indicator	Specific performance indicator requirements
	Extension of local community services	Over 80 percent of the surveyed community members are satisfied with the community dialogue
		Number of outreach activities implemented by the park management entity annually that are regarded as positive by over 80 percent of the surveyed community members
Economy	Creating job opportunities	Percentage of total workers employed in the industrial park who live within daily commuting distance
		Percentage of total firm workers in industrial park employed through direct employment and permanent contracts
	Improving local businesses and SMEs	Percentage of resident firms using local suppliers or service providers for at least 80 percent of their total procurement value
		Percentage of total procurement value of park management entity supplied by local firms or service providers
	Creating economic value	The ratio of rented or used space by resident firms compared to the total amount of available space earmarked for resident firms within industrial parks

(c) Social performance requirements

The eco-industrial parks shall ensure the implementation of good social management practices, including decent social management, social and community infrastructure, and shall maintain good relations with local communities.

The primary goal of social performance requirements is to gain recognition among the park and the community residents. In addition to compliance with national regulations, there are many important considerations and social factors. The social performance requirements of eco-industrial parks and their level 2 and level 3 indicators are as follows. The evaluation indicator system helps to achieve social performance expectations, although it may need to adapt to the local specifications and industry benchmarks.

Table 3-15 Social performance evaluation indicator

Level 2 indicator	Level 3 indicator	Description	Scoring criteria	Target value
Social management system	Occupational health and safety management system	Firms in the industrial park should have an OHandS management system in place (based on ISO 18001 standard), keep records about rates of injury, occupational diseases, absenteeism, as well as total numbers of work-related fatalities	Percentage of all firms in the industrial park with more than 250 employees that have a well-functioning OHandS management system in place	Enterprise percentage 75%
	Grievance management	Grievance mechanism should be in place and accessible to receive and address grievances from within the industrial park, as well as outside the park from external stakeholders Examples include help desks, complaint boxes, and hotlines (phone booths) located inside and outside of the industrial park	Percentage of grievances received by the park management entity, which are addressed within 90 days	100%
			Percentage of grievances received by the park management entity, which were brought to conclusions	60%
			Percentage of all firms in the industrial park with more than 250 employees that have a code of conduct system in place to deal with grievances	Percentage of firms 75%
	Clear response to complaints and harassment	Response system should be in place	Percentage of all firms in the industrial park with more than 250 employees that have a harassment prevention and response system in place	Enterprise percentage 75%
Social infrastructure	Primary social infrastructure	Social infrastructure should meet the norms and requirements of the workforce and client expectations	Percentage of the surveyed employees' reporting satisfaction with social infrastructure	Satisfaction percentage 80%
	Industrial park security	Industrial park has security systems and services that are fully operational and fit-for-purpose operation. Examples include, among others: appropriate lighting systems in and around the park, closed-circuit television (CCTV) systems, a centralized security office, and night transportation provisioning	Percentage of reported security and safety issues that are adequately addressed within 30 days.	Report percentage 100%

Level 2 indicator	Level 3 indicator	Description	Scoring criteria	Target value
	Capacity building	Programmes for skills training and development by employee category are in place, with a particular emphasis on equal opportunity. Examples include training and skills development programmes and women entrepreneurship development programmes	Percentage of all firms in the industrial park with more than 250 employees with a programme for skills/ vocational training and development	Enterprise percentage 75%
			Percentage of female labour force benefiting from existing supporting infrastructure/ programmes	Percentage of the female workforce ≥ 20%
Local community advocacy	Community dialogue	Provision of established accessible communication platforms or other means to maintain regular dialogue with the community and relevant civil society organizations. Examples include news bulletins, regular media releases, and information display boards	Over 80 percent of the surveyed community members are satisfied with the community dialogue	Percentage of surveyed community members 80%
	Community outreach	The park management entity and resident firms engage in community outreach activities and maintain documentation. These activities could include: an annual day with celebrations inside the park; clean-up drives or public service activities that are organized in the community areas by the park management; infrastructure for community areas (for instance, drinking water supply, sanitation)	The number of outreach activities implemented by the park management entity annually that are regarded as positive by over 80 percent of the surveyed community members	80% Satisfaction percentage 80%

In the Framework, the social performance component, including level 2 indicators of the social management system, social infrastructure and local community dialogue, is mainly reflected in the capacity-building and professional care for employees in the park, social responsibility, enterprise satisfaction, local economic support, among other areas. Together with the detailed prerequisite requirements and attention to the park management body, this embodies the humane care of international standards.

World Bank

The World Bank is an international financial institution of the United Nations system that provides loans for capital projects in developing countries, with the official goal of poverty eradication. In 2011, the World Bank published Cluster-Based Industrial Parks: A Practical Framework for Action, which explores the phenomenon of the accelerated development of industrial clusters and framework for action to address the key associated issues. The EIP Framework looks at the reasons why many existing special economic zones have not achieved the expected results, which provide some practical guidance for the development of those cluster-based industrial parks. In 2013, the World Bank conducted a strategic environmental assessment for the industry sector of Himachal Pradesh, in India, with the aim of helping the local industrial sector reduce industrial waste and providing economic development recommendations.

In recent years, the World Bank has attached great importance to the sustainable development of industrial parks and carried out promotion and pilot work for industrial parks in many countries around the world, with special attention to the development and evaluation of eco-industrial parks, which has played an important role in promoting the green ecological development of industrial parks. For example, the World Bank is cooperating with Jiangxi Province in China to prepare the demonstration project of Green Park renovation and upgrading in Fuzhou High-tech Zone, which is the first experience of the adoption of the EIP Framework in China. The World Bank also supported the development of the Xuancheng Economic and Technological Development Zone in China's Anhui Province, designed to improve economic, social and environmental sustainability by providing finance, improving investment promotion and developing real-time environmental monitoring.

In 2019, in response to the development status of China's industrial parks, the World Bank published a report entitled: "Strengthening the regulatory framework of eco-industrial parks in China: comparative analysis of Chinese and foreign green standards". The report compares the Chinese green standards and the EIP Framework across all four dimensions – park management and economic, social, and environmental performance – to identify differences and share policy recommendations for further improvements of the Chinese standards. The main differences identified between the Chinese green standards and the EIP Framework are shown in the following table.

Table 3-16 Main differences between the Chinese green standards and the EIP Framework [1]

Park management	General vs. specific requirements:	Chinese standards formulate more general requirements for park management, while the EIP Framework sets more specific requirements.
	Implicit vs. explicit requirements	Many prerequisites included in the EIP Framework are not explicitly listed in the Chinese standards.

1 Resource of the table: *Enhancing China's Regulatory Framework for Eco-Industrial Parks: Comparative Analysis of Chinese and International Green Standards*

Environmental performance	Result-based vs. process-based assessment	The Chinese standards are results-oriented and focus more on the ultimate impact in terms of pollution reduction or resource efficiency. On the other hand, the EIP Framework focuses more on the systems and processes established for pollution control and resource efficiency.
Social performance	Implicit vs. explicit requirements	Some EIP Framework requirements in the social performance section are not part of the Chinese standards.
	Moral standards vs. legal requirements	Harassment-related and women-right-related requirements are different between the Chinese standards and the EIP Framework.
	Beyond regulatory consideration	Requirements on occupational health and safety (OHandS) management systems, community dialogue and community outreach are not part of the Chinese standards.
Economic performance	Economic standards vs. socioeconomic standards	The evaluation criteria used by the Chinese standards focus on the economic output of industrial parks, mainly GDP, while the EIP Framework assesses the overall socioeconomic performance of industrial parks going beyond the park level.

The analysis shows that the differences between the Chinese green standards and EIP standards are largely due to differences in assessment methods, rather than to weaknesses in the Chinese regulatory framework. The Chinese standards seem to be quite comprehensive, covering the key requirements for evaluating and promoting of eco-industrial parks. They could, however, be further improved by strengthening the incentive mechanism for industrial parks and other ways to move closer towards the EIP Framework.

The case study of the first application of the EIP Framework in China by the Fuzhou High-Tech Zone in Jiangxi Province shows that Chinese industrial parks may face several challenges in moving toward EIP standards. The key challenges include lack of data, incomplete infrastructure and insufficient incentives. In view of the above challenges, workable suggestions are put forward for further upgrading the regulatory framework of China's eco-industrial parks, such as strengthening the incentive mechanism for promoting green certification of industrial parks, further optimizing the financing convenience and broadening the financing channels.

The report concludes by sharing policy recommendations that the Chinese authorities could consider to further improve the green standards and promote green industrial parks. The recommendations include the following items:

- Introduce more ambitious targets to increase the number of eco-industrial parks
- Consider consolidating, updating and streamlining EIP standards
- Seek an optimal set of indicators to balance economic competitiveness and environmental protection

- Improve data collection and analysis systems to track park performance of industrial parks against domestic and international EIP standards and expand access to information
- Strengthen enforcement of existing regulations
- Consider adopting a specific act on industrial park management
- Leverage green finance for EIP development

German Agency for International Cooperation

The German Agency for International Cooperation (GIZ) is a federal enterprise committed to international cooperation on sustainable development all over the world. It supports the German Federal Government in achieving its goals of international cooperation for sustainable development in more than 130 countries around the world. GIZ has carried out a large number of global projects in promoting the ecological development of industrial parks, and set up some methodological frameworks.

Within the context of the Indo-German Environment Partnership programme of the Indo-German Development Cooperation, GIZ published a report entitled "Planning for sustainable industrial parks – environmental quality, technical quality, economic and social quality". This report provides an introduction to the siting and site master planning of green industrial parks in India, along with two case examples of industrial parks that have acquired pilot status under the Indo-German Environment Partnership Programme. The document Planning for Sustainable Industrial Parks compiled by GIZ describes the key indicator parameters of the green industrial park, which are related to the following items:

- Economic quality: land value development
- Technology quality: renewable energy and energy efficiency
- Environmental quality: waste management, rainwater management, climate change adaptation
- Quality of social functions: social quality and infrastructure, gender considerations, health and comfort and user satisfaction
- Administrative quality: administrative infrastructure, service delivery, organizational structure

In the report on planning for sustainable industrial parks, GIZ has designed a customized eco-industrial park strategy for India, which integrates eco-industrial park sustainability standards with international frameworks through site master plans. Specifically, six quality standards have been set for industrial parks in India, in the areas of economy, environment, society, infrastructure and services, management, and application of laws and regulations, to judge the degree of ecological development of industrial parks. Green indicators have been specially designed for industrial parks in India. The indicators for planning green industrial parks in India include:

- Technical facilities: commercial facilities, buildings, new energy/energy efficiency
- Environmental facilities: storm water management, wastewater management, solid waste management, open space and landscaping
- Social facilities: education and training, gender, health care, staff recreation facilities, public restrooms, dining facilities

Table 3-17 Green indicators of Indian industrial parks

Green indicators	Indicator description
Zoning	Zoning – industries were appropriately grouped in different zones in accordance with their pollution potential. No-polluting industry zones were located at the boundaries of the industrial park to act as a buffer.
Block and graph sizing	Each region is further divided into blocks and graphs. The size of the plot depends on the requirements of the entrepreneur.
Plot direction	The plots are oriented to take advantage of climatic and microclimatic conditions for better natural ventilation and light.
Road network	The road hierarchy is established to realize the proper circulation of goods and passenger cars. The road cross-section is customized according to the requirements of the power industry, including power lines, water pipelines, sewer pipelines, trees, storm drains, bicycle lanes, sidewalks, etc. The park has access control. Signs are integrated along the road.
Eco-efficient Transportation	Provision is made for workers to be transported internally and externally from the nearest public transportation hub. Facilities such as battery-operated vehicles, bus shelters, and bus terminals are provided for transportation. In addition, facilities are also provided for bicycle paths and sidewalks with shade trees.
Parking space	The park has adequate parking space at the park level, subdivision level and parcel level. Truck drivers provide restroom and food facilities for dormitories, auto shops and maintenance/service areas.
Others	Security, fencing, fire regulations, signature structure, etc.
Public utilities	Transmission lines and substations; water transmission, treatment, adequate storage and distribution networks; and telephone lines and telecommunications networks.
Building structure	Green building, controlling the use of materials and colour schemes.
Energy efficiency	Provisions on the use of renewable energy and energy efficiency.
Environmental infrastructure	Environmental infrastructure provisions, including rainwater drainage, treatment and recycling; wastewater management including conveyance, treatment and recycling; solid waste management including treatment and recycling/reuse; and greening grades, including landscaping, avenue planting and buffer zones.
Social infrastructure	Provisions for social facilities to meet the needs of employees, female employees, health care, public restrooms, food facilities, recreational and socio-cultural infrastructure, etc.

European Union

European Union eco-industrial parks attach great importance to internal management. Most of the existing eco-industrial parks are planned and built by the government. Research institutions or governments of six European Union countries (Finland, Germany, Netherlands, Portugal, Spain and Sweden) have specially formulated an initiative known as the "Ecopadev plan" to strengthen government guidance and park management, and coordinate the joint development of eco-industrial parks within European Union countries. The Ecopadev plan promotes the change of urban planning policies in the industrial and commercial sectors through the development of decision-making tools and methods based on the development of eco-industrial parks, so as to achieve greater sustainability, improve the quality of life and improve ecological efficiency. The plan is based on a survey of more than 40 existing parks in the European Union and provides general guidance for the management of the Union's eco-industrial parks.

World Wide Fund for Nature

The World Wide Fund for Nature (WWF) is one of the world's most prestigious and independent non-governmental environmental protection organizations. Since its establishment in 1961, WWF has been committed to the cause of environmental protection, with a project network of more than 100 countries around the world.

In recent years, China has introduced a number of measures and standards to guide and regulate the construction and operation of industrial parks. In order to facilitate the implementation of measures and standards and promote the implementation of ecological civilization construction in the industrial field, WWF has drawn on global experiences and standards of water management innovation and compiled the Industrial Park Water Management Innovation Practice Guide, in collaboration with Tsinghua University, Tongji University, Nanjing University of Information Engineering, Shanghai Academy of Social Sciences and Jiangsu Engineering Consulting Centre. Through the promotion of innovative practices and platform building, the guide recommends the manner in which the industrial park management committee, park enterprises, and environmental protection enterprises, financial institutions, NGOs and other stakeholders may participate in the water management innovation projects of the industrial park. By encouraging enterprises in the park to learn from successful cases and explore green modes of public-private participation, the water management level and water resource utilization efficiency of the park and enterprises can be improved. To that end, parks are encouraged to give close attention to the water risk of their catchment basin, so as to harness the shared value of sustainable utilization of water resources of stakeholders in that basin.

3.2.2 Research on performance evaluation of industrial parks in developed countries

This report selects two Asian countries, one European country and one American country as benchmark countries. The construction of industrial parks in two east Asian developed countries, Japan and the Republic of Korea, are selected as examples. Because they are close neighbours with China, their economic, social, and environmental conditions are similar and comparable. The development history, management mechanisms, funding sources and demonstration pilots of the eco-town of Japan and the eco-industrial park of the Republic of Korea all provide valuable lessons for China. In addition, the report selects two Western developed countries, Switzerland and the United States, as cases. Based on previous research conducted by Switzerland into the ecological innovation practices of parks in 27 countries, the 12 ecological standards proposed can be used as important points of reference for the environmental performance of the International Guidelines for Industrial Parks. The Silicon Valley Index of the United States is the only comprehensive industrial park performance evaluation index system in any country other than China involved in the research of this project, and is of indubitable value for research purposes.

Japan

Japan has no performance evaluation indices specifically for industrial parks, and has developed certain practices in the construction of eco-industrial parks. Over the nine-year period from 1997 to 2006, the Government of Japan rolled out its Eco-town project, which has now become the country's most representative eco-industrial park. The project is passed on a system of top-down cooperation between industry, academia and research institutions, jointly promoted by the Ministry of Economy, Trade and Industry and the Ministry of Environment. The Ministry of Economy, Trade and Industry provides hardware technology support and the Ministry of Environment software technology support (as shown in figure 3-1).

The goal of the Eco-town project is to build a series of environmentally friendly cities and towns through the promotion of advanced resource recycling and waste treatment technologies, together with the development of environmental and so-called "venous" industries, which turn industrial waste into reusable resources, and, ultimately, to realize a zero-emission society. The Ministry of Economy, Trade and Industry and the Ministry of the Environment provide subsidies to assist the process of industrializing environmental technology and resource recycling projects. A total of 26 pilot projects (shown in figure 3-2) have been recognized throughout Japan, and subsidies have been granted through local governments to those involved in the construction and operation of recycling facilities. A total of 64 facilities have taken advantage of these subsidies.

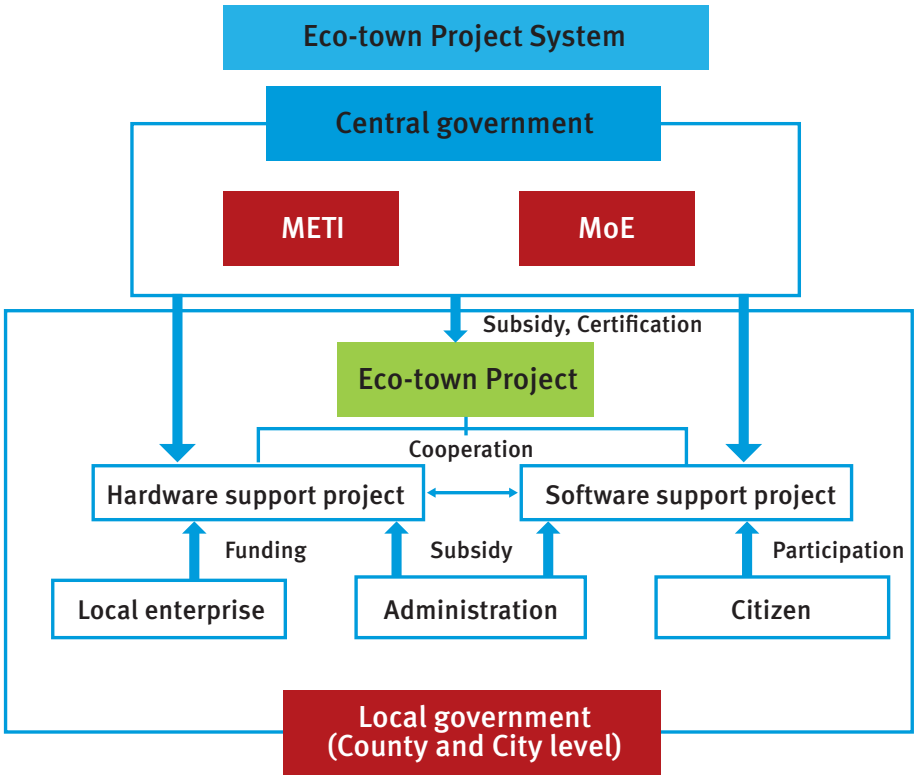


Figure 3-1 Japanese Eco-town project

Figure 3-2 Pilot cities of the Japanese Eco-town project

The Japanese government actively provides financial assistance and other policy support for the development of new enterprises in eco-industrial parks. In addition to providing financial support for enterprises entering eco-industrial parks, the Ministry of Environment plays a major role in the management of eco-industrial parks and guidance in the areas of waste recycling and disposal. The technology level of the enterprises entering the park must be advanced and at the forefront of the respective industry in order to obtain financial assistance from the national and local governments. The State subsidies for enterprises in the park generally account for between one third and one half of the total construction cost of the enterprises. Local governments also provide a small number of subsidies to the enterprises in the park, but the number of such subsidies varies.

The management of local environmental protection departments for the eco-industrial park includes: first, monitoring the discharge of pollutants by enterprises; second, providing information and technical guidance for enterprises to make rational use of resources, examining and approving enterprises entering the park, and helping them to perform the relevant procedures; third, providing financial support for qualified enterprises entering the eco-industrial park; and, fourth, taking responsibility for disseminating information to the society and the public and enhancing the exchange of information with the public on risks.

Republic of Korea

The Republic of Korea has a long history of government-led industrial park and economic development. The first industrial parks were introduced through the five-year plan in the 1960s. According to its different development purposes and subordinate management institutions, industrial parks in the Republic of Korea are divided into three types: national industrial parks, local industrial parks and agro-industrial parks. National industrial parks are set up by the Government for the development of national backbone industries and advanced technology industries, and to date the country has 27 such parks. The establishment and approval of the national industrial park is vested in the Ministry of Construction and Transportation and the Ministry of Industry for management; the local industrial park is set up for the purpose of balanced development of the region and invigorating the local economy. Approval for the establishment of parks and their management are within the jurisdiction of the city and county (county level).

In 2014, the Ministry of Industry of the Republic of Korea undertook to invest 2.3 trillion won (about 13.7 billion yuan) in a project for the comprehensive renovation of old industrial zones, and pledged to complete the transformation and upgrading of 17 industrial parks nationwide by 2017. The Ministry of Industry will also build 10,000 so-called "smart factories" in industrial parks by 2020 to provide assistance to the industrial parks in pursuit of intelligent transformation. The fostering of green industrial parks is one of the key projects of this plan. The Ministry will also adopt the Factory Energy Management System in 10 industrial parks in the country by 2017, to optimize energy supply and demand in old industrial areas. In addition, it will increase the number of eco-industrial parks from 46 to 150 by 2019, with the aim of recycling a large amount of waste heat and by-products generated in the production process of factories.

After December 2006, following the transfer of jurisdiction over the eco-industrial parks, the Ministry of Knowledge Economy of the Republic of Korea assumed primary responsibility for formulating policies for the development of the eco-industrial parks and jurisdiction over the parks was transferred to the subordinate Korea Industrial Complex Corporation (KICOX). KICOX is the national agency responsible for the supervision and management of the country's industrial complex, with the main task of supporting the regional EIP offices in project management. Since 2005, KICOX has been operating the industrial complex, including providing support for overall corporate activities, technology development, park management and marketing.

Eco-industrial park project managers, research participants, enterprises, government and other stakeholders in the Republic of Korea have formed a strong interdependent relationship in the areas of fund and project management with a view to promoting the sound development of eco-industrial parks. KICOX is the main management body of eco-industrial park projects and is responsible for development planning, budget management and performance evaluation of regional offices. The company's evaluation committee is mainly responsible for project evaluation and review of key factors, and is directly responsible for the administration, networked identification of industrial symbiosis and networked construction and monitoring of each park.

In addition, eco-industrial park projects are subject to external evaluation every year. The development of demonstration projects is generally comprises three phases, a symbiotic network discovery and project identification phase, a research project implementation phase and a marketing phase. The project manager needs to continuously monitor the progress of the project, solve the problems faced and also coordinate the profit distribution among the investment participants. During the project process, it is also necessary to explore the potential for integration between eco-industrial park projects and greenhouse gas reduction projects.

Switzerland

As part of the comprehensive revision of the Federal Act on Research and Innovation, Switzerland has a new clause that allows it to support the establishment of Swiss Innovation Parks (SR 420.1, Art. 32) that represent an overriding national interest and will contribute to competitiveness, resource efficiency and sustainable development. In the implementation of the new provisions, a comprehensive overview must be made of the different initiatives in Europe and around the world, and also of the success factors of the established eco-innovation parks.

Within the framework of the ECO-INNOVERA network, the Federal Environment Office has launched an international survey on eco-innovation parks. The eco-innovation park is an eco-industrial park and eco-city, including residential and economically active areas. It is optimized from the perspective of environment and continuously improved through cooperation with science. Over the past two decades, many regions and countries have developed eco-innovation strategies to promote economic development and reduce environmental impact.

In their 2012 research report on industrial parks, Swiss analysts looked at the park ecological innovation practices of 27 countries. The report describes the implementation of eco-innovation (technology, processes and services) and industrial symbiosis in European and non-European industrial parks. The case studies, spread over 18 European and 9 non-European countries, highlight a range of positive impacts and feedback from existing or planned eco-innovation parks. Lessons learned from best practices are summarized and recommendations provided to advise park developers, operators and stakeholders on how to design and manage industrial parks or urban areas to achieve eco-innovation. According to 12 ecological standards, the report identifies different combinations of environmental measures, business models and comprehensive development that may be used to bring economic, environmental and social benefits to the park and its surrounding areas. Lastly, the study also identifies eight factors for the success of eco-innovation parks and their relative importance, which provide an important basis for the future development of eco-innovation parks in Switzerland and further global initiatives.

Table 3-18 Ecological evaluation indicators for industrial parks in the Swiss survey report

Evaluation indicators	Indicator description
Energy efficiency	Optimize or reduce energy use, including energy required for buildings and other infrastructure and industrial production
Renewable energy resources	Use and/or on-site production of renewable energy. This includes solar, wind, hydropower, cogeneration, waste-based energy production, geothermal energy tidal/wave generated energy and biofuels
Waste management	On-site collection and transportation, on-site or external treatment and recycling or disposal of waste
Water management	On-site wastewater treatment to reduce or optimize water use for infrastructure and production

Evaluation indicators	Indicator description
Material/chemical flow	Synergies between companies, exchange of materials (chemicals, waste, etc.), cooperation among enterprises. Input-output solutions as defined by industrial symbiosis theory
Biodiversity	Biodiversity conservation or ecosystem revitalization in industrial/urban and surrounding areas
Transportation traffic	Efficient and feasible transportation of people and goods with low environmental impact (e.g., public transport, electric vehicles, plug-in hybrids, carpool systems)
Land use	Optimize or reduce land use for industrial/urban infrastructure and revitalize abandoned land
Air pollution prevention	Reduce pollutant emissions through cleaner production processes or implementation of end-of-pipe technologies
Noise prevention	Reduce noise emissions through cleaner production processes or implementation of end-of-pipe technologies
Environmental management system	Environmental standards certification and labelling in accordance with park standards, such as ISO 14 000 or EMAS
Culture, society, health and safety	Cultural aspects include preserving cultural diversity and value-added local identity; social aspects include gender equality, professional reintegration, child care and social integration of the disabled; health and safety aspects include a safe and clean natural and working environment in the industrial/urban and surrounding areas

United States of America

Silicon Valley is the first science and technology park in the world and the most successful one to date. The Silicon Valley Index reflects the comprehensive development of Silicon Valley. The characteristics revealed by the Silicon Valley Index, including the diversified talent structure, the prosperous and shared innovative economy with efficient growth, and the environmentally friendly, harmonious and comfortable liveable community, show that Silicon Valley has been making breakthroughs and taking the lead among industrial parks in the world for more than half a century, and this is a source of inspiration for the development of science and technology parks in China.

The Silicon Valley Index compiled by Joint Venture Silicon Valley can be used for quantitative analysis of the economic and social development of the Silicon Valley Region during a certain period or at a certain time. It is a comprehensive evaluation report reflecting the regional development, which is measurable, attainable and outcome-oriented. The Silicon Valley Index was first published in 1995 and then reissued at the beginning of each year. Serving as an analytical basis for enterprise leaders and decision-making and as important data for studying the development of the Silicon Valley Region, the index has become an important indicator for mapping the trend of venture capital, enterprise development and the fostering of emerging industries in Silicon Valley. According to the Silicon

Valley Index 2015 released by Joint Venture Silicon Valley in February 2015, the rich human resources, rapidly increasing venture capital, innovative work style and spirit, high salary level, comfortable living environment and other factors together provide a strong intellectual foundation and lasting power for Silicon Valley to become the leader in the development of high-tech industry in the United States and even in the world.

The evaluation indicator system represented by the Silicon Valley Index principally comprises three levels. The level 1 evaluation indicators mainly cover people, economy, society, place and governance. At level 2, there are more than ten indicators, including population structure, employment, innovation, health, environment and transport. The level-2 evaluation indicators are subdivided into more than 50 level 3 indicators. It should be noted that the evaluation indicator system followed by the Silicon Valley Index is quite flexible. Except for the level 1 indicators, which are relatively fixed, the level 2 and level 3 indicators in each year are not completely the same. Taking the Silicon Valley Index 2015 as an example, the specific structure of the index system is shown in the table below.

Table 3-19 Indicator system of Silicon Valley Index 2015

Level 1 indicator	Level 2 indicator	Level 3 indicator
People	Talent flow and diversity	Population change, net migration flows, birth rate, age distribution, education attainment, total science and engineering degrees conferred, percentage of the total population who are foreign-born, population share that speaks a language other than exclusively English
Economy	Employment	Job growth, average annual employments, Silicon Valley employment growth by major areas of economic activity, Silicon Valley employment in the public sector, monthly unemployment rate, percentage change in employment by tier, residents over 16 years of age by race and ethnicity
	Income	Per capita income, per capita income distribution (by race and ethnicity), median household income, average wages, median wages for various occupational categories, median wages by tier, poverty and self-sufficiency, income distribution range, individual median income by educational attainment, individual median income by gender, free or reduced-price school meals
	Innovation and entrepreneurship	Value added, patent registrations, patent registrations by technology area, venture capital investment, industrial distribution of venture capital investment, the ranking of venture capital investment companies, venture capital investment in clean technology, venture capital investment in clean technology by segment, the total number of cleantech venture capital deals, angel investment, the total number of initial public offerings, angel investment by stage, IPO pricings of international companies by country, number of mergers and acquisitions, percentage of non-employers by industry, and relative growth of firms without employees

Level 1 indicator	Level 2 indicator	Level 3 indicator
	Commercial space	Change in the supply of commercial space, rate of commercial vacancy, rent of commercial space, and new commercial development by sector
Society	Foundation of economic development	Share of graduates who meet University of California or California State University requirements, high school graduation rate (by race), high school graduation rate and dropout rate, math and science scores
	Early education	Pre-school enrolment rate
	Arts and culture	Cultural participation, consumer expenditure, non-profit art organizations, cultural and art establishment
	Health level	Health insurance coverage and percentage of student population that is overweight or obese
	Security	Number of violent crimes, felony offences and public safety officers
Living area	Environment	Water resources, electricity productivity, electricity consumption per capita, number of solar power stations
	Transport	Vehicle miles travelled per capita and gas prices, commuter patterns and interregional commuter patterns
	Land use	Residential density, housing near public transit, non-residential land development
	Housing	Trends in home sales, house building type, rental affordability, building affordable housing, percent of households with housing costs greater than 35% of income, home affordability, and percent of population age 18 to 34 living with a parent who is the householder
Government governance	City finance	Financial revenues
	Civic participation	Partisan affiliation and voter participation

3.2.3 Policies on the evaluation of industrial park development in developing countries

The development and construction of industrial parks is one of the industrialization promotion strategies in developing countries. In order to ensure the standardization, rationality and efficiency of the development and construction of industrial parks, a variety of policies on the development and management of industrial parks have been adopted in developing countries, including relevant laws, regulations, specifications and incentive policies.

By and large, most of the relevant policies of these countries focus on the procedures pf the establishment of industrial parks, park planning and construction, park investment management, and enterprise settlement procedures. The Industrial Parks Proclamation No 886/2015 of Ethiopia, for example, comprises eight parts: general provisions, rights and obligations of developers and operators, enterprises and investment in industrial parks, work permits and residence in industrial parks, guarantee and protection and national treatment, protection of land and environment, competent authority

and appeal procedures, and other provisions. Together, these provide clear specifications on the establishment, development, operation and management of industrial parks.

Another example, the Special Economic Zone Act of South Africa, defines the definition, development requirements, operation, management and other criteria of special economic zones, and makes consistent and detailed provisions on the types, incentive measures, and the roles and responsibilities of important participants of the special economic zones in South Africa.

Table 3-20 Applicable laws and policies on industrial parks in some developing countries

Country	Name of policy	Issuance date	Issuance department
Ethiopia	Industrial Parks Proclamation No. 886/2015	2015	Federal Government of Ethiopia
Kenya	Special Economic Zones Bill 2015	2015	President of Kenya
Nigeria	Nigeria Export Processing Zone Act 1992	1992	President of Nigeria
South Africa	Special Economic Zone Act	2014	National Parliament of South Africa
Iran	Act on the Administration of Free-Trade-Industrial Zones of the Islamic Republic of Iran	1993	Ministry of Industry, Mines and Trade of the Islamic Republic of Iran
Jordan	Industrial Park Ordinance	1999	——
Vietnam	Decree Providing for Industrial Parks, Export Processing Zones and Economic Zones No. 29/2008/ND-CP	2008	Government of the Socialist Republic of Viet Nam
Myanmar	Myanmar Special Economic Zone Act, 2014	2014	President of Myanmar
India	Special Economic Zone (SEZ) Act, 2005	2005	Ministry of Law and Justice of India
Bangladesh	Bangladesh Economic Zones Act, 2010	2010	——

Where the establishment of industrial parks is concerned, developing countries have formulated basic procedures and requirements for the establishment of parks in accordance with their industrial development foundation, relevant laws and regulations, land systems and so forth. Thus, in Ethiopia, the industrial parks will be established in strategic locations to promote and attract productive domestic and foreign direct investment, upgrade industries and generate employment opportunity, thereby accelerating the economic transformation and development of the country. According to the Industrial Parks Proclamation No 886/2015, an industrial park shall be designated by the Ethiopian Investment Board and, in designating the industrial parks, the Board will consider: the nature of the proposed project; the intended size and perimeter of the proposed industrial parks; clearance from encumbrance; proximity to industrial inputs and infrastructure; conduciveness to become a population centre; and the nature of the project, including the availability of medical and recreational centres; compatibility with the master plan; land use; and other such factors. In addition, any modification to and revocation of an industrial park shall be determined by the Board.

With regard to the acquisition of industrial park land, the industrial park developer may possess industrial park land through a lease system and transfer developed industrial park land through subleases; the industrial park operator may possess and administer, upon approval by the Ethiopian Investment Board, the industrial park land which the operator has acquired through agreement from the industrial park developer; the industrial park enterprise may possess land within the industrial park land which it has obtained through agreement from the industrial park developer or industrial park operator upon approval and issuance of investment permit by the Ethiopian Investment Commission.

In Viet Nam, however, the requirements for establishment and expansion of industrial parks are somewhat different. For the establishment of an industrial park, the following issues need to be considered: whether the industrial zone is in line with the approved master plan for the development of industrial zones; whether at least 60 per cent of the total industrial land area of industrial zones already established in the territory of the province or centrally run city where this industrial zone is to be located has been leased or subleased to investment projects which have been registered or granted investment certificates. For the expansion of an industrial park, the following must be considered: again, whether the industrial park is in line with the approved master plan for the development of industrial zones and whether at least 60 per cent of the total industrial land area of this industrial zone has been leased or subleased to investment projects which have been registered or granted investment certificates; and whether this industrial park has already built and put into use a consolidated wastewater treatment work.

The number of developing countries in which special policies and measures have been formulated for evaluation of the development and performance of industrial parks is relatively small, largely because the development and construction of industrial parks and the formulation of relevant policies in such countries are still at the exploratory stage.

In recent years, however, some developing countries have made remarkable progress in the construction of industrial parks. With the increasing number, scale and types of industrial parks, there is also growing demand for a systematic evaluation of the development and performance of industrial parks, and some developing countries have launched exploratory work in this area. For example, the Industrial Park Rating System was developed by India in 2018 to assess the competitiveness of industrial parks in India at the global level. The system, which was jointly conceived and developed by the Indian Government, the Asian Development Bank and PricewaterhouseCoopers, mainly evaluates the development of industrial parks in India from four standpoints: internal infrastructure and utilities; external infrastructure and connectivity; business support services; and environment and safety management. Based on the evaluation results, those parks that are developing better

are recognized, and competitiveness is promoted among the developers and operators of the parks. Those indicators also help the stakeholders of Indian industrial development (including decision-makers, investors and financial institutions) to make sound decisions. The four evaluation aspects of the Indian Industrial Park Rating System include a total of 61 specific evaluation indicators, which cover 34 evaluation parameters and 27 additional questions. The additional questions are mainly used to understand the service and service level provided by the developers or operators of the industrial park, but not to evaluate the industrial park.

3.3 Comparison of differences between indicator systems

3.3.1 Analysis of differences between Chinese and foreign industrial parks

In addition to the differences between China and other countries in their administrative systems, stages of industrial development, culture and traditions, the industrial parks are also significantly different at the management level.

First, there are differences in the management institution. While governments throughout the world attach great importance to the building of industrial parks and play an important role in promoting the development of industrial parks, the roles that they play and the mode and degree of their participation in the management of industrial parks differ.

In developed countries, the governments manage the parks mainly at the macro level, while the enterprises, social organizations, and individual residents do so at the micro level. In the United States, the management bodies of industrial parks include the governments and private sector bodies, including city governments, town governments or their development organizations, local economic development companies, private industry and other social organizations. In the European Union, the governments of member countries, non-governmental public sector bodies and scientific research institutions do not play a dominant role, but only provide indirect management, coordination and consulting services. In Japan, the local self-governing bodies are responsible for the construction of the industrial parks, with joint assistance and management from the State and local governments and the involvement of enterprises, research institutions and administrative authorities, thus forming a park management and operation system that encompasses industries, universities and the Government.

Most industrial parks in China are planned and constructed by the government authority that is usually the dominant management institution and performs the administrative duties covering not only planning and investment at the macro level but also approval of activities and infrastructure maintenance at the micro level. Although there is some involvement of industry associations and enterprises, the level of their participation is low. In the context of city-industry integration, most industrial parks in China also have residential communities, the residents are not involved in the park management. It may be seen that the management system of industrial parks in China is not highly diversified at present and relies on top-down administrative management by government agencies.

In the initial period of development, evaluation of the parks is also limited to the economic indicators associated with the evaluation of local political performance. In recent years, in the pursuit of ecological civilization and high-quality development, a series of indicators related to the environmentally friendly construction and industrial quality of the parks, including their resource productivity, pollutant emission levels and scientific and technological innovations, have been incorporated into the evaluation system of industrial parks. The

evaluation of industrial parks in China is becoming more scientific and exerting a guiding influence on the parks. It should be noted, however, that the involvement of social organizations in the management of industrial parks in China is still very limited, and the social indicators on most evaluation indicator systems are relatively low in terms of number and weight.

3.3.2 Comparison and analysis of indicators in the International Guidelines for Industrial Parks

China has promulgated and implemented evaluation index systems at different levels for seven types of industrial parks, namely, green parks, low-carbon parks, parks in transformation to the circular economy, eco-industrial demonstration parks, national economic and technological development zones, national high-tech industrial development zones and socially responsible Chinese industrial enterprises. The framework, implementation, and assessment of these indicator systems are important as references for the incorporation into the Chinese legal and regulatory system of the International Guidelines for Industrial Parks. This study will compare the Guidelines with the evaluation index system of the seven types of industrial parks in China, with a view to identifying the differences between the respective evaluation index systems. It will focus primarily on the evaluation purpose, the subject of application, the evaluation aspect, the structure of the indicator system, the evaluation calculation method and the data availability and constraints on the evaluation, in order to determine the differences between the evaluation indicator systems. The results of a horizontal comparison between the systems are set out in appendix II to this report.

In terms of evaluation coverage of the indicator system, the evaluation indicator system in the International Guidelines for Industrial Parks is developed at three levels: the economy, society and the environment, an approach highly compatible with the current evaluation indicator system for major industrial parks in China. Where the second-level indicators are concerned, some evaluation fields in the International Guidelines for Industrial Parks could usefully supplement the existing evaluation indicator system in China, including the indicators covering good industrial relations and welfare, environmentally suitable sites, and others.

In terms of the subject of evaluation, the evaluation indicator system for industrial parks in China employed for horizontal comparison purposes is mostly used to evaluate development zones at levels above the provincial level, while the International Guidelines for Industrial Parks impose no requirements on the size of the subjects of evaluation, so this has some complementary value for the evaluation of small and medium-sized industrial parks in China.

In terms of the set up and the computation of scores in the evaluation system, the existing evaluation indicator system for industrial parks in China is relatively complex, relying on the subjective evaluation made by such leading departments as the Ministry of Commerce and the Ministry of Science and Technology and expert panels, and a scoring system is adopted in International Guidelines for Industrial Parks, so that the evaluation method is more intuitive.

In terms of data availability, restricted by the existing statistical coverage, most of the existing evaluation indicator systems for industrial parks in China require industrial parks to compile relevant data themselves. Reference shall be made to this approach to the compilation of data in the process of the adaptation and promotion of the International Guidelines for Industrial Parks.

Where constraints are concerned, the relevant incentives and constraints are mostly achieved in the existing evaluation indicator system for industrial parks in China by granting merit awards to industrial parks or revoking awards in accordance with successive evaluations. Among these measures, the evaluation of national economic and technological development zones and high-tech industrial development zones includes the penalty of downgrading for the parks, which is more binding.

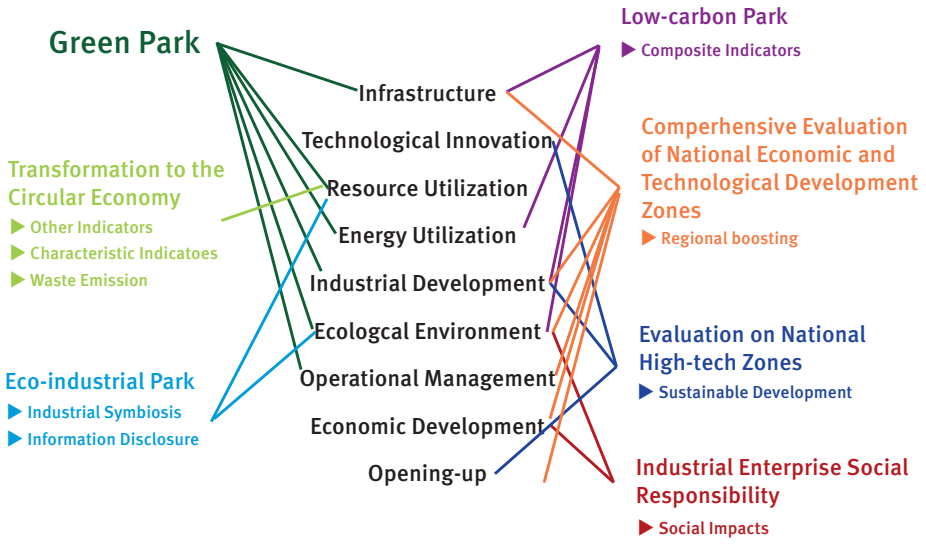


Figure 3-3 Analysis of the evaluation coverage of first-level indicators in the evaluation indicator system for industrial parks in China

3.3.3 Indicator frequency analysis for industrial park evaluation indicator system

3.3.3.1 Basis for key indicator selection

In this study, by selecting the frequency of key indicators as the evaluation factor, a comparison is made between the International Guidelines for Industrial Parks and seven sets of evaluation indicator systems for industrial parks in China.

The key economic performance indicators selected include economic output, regional boosting, investment and construction, financial services, and other indicators from among the level 1 indicators of economic facilities and hardware construction, service software, and other aspects, in the International Guidelines for Industrial Parks. The proportion indicator among level 1 indicators of economic impacts is incorporated with the economic indicators (per capita output value), economic internationalization level (import and export values), and other indicators commonly used in the seven sets of evaluation indicator systems for industrial parks in China, thus forming key indicators of eight aspects: economic output, regional boosting, investment and construction, financial services, import and export values, high-tech, per capita output value and enterprise development.

In terms of social indicators, since the seven sets of evaluation indicator systems for industrial parks in horizontal comparison make scant mention of evaluation from this perspective, on the basis of the main keywords of social performance infrastructure, social management and service, occupational health, occupational safety, and other level 1 indicators on which the International Guidelines for Industrial Parks are focusing, the key indicators at eight aspects: public service, safety production, salary and welfare, employee rights and interests, vocational training, management and operation, and community development are proposed for frequency analysis.

Key environmental performance indicators are selected mainly based on the four aspects listed in the Figures: environmentally suitable site, green infrastructure, green system, and efficient and clean production, discharge, and waste management, for easier horizontal comparison. In addition, the keywords frequently appearing in the seven sets of evaluation indicator systems for industrial parks in China are taken into account. The two aspects of an environmentally suitable site and green infrastructure in the International Guidelines for Industrial Parks are retained. The "green system" aspect is expanded into two aspects: green evaluation and information disclosure, while the "efficient and clean production, discharge and waste management" aspect is expanded into energy utilization, resource conservation, pollution emission, and solid waste utilization. In this way, key indicators at eight aspects are finally formed for analysis and evaluation.

3.3.3.2 Indicator frequency analysis result

(a) Economic performance indicator

Following the relevant evaluation approaches in the International Guidelines for Industrial Parks and those adopted in China, the social performance of industrial parks is mainly evaluated at eight aspects: economic output, regional boosting, investment and construction, financial services, import and export values, high-tech, per capita output value and enterprise development. Analysis on the indicator frequency and frequency proportion is made for the relevant evaluation approaches in the International Guidelines for Industrial Parks and adopted in China at the above eight aspects, and the analysis results are shown in the figures below.

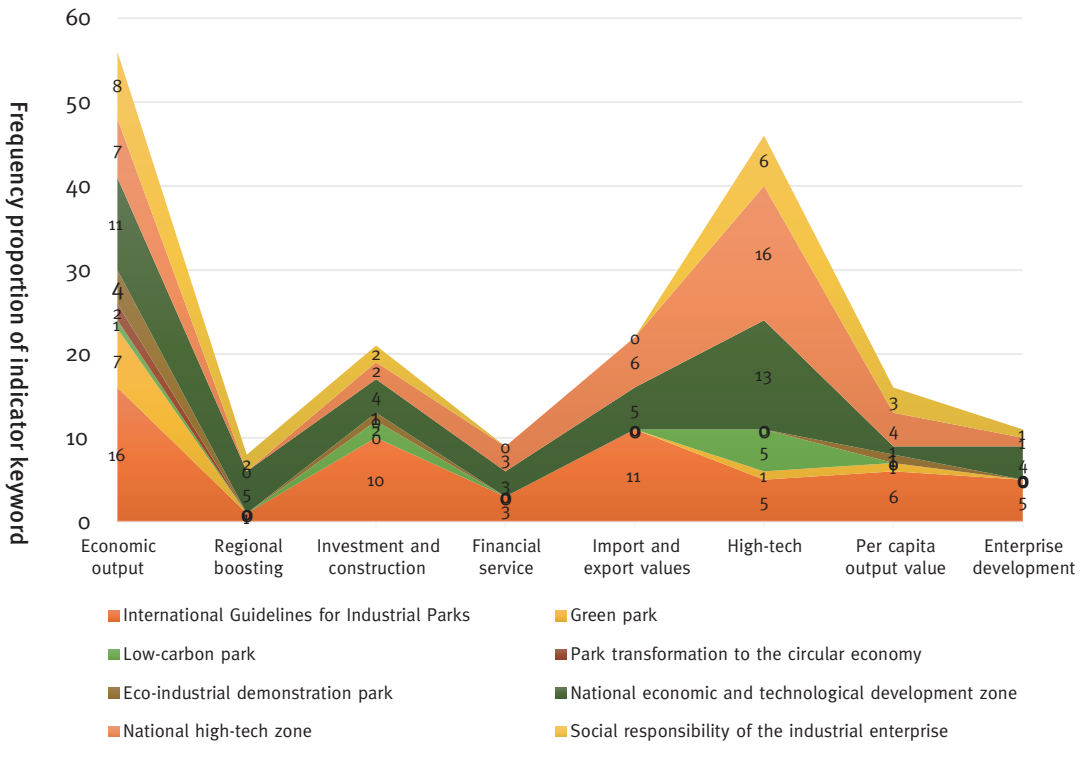


Figure 3-4 Analysis of the frequency of economic performance key indicators adopted in China and in other countries

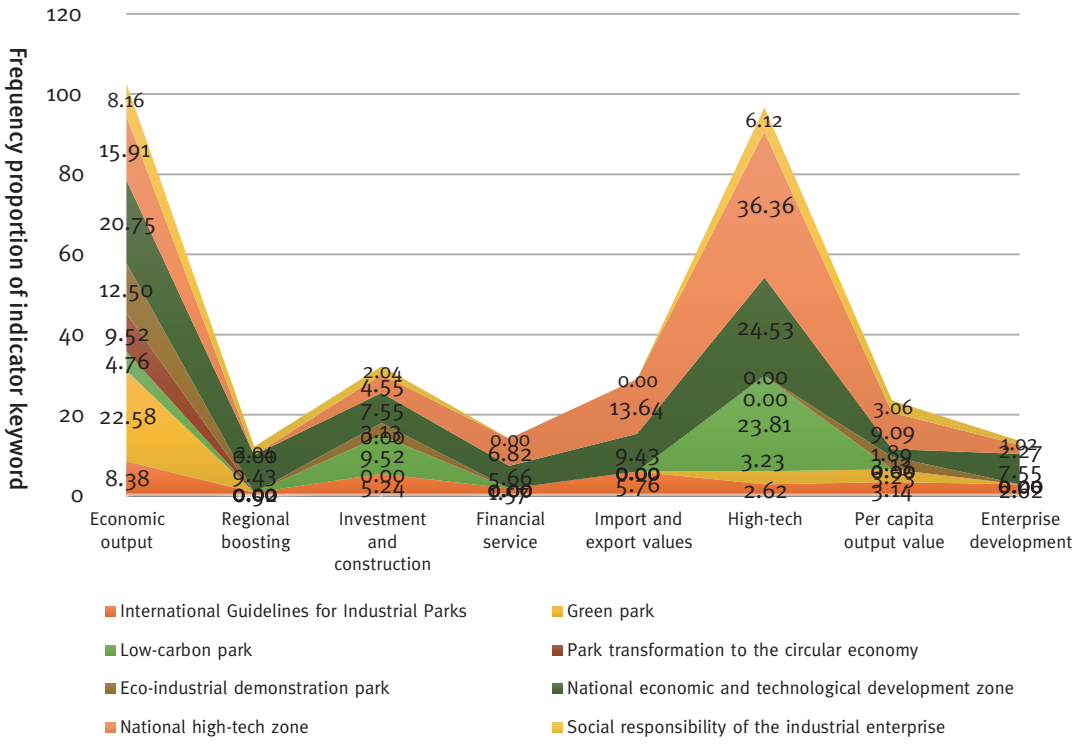


Figure 3-5 Analysis of the frequency proportion of economic performance key indicators adopted in China and other countries

From figure 3-4, it may be seen that, in a manner consistent with most of the current evaluation indicator systems for industrial parks in China, the International Guidelines for Industrial Parks focus on the evaluation of economic output and investment and construction of industrial parks. Only the evaluation indicators for national economic and technological development zones, however, attach great importance to the regional dissemination of the economic output of the parks. Only the International Guidelines for Industrial Parks, the evaluation of national economic and technological development zones and the evaluation of national high-tech zones pay attention to the financial services that highlight the economic soft power of industrial parks.

In this respect, the International Guidelines for Industrial Parks play a complementary role to the evaluation of individual industrial parks. In addition, to reflect the economic quality of industrial parks, the International Guidelines for Industrial Parks and the current indicator systems in China are focusing on both the high-tech and the per capita output value. As for the import and export values and the indicators reflecting the sustainable development of enterprises, however, these are mainly reflected in the comprehensive evaluation indicator systems for both the national economic and technological development zones and the national high-tech zones. The corresponding indicators in the International Guidelines for Industrial Parks provide excellent guides to the sustainable development of industrial parks.

From figure 3-5, it may be seen that, in terms of key indicator frequency proportion, in the International Guidelines for Industrial Parks economic output accounts for the highest proportion, with 8.38 per cent, while regional boosting accounts for the lowest proportion, with 0.52 per cent. Similarly, in the evaluation indicator system for green parks, the economic output keyword accounts for the highest proportion, with 22.58 per cent, while regional boosting, investment and construction, financial service, import and export value and enterprise development the lowest, all accounting for zero; energy conservation accounts for the highest proportion, with 22.58 per cent, while green evaluation the lowest, with zero; in the evaluation indicator system for low-carbon parks, key economic indicator for high-tech account for the highest proportion, with 23.81 per cent, while such keywords as "regional boosting", "financial service", "import and export value", "per capita output value" and "enterprise development" are not mentioned; the evaluation indicator system for parks in transformation to the circular economy pays little attention to economic indicators, but focuses primarily on economic output indicators; economic output keywords also appear the most frequently in the evaluation indicator system for eco-industrial demonstration parks, up to 12.5 per cent, while regional boosting, financial service, import and export value, high-tech and enterprise development are not mentioned, thus constituting zero; the evaluation indicator system for national economic and technological development zones are involved with these aspects, among which high-tech indicator keyword appear the most frequently, up to 24.53 per cent, while per capita output value is the least frequent, with only 1.89 per cent. In the economic indicators for national high-tech zones, key indicators of high-tech category also appear the most frequently, up to 36.36 per cent, while regional boosting are the least frequent, with zero; among the economic performance indicators for social responsibility of industrial enterprises, economic output appear the most frequently, with up to 8.16 per cent.

(b) Social performance indicator

Following the relevant evaluation approaches in the International Guidelines for Industrial Parks and those adopted in China, the social performance of industrial parks is principally evaluated in eight aspects: public service, safety production, salary and welfare, employee rights and interests, vocational training, management, and operation, community development, and social responsibility. An analysis of the indicator frequency and frequency proportion is carried out for the relevant evaluation approaches in the International Guidelines for Industrial Parks and adopted in China at the above eight aspects, and the analysis results are shown in the figures below.

From figure 3-6, it is clear that the International Guidelines for Industrial Parks and the evaluation indicator systems for green parks, national economic and technological development zones and national high-tech zones regard public service as an indicator for evaluation social performance, while the public service of the park is not incorporated in other indicator systems. Where safe production is concerned, there are relevant indicators in the International Guidelines for Industrial Parks, along with evaluation indicator systems for eco-industrial demonstration parks, national economic and technological development zones and social responsibility of industrial enterprises, while this area is not covered by other indicator systems. As for salary and welfare, there are relevant indicators in the International Guidelines for Industrial Parks and in evaluation indicator systems for national high-tech parks and social responsibility of industrial enterprises, while this area too is not covered by other indicator systems. Similarly, there are relevant indicators for employee rights and interests in the International Guidelines for Industrial Parks, along with an evaluation indicator system for social responsibility of industrial enterprises, but the area is not covered by other indicator systems. For occupational training, there are relevant indicators in the International Guidelines for Industrial Parks, and also evaluation indicator systems for national

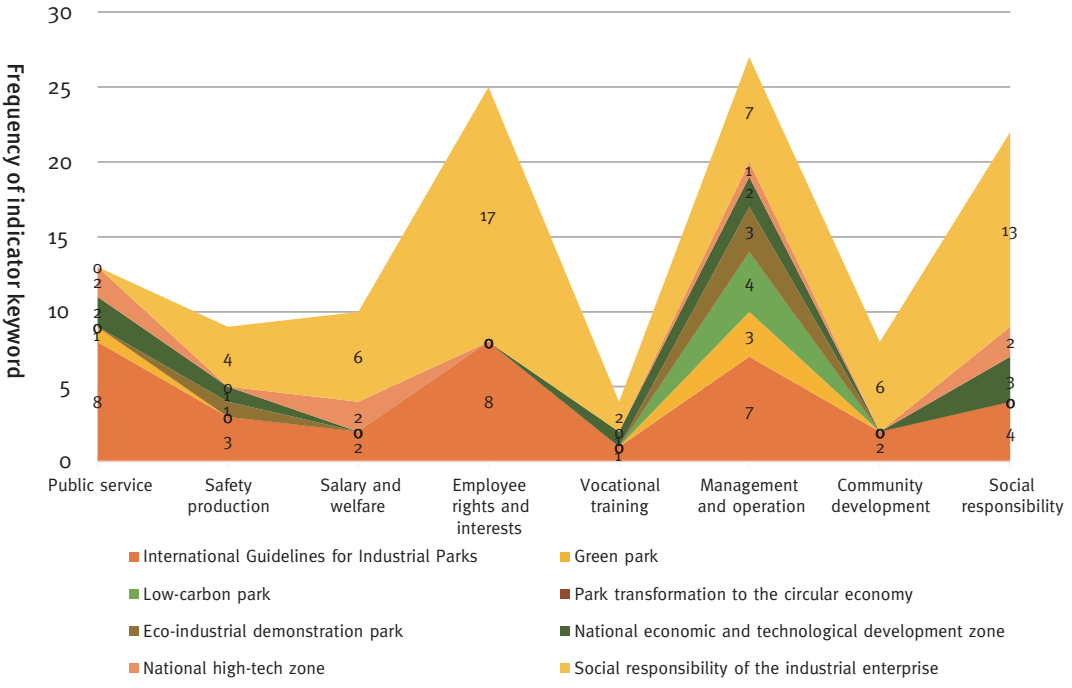


Figure 3-6 Analysis of the frequency of social performance key indicators adopted in China and other countries

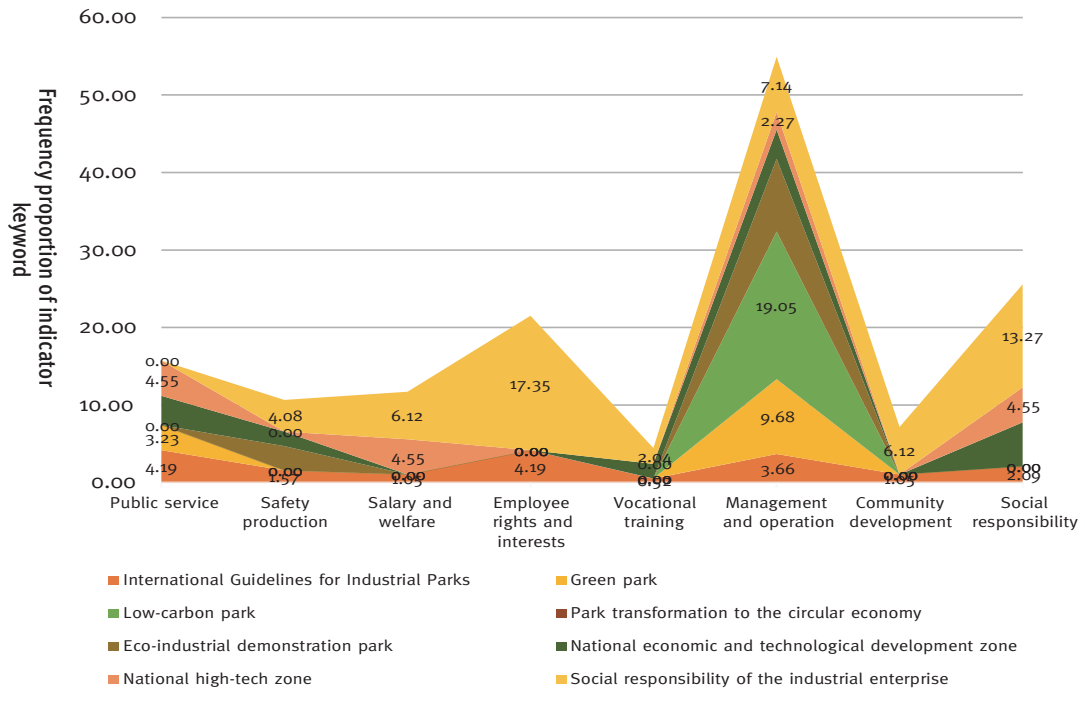


Figure 3-7 Analysis of the keyword frequency of social performance key indicators adopted in China and other countries

economic and technological development zones and social responsibility of industrial enterprises, while the area is not covered by other indicator systems. For management and operation, there are relevant indicators exist in all indicator systems, except the one for parks in transformation to the circular economy. For community development, there are relevant indicators in the International Guidelines for Industrial Parks and also evaluation indicator systems for social responsibility of industrial enterprises, while the area is not covered by other indicator systems. For social responsibility, there are relevant indicators in the International Guidelines for Industrial Parks, together with evaluation indicator systems for national economic and technological development zones, national high-tech zones and social responsibility of industrial enterprises, while the area is not covered by other indicator systems. There are relatively more indicators for the evaluation of social performance in the International Guidelines for Industrial Parks and in evaluation indicator systems for the social responsibility of industrial enterprises, while the indicator system for parks in transformation to the circular economy is hardly concerned with the evaluation of social performance.

From figure 3-7, in terms of indicator keyword frequency proportion, it is clear that, in the International Guidelines for Industrial Parks, public service and employee rights and interests account for the highest proportion, with 4.19 per cent, while vocational training accounts for the lowest, with 0.52 per cent. In the evaluation of green parks, management and operation account for the highest proportion, with 9.68 per cent, followed by public service, with 3.23 per cent, while safety production, salary and welfare, employee rights and interests, vocational training, community development and social responsibility the lowest, with zero. In the evaluation of low-carbon parks, management and operation account for the highest proportion, with 19.05 per cent, while public service, safety production, salary and welfare, employee rights and interests, vocational training, community development and social responsibility account for zero. In the evaluation of parks in transformation to the circular economy, all indicators for evaluation of social performance account for zero. In the evaluation of eco-industrial demonstration parks, management and operation account for the highest proportion, with 9.38 per cent, followed by safety production, with 3.13 per cent, while public service, salary and welfare, employee rights and interests, vocational training, community development and social responsibility account for zero. In the evaluation of national economic and technological development zones, social responsibility accounts for the highest proportion, with 5.66 per cent, while salary and welfare, employee rights and interests and community development account for zero. In the evaluation of national high-tech zones, public service, salary and welfare and social responsibility account for the highest proportion, all with 4.55 per cent, while safety production, employee rights and interests, vocational training and community development account for zero. In the evaluation of social responsibility for industrial enterprises, employee rights and interests account for the highest proportion, with 17.35 per cent, while public service accounts for the lowest, with zero.

(c) Environmental performance indicator

Following the relevant evaluation approaches in the International Guidelines for Industrial Parks and those adopted in China, the environmental performance of industrial parks is mainly evaluated in eight dimensions: environmentally suitable site, infrastructure, green evaluation, information disclosure, energy utilization, resource conservation, pollution emission, and solid waste utilization. With the above eight dimensions as key indicators, their frequency and proportion in the indicator systems are measured. An analysis of the indicator frequency and keywork frequency is carried out for the relevant evaluation approaches in the International Guidelines for Industrial Parks and adopted in China for the above eight dimensions, and the analysis results are shown in the figures below.

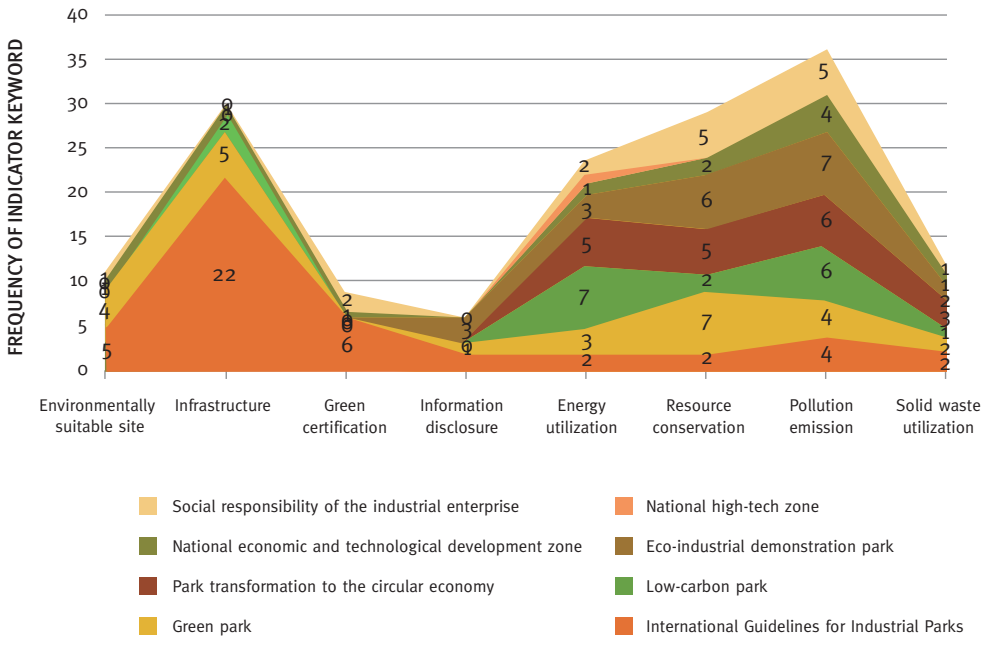


Figure 3-8 Analysis of the frequency of environmental performance key indicators adopted in China and other countries

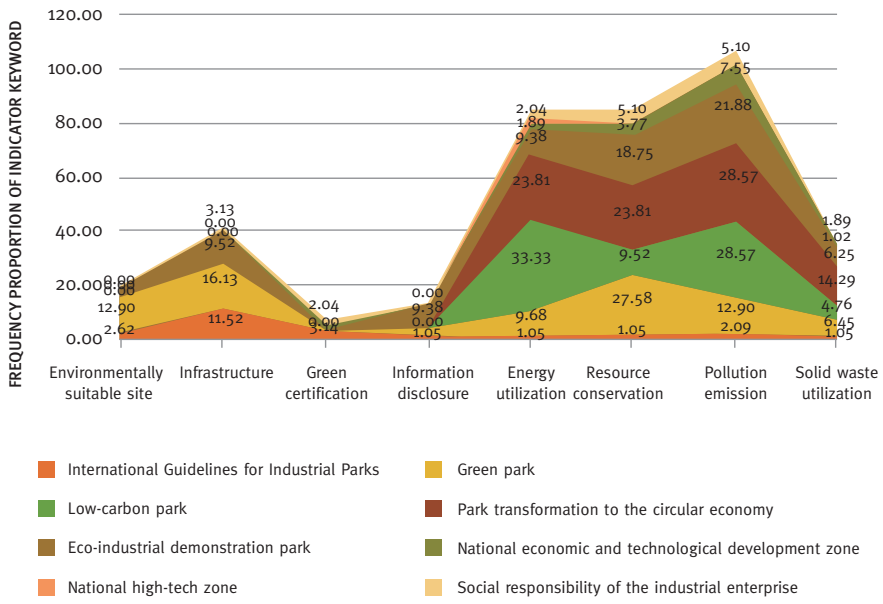


Figure 3-9 Analysis of the frequency proportion of environmental performance key indicators adopted in China and other countries

For its part, figure 3-8 shows that an environmentally suitable site and infrastructure are taken as the environmental performance evaluation indicators specified in the International Guidelines for Industrial Parks and in the evaluation of green parks, while an environmentally suitable site is not incorporated in other indicator systems. Where green evaluation is concerned, there are relevant indicators exist in the International Guidelines for Industrial Parks and in the evaluation of national economic and technological development zones and social responsibility of industrial enterprises, while this is not covered by other indicator systems. As for the issue of information disclosure, there are relevant indicators exist in the International Guidelines for Industrial Parks and in the evaluation of green parks and eco-industrial demonstration parks, while it is not covered by other indicator systems. Energy utilization is regarded as an important indicator of environmental performance in the eight major indicator systems in China and in other countries, accounting for a relatively high proportion in the entire indicator system for low-carbon parks and park transformation to the circular economy. Except for the national high-tech zones, the indicators of resource conservation, pollution emission and solid waste utilization are incorporated in the other seven indicator systems.

As may be seen from figure 3-9, on indicator keyword frequency proportion, in the International Guidelines for Industrial Parks infrastructure accounts for the highest proportion, namely, 11.52 per cent, while energy utilization, resource conservation and solid waste utilization account for the lowest proportion, together accounting for 1.05 per cent; in the evaluation of green parks, energy conservation accounts for the highest proportion, 22.58 per cent, while green evaluation the lowest, with zero. In the evaluation of low-carbon parks, energy utilization accounts for the highest proportion, with 33.33 per cent, while the parameters of environmentally suitable site, green evaluation and information disclosure account for zero. In the evaluation of parks in transformation to the circular economy, energy utilization, resource conservation and pollution emission account for a considerable proportion, while environmentally suitable site, infrastructure, green evaluation and information disclosure account for zero. In the evaluation of eco-industrial demonstration parks, pollution emission accounts for the highest proportion, with 21.88 per cent, while green evaluation accounts for zero. In the evaluation of national economic and technological development zones, pollution emission accounts for the highest proportion, with 7.55 per cent, while environmentally suitable site, infrastructure and information disclosure account for zero. The environmental performance indicator for national high-tech zones only incorporates energy utilization, which accounts for 2.27 per cent; all the environmental performance indicators for social responsibility of industrial enterprises accounts for a proportion below 5 per cent.

3.3.3.3 Application of indicator frequency analysis

In this study, the indicator frequency analysis results will be used as the basis for the adjustment of the indicators used in China's adaptation of the International Guidelines for Industrial Parks. By referring to the frequency of keywords in individual indicator systems for the industrial parks, the indicators in the Guidelines are modified, supplemented, integrated or deleted. For detailed recommendations on the adjustment of indicators, see chapter 4 below.

3.4 Identification and screening of key points for China's adaptation of the International Guidelines for Industrial Parks

3.4.1 Analysis framework for key points for China's adaptation of the International Guidelines for Industrial Parks

The underlying purpose of indicator comparison and analysis is to establish an analysis framework with a set of indicators in line with the requirements for promoting the International Guidelines for Industrial Parks in China. According to the framework, an analysis is made of the second-level indicators in the Guidelines one by one, for purpose of multi-dimensional analysis of the availability, applicability and special value of applicable indicators of industrial parks in China.

On basis of this analysis, recommendations are made on adding, deleting, or modifying the indicators in the Guideline to meet the needs of their promotion and application in China.

Table 3-21 Analysis framework for indicators in the International Guidelines for Industrial Parks

Quantitative / non-quantitative	Availability	Applicability	Value to existing indicator system (additional label)	Adaptation recommendations	
Quantitative indicator	Accurately available - corresponding to the existing statistical coverage	Applicable	Of complementary value Note: this indicator in the Guidelines is outstanding as a complement to the existing evaluation indicator system for industrial parks in China.	Directly applied	
Non-quantitative indicator	Estimable – with the survey (sampling/ questionnaire)	Not applicable – without discrimination	Of forward-looking value Note: this indicator in the Guidelines is forward-looking for the future development of industrial parks in China.	Recommended to apply but requiring adjustment/ supplementation	Adjustment to indicator type
	Estimable – estimated with other indicators/ information	Not applicable – not in line with domestic policy	(Allowing backward supplementation)		Requiring refinement of/ adjustment to the indicator definition
	Unavailable at the technical level	Not applicable – not in line with the current development stage of industrial parks in China		Recommended to delete	

Note: Recommendations set out in the International Guidelines for Industrial Parks apply to new and existing industrial parks in a variety of international settings, focusing on developing economies and economies in transition. The Guidelines are applicable at all development stages of various industrial parks and can be relied upon by stakeholders in various areas of industrial parks, including park regulators, park developers, park management institutions, park tenants, stakeholders, and partners (such as multilateral development institutions and financial institutions).

3.4.2 Screening of key economic performance indicators in the International Guidelines for Industrial Parks for adaptation

3.4.2.1. Directly applicable indicators

These indicators may be further subdivided into the following categories:

(1) Robust economic system tracking economic analysis quantitatively showing a positive economic return (i.e., in terms of employment, taxes, net exports, forex, local supplies), after such factors as land, CAPEX and OPEX costs and subsidies are taken into account.

Indicator analysis: the existing park evaluation system for economic output evaluation in China is relatively satisfactory, and there are indicators corresponding to the indicator content of the Guidelines. As this is an indicator which most directly reflects the positive value of the economic output of the park, it should be directly used.

(2) Private participation in industrial park planning

(3) Private sector represented on the Board of Regulators

Indicator analysis shows that most industrial parks in China are managed by government-dominated or quasi-governmental State-owned enterprises, and the involvement of enterprises consists more in their pursuit of the efficiency of enterprise-based management institutions and fewer policy restrictions. Accordingly, among the four indicators for evaluating the involvement of social capital in the International Guidelines for Industrial Parks, uses is made essentially of two applicable indicators reflecting the involvement of social capital in park planning and development affairs.

(4) Existence and functioning of a formal industrial park marketing department/ unit

Indicator analysis shows that, generally, this is the investment promotion department of the park in China, which is an important department or unit for the development of the park.

(5) User maintenance & operation fees or charges collected by the operator

Indicator analysis shows that the main operators of parks in China are generally government or platform enterprises of the government. Generally, they do not levy separate operation or management fees from enterprises, but usually charge taxes, water and electricity fees, and other utility service fees.

(6) % user enterprise satisfaction with the services provided by the industrial park operator

Indicator analysis shows that such bottom-up evaluation is needed in the existing indicator system, which will play a leading role in the development and optimization of the park management system.

(7) Operator customer relationship management (CRM) system in place

Indicator analysis shows that, in China, the park operators are usually the government, and the customers are usually the resident enterprises. The customer relationship system can be an intelligent management platform at the park management level, similar to the indicator on the construction of a smart development zone platform for scenic industrial parks in Zhejiang Province, but the national indicator system is relatively inadequate in this regard.

(8) Operator ISO 9001 certification

Indicator analysis shows that this indicator should be directly used without an obvious difference between Chinese and foreign evaluation indicator systems.

(9) Unencumbered land title

Indicator analysis shows that this indicator reflects the park development land compliance and it should therefore be directly used.

(10) Phased site development strategy and implementation

Indicator analysis shows that this is an indicator reflecting the park development planning and it should be directly used.

(11) Proximity to appropriate highway

Indicator analysis shows that this indicator reflects the level of infrastructure in the park and should be directly used.

(12) Proximity to power transmission or distribution grid

Indicator analysis shows that this indicator reflects the level of infrastructure in the park and should be directly used.

(13) Proximity to gas transmission mains and gas "city-gate"

Indicator analysis shows that this indicator reflects the level of infrastructure in the park and should be directly used.

(14) Proximity to microwave tower for broadband GSM mobile telephony and Wi-Fi connectivity

Indicator analysis shows that this indicator reflects the level of infrastructure in the park and should be directly used.

(15) Appropriately-sized (wide) internal roads

Indicator analysis shows that this indicator reflects the level of infrastructure in the park and should be directly used.

(16) [% hours power outage per period in industrial park / % hours power outage nationally]

Indicator analysis shows that this indicator reflects the level of infrastructure in the park and should be directly used.

(17) [% hours of interruption of water supply, quality or quality in industrial park / % hours of interruption of water supply, quality or quality nationally]

Indicator analysis shows that this indicator reflects the level of infrastructure in the park and should be directly used.

(18) Regular, scheduled maintenance of buildings, and dedicated rapid-response or emergency maintenance, repair, rectification and restoration service, including for utilities and superstructure assets

Indicator analysis shows that this indicator reflects the level of supporting services in the park and should be directly used.

(19) Dedicated or localized industrial park business support, business association support, incubation, innovation or competitiveness programmes on effective offer

Indicator analysis shows that this indicator reflects the level of supporting services in the park and should be directly used.

(20) Industrial park user enterprises have access to specific financial support programmes

Indicator analysis shows that this indicator reflects the level of supporting services in the park and should be directly used.

(21) Dedicated one-stop shop/single window in industrial park

Indicator analysis shows that this indicator reflects the level of supporting services in the park and should be directly used.

(22) E-government services dedicated to the industrial park

Indicator analysis shows that this indicator reflects the level of supporting services in the park and should be directly used.

(23) Formal industrial park B2B gatherings held on formal industrial park B2B platforms on regular basis

Indicator analysis shows that this indicator reflects the level of supporting services in the park and should be directly used.

(24) Operator landscaping, gardening, and cleaning services

Indicator analysis shows that this indicator reflects the level of supporting services in the park and should be directly used.

(25) Presence of mechanical cargo loading and off-loading services for users

Indicator analysis shows that this indicator reflects the level of supporting services in the park and should be directly used.

(26) Operation of product exhibition centres, product display areas, conference centres and/or auditoriums

Indicator analysis shows that this indicator reflects the level of supporting services in the park and should be directly used.

(27) Presence of on-site banking, bureaux de change and ATM facilities

Indicator analysis shows that this indicator reflects the level of supporting services in the park and should be directly used.

(28) Presence of human resources agency and recruiting services

Indicator analysis shows that this indicator reflects the level of supporting services in the park and should be directly used.

(29) Presence of workforce training services, in coordination with recognized specialized technical training institutions in various fields

Indicator analysis shows that this indicator reflects the perfect level of supporting services in the park and should be directly used.

(30) Presence of dedicated on-site R&D, patenting, and product commercialisation services, in conjunction with recognized universities and/or legal services providers

Indicator analysis shows that this indicator reflects the perfect level of supporting services in the park and should be directly used.

(31) Presence of dedicated on-site matching, twinning and local supplier and buyer forward and backward linkages schemes

Indicator analysis shows that this indicator reflects the perfect level of supporting services in the park and should be directly used.

(32) Presence of quality, product, process standards and trade certification services

Indicator analysis shows that this indicator reflects an entirely satisfactory level of supporting services in the park and should be directly used.

(33) [Per capita income in the industrial park / per capita income nationally]

Indicator analysis shows that this is an economic quality indicator that should be directly used without obvious difference between the one in China and the one in other countries.

(34) [Full-time equivalent employment/hectare in industrial park] / full-time equivalent employment/ hectare / in industrial parks nationally]

Indicator analysis shows that this is an economic quality indicator without obvious difference between China and other countries. The labour supply indicator in the national evaluation system is inadequate. This indicator is highly complementary and should be used directly.

(35) [US$ sales revenues/ha in industrial park / US$ sales revenues/ha nationally]

Indicator analysis shows that this is an economic quality indicator that should be directly used without obvious difference between the one in China and the one in other countries.

(36) [%manufacturing inputs sourced domestically in industrial park / % manufacturing inputs sourced domestically nationally]

Indicator analysis: an economic quality indicator that should be directly used without obvious difference between the one in China and the one in other countries.

(37) [US$ economic value addition (EVA, calculated as output-inputs) per capita in industrial park / US$ per capita nationally]

Indicator analysis shows that this is an economic quality indicator that should be directly used without obvious difference between the one in China and the one in other countries.

(38) [Exports minus imports in industrial park / exports minus imports nationally]

Indicator analysis shows that this is an economic quality indicator that should be directly used without obvious difference between the one in China and the one in other countries.

(39) [FDI % of total investment (or GFCF) in industrial park / FDI % of total investment (or GFCF) nationally]

Indicator analysis shows that this is an economic quality indicator that should be directly used without obvious difference between the one in China and the one in other countries.

(40) [US$ exports/ha in industrial park / US$ exports/ha nationally]

Indicator analysis shows that this is an economic quality indicator that should be directly used without obvious difference between the one in China and the one in other countries.

(41) [Enterprises/ha in industrial park / enterprises/ ha nationally]

Indicator analysis shows that this is an economic quality indicator that should be directly used without obvious difference between the one in China and the one in other countries.

(42) [IPR registrations/year/company in industrial park / IPR registrations/year/company nationally]

Indicator analysis shows that this is an economic quality indicator that should be directly used without obvious difference between the one in China and the one in other countries.

3.4.2.2. Indicators to be applied after the adjustment

(1) Existence of 60% occupancy rate within 6 years (ha of land used by companies for productive use)

Indicator analysis shows that it is difficult to quantify the occupancy rate of parks in China, and this could be changed to a land utilization rate of up to 60 per cent.

(2) Proximity to urban centre (with country significant population)

Indicator analysis shows that industrial parks and cities in China are quite different, so it is difficult to evaluate the soundness of the siting of a park by its distance from the downtown area. This could therefore be changed to an indicator similar to that of “park liveability and perfection of urban service functions” in the evaluation indicator system for national high-tech zones.

(3) Proximity operational public port, airport of use and of interest to the industrial park’s users

Indicator analysis shows that high-speed railway stations can be added to the Chinese road transport system.

(4) [# services offered through one-stop shop in industrial park / # services offered through one-stop shop in nearest urban community]

Indicator analysis shows that, by referring to the clean park evaluation indicator system in Zhejiang Province, it is changed to an online approval rate of (one-stop) government service hall.

(5) [Investment/ha in industrial park / investment/ha nationally]

Indicator analysis shows that it is difficult to carry out statistics of the total investment data of the industrial park, so this is changed to a more direct indicator of regional GDP reflecting the economic output of the industrial park, namely: [Regional GDP/ha in industrial park / regional GDP/ha nationally].

(6) [US$ sales of processed or semi-processed goods as % of total industrial park sales /US$ sales of processed or semi-processed goods as % of GDP in US$]

Indicator analysis shows that, with adjustment by referring to "the proportion of the output value of high-tech manufacturing industry in the output value of high-tech manufacturing industry of the local city", this is changed to [output value of high-tech manufacturing / gross output in industrial park / output value of high-tech manufacturing / gross output nationally].

3.4.2.3. Indicators recommended for integration (deletion)

(1) Private participation in industrial park ownership

Indicator analysis shows that, in the context of industrial park management in China, private capital is generally involved with the development, operational management and land of some industrial parks through possession of the right of use, but generally without ownership.

(2) If industrial park is on public land, operator sourced on the basis of an open competitive tender

Indicator analysis shows that, in the context of industrial park management in China, the park management institution is a government agency, which is not determined through open bidding.

(3) [US$ exports of processed or semi-processed goods as % of total industrial park US$ exports / US$ exports of processed or semi-processed goods as % of total national exports in US$]

Indicator analysis shows that, since it is difficult to obtain the data, it can be integrated into the indicator item reflecting [proportion of sales of processed or semi-processed products in the total sales of the industrial park / proportion of sales of processed or semi-processed products in GDP] of the high value-added products, as percentage.

3.4.3 Screening of key social performance indicators in the International Guidelines for industrial parks for adaptation

3.4.3.1. Directly applicable indicators

(1) Project ESIA conducted and filed with appropriate authorities

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(2) Childcare facilities

Indicator analysis shows correspondence with park liveability and improvement of urban service functions in the evaluation of high-tech industrial development zones of Shaanxi Province. It is recommended that it be directly used.

(3) Park or greenspace as % of total area (as per international standard)

Indicator analysis shows correspondence with land development and utilization ratio in the evaluation approach for the comprehensive development level of national economic and technological development zones; land utilization ratio in scenic industrial park (development zone) evaluation in Zhejiang Province; per capita park or green areas in the indicator system for Qingdao Sino-German Eco-Park. It is recommended that it be directly used.

(4) Presence of on-site incident response centre and public announcement (PA) system

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(5) Disabled-inclusive building design (i.e., access ramp and elevator in each building)

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(6) Construction materials are domestically sourced

Indicator analysis shows that, since the same or similar indicator unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(7) Industrial park provision of utilities to adjacent communities

Indicator analysis shows correspondence with the evaluation of park liveability and urban services for high-tech industrial development zones of Shaanxi Province; the proportion of areas with complete and convenient public utilities within walking range (in the indicator system for Qingdao Sino-German Eco-Park). It is recommended that it be directly used.

(8) ILO/IFC standard worker accommodations on-site

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(9) Drinking fountains in place throughout industrial park buildings

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(10) On-site multi-purpose athletic fields, gym, recreation, leisure, entertainment, community and cultural facilities

Indicator analysis shows correspondence with the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province; the proportion of areas with complete and convenient public utilities within walking range (in the indicator system for Qingdao Sino-German Eco-Park). It is recommended that it be directly used.

(11) Social impact management and monitoring system (SMS) in place in industrial park

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(12) Social audits of each firm on at least biennial basis

Indicator analysis shows that this corresponds to daily disclosure of social responsibility information in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(13) Existence of emergency preparedness and response system in industrial park

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(14) Industrial park community solidarity programme and involvement in community projects

Indicator analysis shows that this corresponds to community development in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(15) Annual public and published social performance report for industrial park

Indicator analysis shows that this corresponds to release of social responsibility report in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(16) % firms with ISO 26000 certification

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(17) % firms with ISO 9001 certification

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(18) % firms with SA 8000 certification

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(19) % firms with AA1000AP certification

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(20) % firms with AA1000AS Sustainability or AA1000SES Stakeholder Engagement Standard certification

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(21) % employees satisfied with social systems and services

Indicator analysis shows that this corresponds to employee satisfaction survey in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(22) Dedicated/enhanced industrial park social regulations, including S-IA requirements, and community dialogue mechanism

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(23) Industrial Park Operator ISO 26000 certifications

Indicator analysis shows that this corresponds to the development zone management institution passing various ISO system (except ISO14000 standard) certifications in a scenic industrial park (development zone) evaluation in Zhejiang Province. It is recommended that it be directly used.

(24) Industrial Park Operator ISO 9001 certifications

Indicator analysis shows that corresponding to passing ISO9001 quality certification in evaluation approach for comprehensive development level of national economic and technological development zones; the development zone management institution getting various ISO system (except ISO14000 standard) certifications in scenic industrial park (development zone) evaluation in Zhejiang Province; the park management institution getting ISO14000 and ISO9001 certification in the comprehensive evaluation of development zones in Shanghai. It is recommended that it be directly used.

(25) Industrial Park Operator SA 8000 certifications

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(26) Industrial Park Operator AA1000AP certifications

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(27) Industrial Park Operator AA1000AS Sustainability or AA1000SES Stakeholder Engagement Standard certifications

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(28) Existence of industrial park dedicated internal ombudsman

Indicator analysis shows that this corresponds to provision of an independent safety production organization in evaluation approach for comprehensive development level of national economic and technological development zones; the internal control and management system in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(29) [Expenditure on health and safety (EHS) per capita in industrial park /EHS per capita nationally]

Indicator analysis shows that this corresponds to per capita investment in occupational health and safety protection in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(30) Existence of internal park operation fire safety guidelines

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this

indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(31) Public or common night transportation or blue-light system in place in industrial park

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service in high-tech industrial development zones of Shaanxi Province; the compliance rate of urban outdoor lighting functional area in the indicator system for Qingdao Sino-German Eco-Park. It is recommended that it be directly used.

(32) [# crimes reported per capita in industrial park / # crimes reported per capita nationally]

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(33) Access by fire services to all parts of industrial park

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(34) [# of nurses per capita in park / # of nurses per capita nationally]

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province. It is recommended that it be directly used.

(35) First-aid room or kit in each building

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province. It is recommended that it be directly used.

(36) Dedicated, 24/7 health services inside the industrial park

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province. It is recommended that it be directly used.

(37) Defibrillator in every building

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province. It is recommended that it be directly used.

(38) [Mean emergency (police, fire, ambulance) response time in industrial park / mean emergency (police, fire, ambulance) response nationally]

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province. It is recommended that it be directly used.

(39) Presence of aggregated, publicly accessible labour complaints or incidents and complaint measurement mechanism data available

Indicator analysis shows that this corresponds to the labour dispute in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(40) Presence of on-site regulator, operator or third-party authorized labour inspectors or counsellors

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(41) Absence of instances of child labour and forced labour

Indicator analysis shows that this corresponds to the prohibition of child labour in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(42) Rights to assemble, unionize, engage in collective bargaining and strike

Indicator analysis shows that this corresponds to labour union organization in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(43) [% workforce unionized in industrial park / % workforce unionized nationally]

Indicator analysis shows that this corresponds to labour union organization in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(44) [Average salary in industrial park / average salary nationally]

Indicator analysis shows that this corresponds to total tax revenue per capita in evaluation approach for national high-tech industrial development zones; tax revenue in scenic industrial park (development zone) evaluation in Zhejiang Province; average labour remuneration of employees in the comprehensive evaluation of development zones in Shanghai; employee compensation in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(45) [% employees on term or open-ended contracts in industrial park / % employees on term or open-ended contracts nationally]

Indicator analysis shows that this corresponds to labour contracting rate in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(46) [# annual complaints per capita about working conditions received in industrial park / # annual complaints per capita about working conditions nationally]

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(47) [# annual complaints per capita resolved in industrial park / # annual complaints per capita resolved nationally]

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(48) % industrial park workers satisfaction with industrial park labour relations

Indicator analysis shows that this corresponds to employee satisfaction survey in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(49) [% employee annual turnover in industrial park / % employee annual turnover nationally]

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(50) [% female workforce in industrial park / % female workforce nationally]

Indicator analysis shows that this corresponds to the number of employees in the park in the evaluation of high-tech industrial development zones of Shaanxi Province. It is recommended that it be directly used.

(51) [% women in management of operator and resident firms / % women in management nationally]

Indicator analysis shows that this corresponds to the number of business managers every 1000 people in evaluation approach for national high-tech industrial development zones. It is recommended that it be directly used.

(52) [Female wages as % of male wages in industrial park / female wages as % of male wages nationally]

Indicator analysis shows that this corresponds to employee compensation in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(53) Industrial park operator-organized inclusiveness or sensitivity training or events

Indicator analysis shows that this corresponds to the number of vocational skill training institutions evaluation approach for comprehensive development level of national economic and technological development zones; hours of vocational skill training for the working-age population in the indicator system for Qingdao Sino-German Eco-Park; social responsibility training and staff training in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(54) [% employees between ages of 16 and 30 in industrial park / % employees between ages of 16 and 30 nationally]

Indicator analysis shows that this corresponds to the number of employees in the park in the evaluation of high-tech industrial development zones of Shaanxi Province. It is recommended that it be directly used.

(55) [# new domestic MSMEs/year/ha in industrial park / # new domestic MSMEs/year/ha nationally]

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(56) [Domestic MSME % total investment in industrial park /MSME % total investment nationally]

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(57) [Domestic MSME % of US$ in sales in industrial park /MSME % of US$ GDP nationally]

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

(58) [Domestic MSME % of US$ in exports in industrial park /MSME % of US$ in exports nationally]

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is recommended that it be directly used.

3.4.3.2. Indicators to be applied after the adjustment

(1) [Average commute time to industrial park workplace for employees / average commute time to workplace nationally]

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China, but it is hard to obtain the average time for employees to and from the workplace across the country. It is recommended that it be changed to "[Average commute time to Industrial Park workplace for employees /average commute time in major cities nationally]".

(2) [% firms with OHSAS 18001 certification in industrial park / % firms with OHSAS 18001 certification nationally]

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China, but it is hard to obtain the data on the proportion, as percentage, of companies certified with OHSAS18001 across the country. It is recommended that it be changed to "% firms with OHSAS 18001 certification in industrial park".

(3) [(# fire alarms/building) in industrial park /(# fire alarms/building) nationally]

Indicator analysis shows that this corresponds to safety production management system in the evaluation indicator system for social responsibility of industrial enterprises in China. It is hard to obtain the number of fire alarms per building across the country, so it is recommended to refer to applicable Chinese standards. It is recommended that it be changed to "[# fire alarms/building in industrial park / # fire alarms/building in accordance with Chinese standards]".

(4) [# sprinklers/building in industrial park / # sprinklers/building nationally]

Indicator analysis shows that this corresponds to safety production management system in the evaluation indicator system for social responsibility of industrial enterprises in China. It is hard to obtain the number of sprinklers per building across the country, so it is recommended to refer to applicable Chinese standards. It is recommended that it be changed to "[# sprinklers/building in industrial park / # sprinklers/building in accordance with Chinese standards]".

(5) [% employees with private health insurance coverage in industrial park / % employees with private health insurance coverage nationally]

Indicator analysis shows that this corresponds to social insurance coverage of local residents in the indicator system for Qingdao Sino-German Eco-Park; social security and provident fund payment in the evaluation indicator system for social responsibility of industrial enterprises in China. It is hard to obtain the national proportion of employees with private health insurance, as percentage, and whether employees have private health insurance does not embody the social performance of the park. It is recommended that it be changed to "[% employees with social health insurance coverage in industrial park / % employees with social health insurance coverage nationally] ".

(6) [% industrial park employees commuting <15km / % national employees commuting <15km]

Indicator analysis shows that, since the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China, this indicator is of complementary value to the existing indicator system for industrial parks in China. It is hard to obtain the national proportion of employees with commuting distance less than 15 km, so it is recommended that it be changed to "[average commuting distance of employees in the industrial park / average commuting distance in major cities nationally]".

(7) [% employees from legally recognized minority or disadvantaged groups, or with disabilities in industrial park / % employees from legally recognized minority or disadvantaged groups, or with disabilities nationally]

Indicator analysis: Employees are not treated differently because of their ethnic background in China's industrial parks. So it is recommended that it be changed to "[% employees from legally recognized disadvantaged groups or with disabilities in industrial park / % employees from legally recognized disadvantaged groups or with disabilities nationally]".

3.4.3.3. Indicators recommended for integration (deletion)

(1) Proximity to public transport (i.e., bus, subway or light rail)

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province; the proportion of areas with complete and convenient public utilities within walking range in the indicator system for Qingdao Sino-German Eco-Park. Buses are operating in almost all industrial parks in China, or there are buses directly to the industrial parks. It is recommended that it be deleted.

(2) Proximity to residentially zoned areas

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province. There are residential areas in or outside industrial parks in China. It is recommended that it be deleted.

(3) Power lines in industrial park are buried, for workforce safety

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province. Elevated or buried power lines have been installed in industrial parks in China as required. It is recommended that it be deleted.

(4) Presence of outdoor street-lighting throughout the industrial park

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province. Outdoor street lamps are substantially installed on roads and in factory areas of industrial parks in China. It is recommended that it be deleted.

(5) Faith and prayer facilities for major denominations and religious groups represented in the workforce

Indicator analysis shows that the employees in industrial parks in China are not discriminated against for their religious beliefs, so it is recommended that it be deleted.

(6) Climate-appropriate (ideally centralized and resource-efficient / sustainable) HVAC equipment and systems in buildings

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province. Buildings in industrial parks in China are substantially equipped with air conditioners. It is recommended that it be deleted.

(7) Proximity to mini-mart or supermarket retail service

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province; the proportion of areas with complete and convenient public utilities within walking range is in the indicator system for Qingdao Sino-German Eco-Park. There are small or medium-sized supermarkets or retail stores in almost all industrial parks in China. It is recommended that it be deleted.

(8) Complaints box or hotline available in industrial park

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province. Complaint boxes and hotlines are available in almost all industrial parks in China. It is recommended that it be deleted.

(9) Separate women's and men's restrooms in each building

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province. Industrial parks in China are provided with separate toilets for men and women. It is recommended that it be deleted.

(10) Site is not on traditional, indigenous or tribal land

Indicator analysis shows that although the same or similar indicator is unavailable in domestic evaluation indicator systems, industrial parks in China are often built on State-owned or collective-owned land, not on traditional, aboriginal or tribal land. It is recommended that it be deleted.

(11) Operable windows in industrial park buildings, ensuring natural ventilation

Indicator analysis shows that though the same or similar indicator is unavailable in domestic evaluation indicator systems, windows of buildings in industrial parks in China can be freely opened and closed to achieve natural ventilation. It is recommended that it be deleted.

(12) On-site common cafeteria/canteen/restaurant/catering

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province; indicator system for Qingdao Sino-German Eco-Park has included the proportion of areas with complete and convenient public utilities within walking range as an indicator. There are restaurants in almost all industrial parks in China, and many enterprises are equipped with dining halls. It is recommended that it be deleted.

(13) Presence of public or subsidized transportation system for workforce between key points in or near industrial park

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province. There are bus routes operating in almost all industrial parks in China. It is recommended that it be deleted.

(14) Perimeter fence and access control posts

Indicator analysis shows that the same or similar indicator is unavailable in the evaluation indicator system for industrial parks in China. Industrial parks in China are substantially open parks, which usually are not provided with fences or access control guards. The parks provided with fences and access control guards are often for management purposes, but not to ensure safety, such as specific specialized parks, free trade zones, comprehensive bonded zones, etc. It is recommended that it be deleted.

(15) On-site hospital, clinic or dispensary within industrial park

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of Shaanxi Province; the proportion of areas with complete and convenient public utilities within walking range in the indicator system for Qingdao Sino-German Eco-Park. There are hospitals, clinics, or medical rooms essentially in all industrial parks in China. It is recommended that it be deleted.

(16) CCTV cameras and security patrols in place

Indicator analysis shows that this corresponds to the evaluation of park liveability and urban service for high-tech industrial development zones of

Shaanxi Province. Surveillance cameras are equipped in substantially all industrial parks in China. It is recommended that it be deleted.

3.4.4 Screening of key environmental performance indicators in the International Guidelines for Industrial Parks for adaptation

3.4.4.1. Directly applied indicators

(1) Site EIA conducted and filed with appropriate authorities

Indicator analysis shows that this corresponds to environmental impact indicators for EIA of the project in the evaluation indicator system for social responsibility of industrial enterprises in China. It is recommended that it be directly used.

(2) Industrial park situated on redeveloped brownfield site, with the effective possibility of reusing, re-purposing and converting existing infrastructure or buildings

Indicator analysis shows that the data is available by referring to the land space planning of the industrial park. It is recommended that it be directly used.

(3) Water, electrical and gas meters and load management systems in place, as appropriate to the services offered

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(4) Air quality monitoring (remote controlling and recording) system and infrastructure in place in industrial park

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(5) Presence of an off-site landfill for industrial park solid waste management

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(6) Presence of sustainable rain and storm water collection / harvesting (i.e., culverts/drains, cisterns/tanks), management, treatment (e.g., filter, water hyacinth) and reuse systems

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(7) % of buildings with German Sustainable Building Council (DGNB) certification

Indicator analysis shows that this corresponds to the proportion of green buildings in new industrial buildings and the proportion of green buildings in new public buildings in the evaluation indicator system for green parks; the evaluation indicator system for low-carbon parks includes the proportion of new public buildings certified as green buildings. It is recommended that it be directly used.

(8) % of buildings with Building Research Establishment Environmental Assessment Method (BREAM) certification

Indicator analysis shows that this corresponds to the proportion of green buildings in new industrial buildings and the proportion of green buildings in new public buildings in the evaluation indicator system for green parks; the evaluation indicator system for low-carbon parks includes the proportion of new public buildings certified as green buildings. It is recommended that it be directly used.

(9) % of buildings with World Green Building Council (WGBC) certification

Indicator analysis shows that this corresponds to the proportion of green buildings in new industrial buildings and the proportion of green buildings in new public buildings in the evaluation indicator system for green parks; the evaluation indicator system for low-carbon parks includes the proportion of new public buildings certified as green buildings. It is recommended that it be directly used.

(10) [% firms with one of the listed WGBC certifications in industrial park for on-site buildings / % firms having obtained such a certification nationally]

Indicator analysis shows that this corresponds to the proportion of green buildings in new industrial buildings and the proportion of green buildings in new public buildings in the evaluation indicator system for green parks; the evaluation indicator system for low-carbon parks includes the proportion of new public buildings certified as green buildings. It is recommended that it be directly used.

(11) Anti-seismic, anti-flood, or anti-avalanche resilient construction techniques used, as applicable to site conditions

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(12) Presence of solar street lighting

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(13) Presence of waste exchange clearinghouse in the industrial park, promoting industrial symbiosis and economic circularity

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(14) Low-voltage (ideally photovoltaic) power electrical systems

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(15) Walking and bicycle paths, and racks, inside park for workforce

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(16) Presence of bicycle-sharing system in industrial park

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(17) Electrical and hybrid vehicle power plug-in points in industrial park

Indicator analysis shows that this corresponds to the proportion of energy-efficient and new-energy buses in the evaluation indicator system for green parks. It is recommended that it be directly used.

(18) Non-potable and "grey" water usage for industrial park irrigation

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(19) Operator or users association shared efficient manufacturing systems and technologies (i.e., cloud-based systems; value networks and joint purchasing; rapid prototyping, CAD, 3D-printing; smart technology, M2M, smart grid, and internet of things; etc.)

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(20) Presence of team of dedicated on-site environmental engineers and/or of staffed unit in the employ of the regulator or operator

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(21) Formal operator schedule for verification of pipes and drains inside park, in place and applied

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(22) Operator annual environmental report released to public

Indicator analysis shows that this corresponds to the environmental information disclosure form for key enterprises and the perfection of eco-industrial park information platform against applicable standards for national eco-industrial demonstration parks; the evaluation indicator system for green parks includes the level of green park information platform. It is recommended that it be directly used.

(23) [Expenditure on environmental management/ha in industrial park / expenditure on environmental management/ha nationally]

Indicator analysis shows that this corresponds to the proportion of the added value of resource recycling industry in the industrial added value of the park against applicable standards for national eco-industrial demonstration parks. It is recommended that it be directly used.

(24) Natural disaster assessment and risk management plan and system in place, as appropriate

Indicator analysis shows that the construction of environmental risk prevention and control system in the park meets applicable standards for national eco-industrial demonstration parks. It is recommended that it be directly used.

(25) Availability of dedicated financial or tax incentives for green building within the industrial park

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(26) Dedicated or enhanced industrial park internal environmental regulations, including biodiversity rules, environmental management system (EMS) requirements

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(27) Dedicated internal operating regulations with respect to odour, smoke, light, dust, vibration and noise, as well as hours of activity

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(28) [% firms that are UN Global Compact registered participants or signatories In the industrial park / % firms having signed the UNGC or obtained such a registration nationally]

Indicator analysis shows that this is a green infrastructure indicator in which there is no obvious difference between that used in China and that used in other countries and it is recommended that it be directly used.

(29) Employee car-sharing or car-pooling system in place

Indicator analysis shows that a green system indicator that has no obvious difference between the one in China and the one in other countries is recommended that it be directly used.

(30) Presence of solid waste collection service

Indicator analysis shows that an indicator for efficient and clean production, emission, and waste management that has no obvious difference between the one in China and the one in other countries is recommended that it be directly used.

(31) [% energy from renewable (e.g., solar, wind, biomass/biogas/biofuel, geothermal, tidal, hydroelectric, waste-to-power) sources in industrial park / % energy acquired from renewable sources nationally]

Indicator analysis shows that this corresponds to the proportion of renewable energy in primary energy in the evaluation indicator system for low-carbon parks; the proportion of non-fossil energy in primary energy consumption and the proportion of renewable energy in the reference indicators for the industrial park transformation to the circular economy; the proportion of renewable energy used against applicable standards for national eco-industrial demonstration parks. It is recommended that it be directly used.

(32) [% solid waste sent to landfills in industrial park / % of solid waste sent to landfills nationally]

Indicator analysis shows that an indicator for efficient and clean production, emission, and waste management that has no obvious difference between the one in China and the one in other countries is recommended that it be directly used.

(33) [# days failing National Air Quality Safety Standards in industrial park / # days failing National Air Quality Safety Standards nationally]

Indicator analysis shows that an indicator for efficient and clean production, emission, and waste management that has no obvious difference between the one in China and the one in other countries is recommended that it be directly used.

(34) [% firms that invest in industrial symbiosis in industrial park / % firms that invest in industrial symbiosis nationally]

Indicator analysis shows that this corresponds to the number of new projects for constructing the eco-industrial chain after implementation of construction plan in the standards for national eco-industrial demonstration parks. Without obvious differences between the one in China and the one in other countries, this indicator is recommended that it be directly used.

3.4.4.2. Indicators to be applied after adjustment

(1) Site compatibility with land-use master plan as regards non-agricultural use and environmentally-sensitive areas, such as forests, wetlands, mangroves, floodplains, wildlife refuges

Indicator analysis shows that this is specified in the guide “Opinions on further improving environmental impact assessment for industrial park planning” by the Ministry of Ecology and Environment: in provinces where an environmental management and control scheme by zone on the “three lines and one list” approach (ecological protection red line, environmental quality bottom line, resource utilization upline and environmental access list) has been issued and followed, the environmental impact report for national industrial park planning within their administrative region can be reviewed by the

provincial competent environmental authorities entrusted by Ministry of Ecology and Environment, and the review comments shall be delivered to Ministry of Ecology and Environment. It is recommended that it be changed to "compliance of the site with the "three lines and one list" (ecological protection red line, environmental quality bottom line, resource utilization upline and environmental access list) requirements".

(2) Internal zoning planning adopted

Indicator analysis shows that the description is not specific enough, so it is recommended that the zoning planning type be clarified. It is recommended that it be changed to "Adoption of specific internal zone planning".

(3) [% plots actually allocated to non-polluting or light manufacturing activities in industrial park / % of GDP represented by non-polluting or light manufacturing activity nationally]

Indicator analysis shows that the statement does not conform to China's national conditions. It is recommended that it be changed to [% plots actually allocated to green industry or non-industrial production activities in industrial park / % of GDP represented by green industry or non-industrial production activities nationally].

(4) Presence of toxic and hazardous waste collection, storage and treatment or disposal management system

Indicator analysis shows that toxic and hazardous wastes in many parks in China are commonly referred to as hazardous wastes, which are generally handled by external institutions with hazardous waste qualifications. It is recommended that it be changed to "Presence of hazardous waste collection, storage and treatment or disposal management system".

(5) Separate recycling reception bins, bells and/or containers for: paper and card; recyclable plastic containers; recyclable metal; glass; wood; and brick or stone materials and debris

Indicator analysis shows that it is recommended that it be changed to "Presence of garbage sorting and recycling devices".

(6) % of buildings with Leadership in Energy and Environmental Design (LEED) certification

Indicator analysis shows that this corresponds to the proportion of green buildings in new industrial buildings, and the proportion of green buildings in new public buildings against applicable standards for national eco-industrial demonstration parks; the proportion of certified green buildings in new public buildings is included in the evaluation indicator system for low-carbon parks. It is recommended that the quantitative input scoring basis in the Guidelines be changed to "$\geq$ 51% = 1; $\leq$ 49% = 0".

(7) Annual environmental audits performed on each firm

Indicator analysis shows that this corresponds to the rate of key enterprises subject to cleaner production audit in the industrial park against applicable standards for national eco-industrial demonstration parks; the rate of key enterprises subject to cleaner production audit, the number of enterprises subject to an energy audit, and energy consumption diagnosis, the number of enterprises with carbon emission report and the number of enterprises subject to carbon inventory are included in the evaluation indicator system for low-carbon parks. It is recommended that it be changed to "% of the implementation of enterprises carrying out annual environmental audit in industrial parks".

(8) [% firms having obtained a "Green" (e.g., "Green Label", etc. 20), ISO14001, ISO 50001, International Sustainability and Carbon (ISCC)21 certification or Global Reporting Initiative (GRI)22 Guidelines G3.1 rating (for recycled materials and wastewater, clean energy, sustainable alternative transport systems, etc.) or registration in industrial park / % firms having obtained such a certification nationally]

Indicator analysis shows that it is recommended to add the title of "National Eco-industrial Park". It is recommended that it be changed to "[% firms

having obtained a "Green" (e.g., "National Eco-industrial Park", "Green Label", etc. 20), ISO14001, ISO 50001, International Sustainability and Carbon (ISCC)21 certification or Global Reporting Initiative (GRI)22 Guidelines G3.1 rating (for recycled materials and wastewater, clean energy, sustainable alternative transport systems, etc.) or registration in industrial park / % firms having obtained such a certification nationally]".

(9) Operator possesses UN Global Compact registration

Indicator analysis shows that it is recommended that the "operator" be changed to the "Management institution of the industrial park".

(10) Operator possesses ISO14001

Indicator analysis shows that it is recommended that the "operator" be changed to the "Management institution of the industrial park".

(11) Operator possesses International Sustainability and Carbon Certification (ISCC)

Indicator analysis shows that it is recommended that the "operator" be changed to the "Management institution of the industrial park".

(12) Operator possesses ISO50001 or Green certification

Indicator analysis shows that it is recommended that the "operator" be changed to the "Management institution of the industrial park".

(13) Operator possesses GRI rating

Indicator analysis shows that it is recommended that the "operator" be changed to the "Management institution of the industrial park".

(14) [Power use in KWh /US$ of sales in industrial park / power use in KWh / US$ of sales nationally]

Indicator analysis shows that this corresponds to the elasticity coefficient of comprehensive energy consumption against applicable standards for national eco-industrial demonstration parks. The total comprehensive energy consumption of the industrial park shall be considered, that is, the total energy consumed by all industrial enterprises in the park, including the consumption of coal, oil, electricity and other forms of energy. It is recommended that it be changed to "[Comprehensive energy consumption (tons of standard coal)/ industrial added value (10,000 yuan) of the industrial park/national comprehensive energy consumption (tons of standard coal)/industrial added value (10,000 yuan)]".

(15) [Water use in m3/US$ sales in industrial park / water use in m3/US$ sales) nationally]

Indicator analysis shows that this corresponds to the elasticity coefficient of freshwater consumption against applicable standards for national eco-industrial demonstration parks. The industrial freshwater consumption shall be specified, that is, the total water amount obtained from any water source by the water-consuming unit or system of industrial enterprises in the park and used for production and living for the first time, excluding the part of domestic water which is metered separately and has domestic sewage discharged separately (not mixed with industrial wastewater). It is recommended that it be changed to "[Freshwater consumption (m3)/industrial added value (10,000 yuan) of the industrial park/national freshwater consumption (m3)/industrial added value (10,000 yuan)]".

(16) [m3 of wastewater recycled/US$ in sales in industrial park / m3 of wastewater recycled/US$ in sales nationally]

Indicator analysis shows that this corresponds to the reuse rate of recycled (reclaimed) water against applicable standards for national eco-industrial demonstration parks. Recycled water (reclaimed water) refers to the water complying with applicable quality standards for recycled water after processing by the sewage treatment plant in the park and then purification by the reclamation process. It is recommended that it be changed to "[Reuse volume of recycled (reclaimed) water from recycled

wastewater (ton)/industrial added value (10,000 yuan) of the industrial park/national reuse volume of recycled (reclaimed) water from recycled wastewater (ton)/industrial added value (10,000 yuan)]".

(17) [Solid waste generated/US$ sales in industrial park / solid waste generated/US$ sales nationally]

Indicator analysis shows that this corresponds to the comprehensive utilization rate of industrial solid waste against applicable standards for national eco-industrial demonstration parks. It is recommended that it be changed to "[Solid waste (including hazardous waste) generated/industrial added value (10,000 yuan) of the industrial park/national solid waste (including hazardous waste) generated/ industrial added value (10,000 yuan)]".

(18) [Tons of solid waste recycled/US$ in sales in industrial park / tons of solid waste recycled/US$ in sales nationally]

Indicator analysis shows that this corresponds to the comprehensive utilization rate of industrial solid waste (including hazardous waste) against applicable standards for national eco-industrial demonstration parks. It is recommended that it be changed to "[Comprehensive utilization of industrial solid waste (ton)/industrial added value (10,000 yuan) of the industrial park/national comprehensive utilization of industrial solid waste (ton)/industrial added value (10,000 yuan)]".

(19) [m3 of SOx, NOx, N2O, CO, CH, CFC, HC emissions/US$ sales in industrial park / (m3 of SOx, NOx, N2O, CO, CH, CFC, HC emissions)/US$ GDP

Indicator analysis shows that this corresponds to the elasticity coefficient of main pollutant emissions and the annual reduction rate of carbon dioxide emissions per unit of industrial added value against applicable standards for national eco-industrial demonstration parks; the waste emission indicator is included as the reference indicator for parks in transformation to the circular economy; ecological waste emissions are included in the evaluation indicator system for the comprehensive development level of national economic and technological development zones. As there are few data on CO, CH, CFC, and HC emissions in China, it is recommended that it be changed to "[SO2, NOx and particulate emissions (tons) of the industrial park/industrial added value (10,000 yuan)/SO2, NOx and particulate emissions (tons) / GDP (10,000 yuan)]".

(20) [Hazardous waste produced/US$ in sales in industrial park / hazardous waste produced/US$ in sales nationally]

Indicator analysis shows that this corresponds to the comprehensive utilization rate of industrial solid waste (including hazardous waste) against applicable standards for national eco-industrial demonstration parks. It is recommended that it be changed to "[Hazardous waste produced/industrial added value (10,000 yuan) of the industrial park / national hazardous waste produced / industrial added value (10,000 yuan)]".

(21) [US$ million/year heavy industry sales/ha in industrial park] / [US$ million/year heavy industry sales/ha nationally]

Indicator analysis shows that it is recommended that it be changed to [added value of heavy industry (10,000 yuan/year)/hectare of the industrial park] / [national added value of heavy industry (10,000 yuan/year)/hectare].

3.4.4.3. Indicators recommended for integration (deletion)

(1) Presence of public wastewater sewerage system, STP and/or of wastewater treatment plant (WWTP)

Indicator analysis shows that it is recommended that this be integrated with "availability of Common Effluent Treatment Plant (CETP)" and be changed to "Presence of central sewage treatment facilities (inside or outside the park)".

(2) Presence of CETP

Indicator analysis shows that this corresponds to the central sewage treatment facility against

applicable standards for national eco-industrial demonstration parks, it is recommended that it be integrated with "establishment of public wastewater discharge system, sewage treatment plant (STP) or wastewater treatment plant (WWTP)" and be changed to "Presence of central sewage treatment facilities (inside or outside the park)".

(3) Presence of organic composting reception point for organic, vegetable and soil waste transformation into fertilizer and/or of biodigesters

Indicator analysis shows that with no or little agricultural land in industrial parks in China, data for this indicator are not available, so it is recommended that t be deleted.

3.5 Framework and content for adaptation

3.5.1 Framework and content for adaptation of the International Guidelines for Industrial Parks – economic indicators

Table 3-22 Economic indicator system for localization of the International Guidelines for Industrial Parks

Indicator	Quantitative input scoring basis	Score
1. Good economic governance		
Robust economic system tracking economic analysis quantitatively showing a positive economic return (i.e., in terms of employment, taxes, net exports, forex, local supplies), after such factors as land, CAPEX and OPEX costs and subsidies are taken into account.	(Yes=1; no=0)	
Private participation in industrial park planning	(Yes=1; no=0)	
Private sector represented on Board of Regulators	(Yes=1; no=0)	
Land utilization rate≥60%	(Yes=1; no=0)	
Existence and functioning of a formal industrial park marketing department/unit	(Yes=1; no=0)	
User maintenance and operation fees or charges collected by the operator	(Yes=1; no=0)	
% user enterprise satisfaction with the services provided by the industrial park operator	(≥51%=1; <49%=0)	
Operator customer relationship management (CRM) system in place	(Yes=1; no=0)	
Operator ISO 9001 certification	(Yes=1; no=0)	
Good economic governance score: (scale of 0–9)		

2. Economically enabling site and infrastructure hardware (appropriate site selection)		
Unencumbered land title	(Yes=1; no=0)	
Phased site development strategy and implementation	(Yes=1; no=0)	
Park liveability and perfection of urban service functions	(Yes=1; no=0)	
Proximity to appropriate highway	(Yes=1; no=0)	
Proximity to power transmission or distribution grid	(Yes=1; no=0)	
Proximity to gas transmission mains and gas 'city-gate'	(Yes=1; no=0)	
Proximity to microwave tower for broadband GSM mobile telephony and Wi-Fi connectivity	(Yes=1; no=0)	
Appropriately-sized (wide) internal roads	(Yes=1; no=0)	
Proximity operational public port, airport and high-speed of use and of interest to the industrial park's users	(Yes=1; no=0)	
[% hours power outage per period in industrial park / % hours power outage nationally]	(≥ 1=0; <1=1)	
[% hours of interruption of water supply, quality or quality in industrial park / % hours of interruption of water supply, quality or quality nationally]	(≥ 1=0; <1=1)	
Economically enabling site and hardware score: (scale of 0–11)		
3. Economically enabling services software		
Regular, scheduled maintenance of buildings, as well as dedicated rapid-response or emergency maintenance, repair, rectification and restoration service, including for utilities and superstructure assets	(Yes=1; no=0)	
Dedicated or localized industrial park business support, business association support, incubation, innovation or competitiveness programmes on effective offer	(Yes=1; no=0) (depending on # of programmes available)	
Industrial park user enterprises have access to specific financial support programmes	(Yes=1; no=0)	
Dedicated one-stop shop/single window in industrial park	(Yes=1; no=0)	
E-government services dedicated to the industrial park	(Yes=1; no=0)	
Online approval rate of (one-stop) government service hall	(≥51%=1; <49%=0)	
Formal industrial park B2B gatherings held on formal industrial park B2B platforms on regular basis	(Yes=1; no=0)	
Operator landscaping, gardening, and cleaning services	(Yes=1; no=0)	

Presence of mechanical cargo loading and off-loading services for users	(Yes=1; no=0)	
Operation of product exhibition centres, product display areas, conference centres, and/or auditoria	(Yes=1; no=0) (depending on # and variety)	
Presence of on-site banking, bureaux-de-change and ATM facilities	(Yes=1; no=0) (depending on # and variety)	
Presence of human resources agency and recruiting services	(Yes=1; no=0)	
Presence of manpower training services, in coordination with recognized specialized technical training institutions in various fields	(Yes=1; no=0)	
Presence of dedicated on-site R&D, patenting, and product commercialisation services, in conjunction with recognized universities and/or legal services providers	(Yes=1; no=0)	
Presence of dedicated on-site matching, twinning, and local supplier and buyer forward and backward linkages schemes	(Yes=1; no=0) (depending on # and sophistication of schemes)	
Presence of quality, product, process standards, and/or trade certification services	(Yes=1; no=0)	
Economically enabling software and services score: (scale of 0–16)		
4. Economically impactful nature: employment, investment, turnover		
[Per capita income in the industrial park / per capita income nationally]	(1=1; <1=0)	
[Full-time equivalent employment/hectare in industrial park] / full-time equivalent employment/hectare / in industrial parks nationally]	(1=1; <1=0)	
[Regional GDP/ha in industrial park / regional GDP/ha nationally]	(1=1; <1=0)	
[US$ sales revenues/ha in industrial park / US$ sales revenues/ ha nationally]	(1=1; <1=0)	
[% manufacturing inputs sourced domestically in industrial park / % manufacturing inputs sourced domestically nationally]	(1=1; <1=0)	
[Output value of high-tech manufacturing / gross output in industrial park / output value of high-tech manufacturing / gross output nationally]	(1=1; <1=0)	
[US$ economic value addition (EVA, calculated as output-inputs) per capita in industrial park / US$ per capita nationally]	(1=1; <1=0)	

[Exports minus imports in industrial park / exports minus imports nationally]	(1=1; <1=0)	
[FDI % of total investment (or GFCF) in industrial park / FDI % of total investment (or GFCF) nationally]	(1=1; <1=0)	
[US$ exports/ha in industrial park / US$ exports/ha nationally]	(1=1; <1=0)	
[Enterprises/ha in industrial park / enterprises/ha nationally]	(1=1; <1=0)	
[IPR registrations/year/company in industrial park/ IPR registrations/year/company nationally]	(1=1; <1=0)	
Economically impactful nature score: (scale of 0–12)		
Economic performance score: (scale of 0–48)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones.

3.5.2 Framework and content for adaptation of the International Guidelines for Industrial Parks – social indicators

Table 3-23 Social indicator system for localization of the International Guidelines for Industrial Parks

Indicator	Quantitative input scoring basis	Score
1. Socially suitable site and social infrastructure		
Project ESIA conducted and filed with appropriate authorities	(Yes=1; no=0)	
Childcare facilities	(Yes=1; no=0)	
(depending on # and type of service)		
Park or greenspace as % of total area (as per international standard)	(Yes=1; no=0)	
Presence of on-site incident response centre and public announcement (PA) system	(Yes=1; no=0)	
Disabled-inclusive building design (i.e., access ramp and elevator in each building	(Yes=1; no=0)	
[Average commute time to industrial park workplace for employees / average commute time in major cities nationally]	(≥1=1; <1=0)	
Construction materials are domestically sourced	(Yes=1; no=0)	
Industrial park provision of utilities to adjacent communities	(Yes=1; no=0)	
ILO/IFC standard worker accommodations on-site	(Yes=1; no=0)	
Drinking fountains in place throughout industrial park buildings	(Yes=1; no=0)	

On-site multi-purpose athletic fields, gym, recreation, leisure, entertainment, community and cultural facilities	(Yes=1; no=0)	
Availability of vocational skill training institution in the industrial park	(Yes=1; no=0)	
Proportion of public service expenditure in public budget expenditure	(≥national average proportion in the said year =1; ≤the national average proportion in the said year =0)	
Socially appropriate site and social infrastructure score: (scale of 0–13)		
2. Quality social management system and services		
Social impact management and monitoring system (SMS) in place in the industrial park	(Yes=1; no=0)	
Social audits of each firm on at least biennial basis	(Yes=1; no=0)	
Existence of emergency preparedness and response system in industrial park	(Yes=1; no=0)	
Industrial park community solidarity programme and involvement in community projects	(Yes=1; no=0)	
Annual public/published social performance report for industrial park	(Yes=1; no=0)	
% firms with ISO 26000 certification	(≥51% =1; ≤49% =0)	
% firms with ISO 9001 certification	(≥51% =1; ≤49% =0)	
% firms with SA 8000 certification	(≥51% =1; ≤49% =0)	
% firms with AA1000AP certification	(≥51% =1; ≤49% =0)	
% firms with AA1000AS sustainability or AA1000SES stakeholder engagement standard certification	(≥51% =1; ≤49% =0)	
% Employees satisfied with social systems and services	(≥50% =1; ≤49% =0)	
Dedicated/enhanced industrial park social regulations, including S-IA requirements, and community dialogue mechanism	(Yes=1; no=0)	
Industrial Park Operator ISO 26000 certifications	(Yes=1; no=0)	
Industrial Park Operator ISO 9001 certifications	(Yes=1; no=0)	
Industrial Park Operator SA 8000 certifications	(Yes=1; no=0)	
Industrial Park Operator AA1000AP certifications	(Yes=1; no=0)	
Industrial Park Operator AA1000AS Sustainability or AA1000SES Stakeholder Engagement Standard certifications	(Yes=1; no=0)	

Existence of industrial park dedicated internal ombudsman	(Yes=1; no=0)	
Quality social management system and social services score: (scale of 0–18)		
3. Occupational health and safety		
[Expenditure on health and safety (EHS) per capita in industrial park / EHS per capita nationally]	(≥1=0; <1=1)	
% firms with OHSAS 18001 certification in industrial park	(≥51% =1; ≤49% =0)	
Existence of internal park operation fire safety guidelines	(Yes=1; no=0)	
Public or common night transportation or blue-light system in place in industrial park	(Yes=1; no=0)	
[# fire alarms/building in industrial park / # fire alarms/building in accordance with Chinese standards]	(≥1=1; <1=0)	
[# sprinklers/building in industrial park / # sprinklers/building in accordance with Chinese standards]	(≥1=1; <1=0)	
[# crimes reported per capita in industrial park / # crimes reported per capita nationally]	(≥1=1; <1=0)	
Access by fire services to all parts of industrial park	(Yes=1; no=0)	
[% employees with social health insurance coverage in industrial park / % employees with social health insurance coverage nationally]	(≥1=1; <1=0)	
[# of nurses per capita in park / # of nurses per capita nationally]	(≥1=1; <1=0)	
First-aid room or kit in each building	(Yes=1; no=0)	
Dedicated, 24/7 health services inside the industrial park	(Yes=1; no=0)	
Defibrillator in every building	(Yes=1; no=0)	
[Mean emergency (police, fire, ambulance) response time in industrial park / mean emergency (police, fire, ambulance) response nationally]	(≥1=1; <1=0)	
Provision of an independent safety production organization	(Yes=1; no=0)	
Occupational health and safety score: (scale of 0–15)		
4. Good labour relations and welfare		
Presence of aggregated, publicly accessible labour complaints or incidents and complaint measurement mechanism data available	(Yes=1; no=0) (depending on sophistication and transparency of system)	

Presence of on-site regulator, operator or third-party authorized labour inspectors or counsellors	(Yes=1; no=0)	
Absence of instances of child labour and forced labour	(No=1; yes=0)	
Rights to assemble, unionize, engage in collective bargaining, and strike	(Yes=1; no=0)	
[% workforce unionized in industrial park / % workforce unionized nationally	(≥1=1 ‹1=0)	
[Average salary in industrial park / average salary nationally]	(≥1=1 ‹1=0)	
[% employees on term or open-ended contracts in industrial park / % employees on term or open-ended contracts nationally]	(≥1=1; ‹1=0)	
[# annual complaints per capita about working conditions received in industrial park/ # annual complaints per capita about working conditions nationally]	(≥1=0; ‹1=1)	
[# annual complaints per capita resolved in industrial park / # annual complaints per capita resolved nationally]	(≥1=1; ‹1=0)	
% industrial park workers satisfaction with industrial park labour relations	(≥51% =1; ≤49% =0)	
[Average commuting distance of employees in the industrial park/average commuting distance in major cities nationally]	(≥1=1; ‹1=0)	
[% employee annual turnover in industrial park / % employee annual turnover nationally]	(≥1=0; ‹1=1)	
Good labour relations and welfare score: (scale of 0–12)		
5. Social inclusiveness		
[% employees from legally-recognized disadvantaged groups or with disabilities in industrial park / % employees from legally-recognized disadvantaged groups or with disabilities nationally]	(≥1=1; ‹1=0)	
[% female workforce in industrial park / % female workforce nationally]	(≥1=1; ‹1=0)	
[% women in management of operator and resident firms / % women in management nationally]	(≥1=1; ‹1=0)	
[Female wages as % of male wages in industrial park / female wages as % of male wages nationally]	(≥1=1; ‹1=0)	
Industrial park operator-organized inclusiveness or sensitivity training or events	(Yes=1; no=0)	
[% employees between ages of 16 and 30 in industrial park / % employees between ages of 16 and 30 nationally]	(≥1=1; ‹1=0)	

[# new domestic MSMEs/year/ha in industrial park / # new domestic MSMEs/year/ha nationally]	(≥1=1; <1=0)	
Establishment of a financing promotion platform for MSMEs	(Yes=1; no=0)	
[Domestic MSME % total investment in industrial park /MSME % total investment nationally]	(≥1=1; <1=0)	
[Domestic MSME % of US$ in sales in industrial park /MSME % of US$ GDP nationally]	(≥1=1; <1=0)	
[Domestic MSME % of US$ in exports in industrial park /MSME % of US$ in exports nationally]	(≥1=1; <1=0)	
Social inclusiveness score: (scale of 0–11)		
Social performance score: (scale of 0–69)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones.

3.5.3 Localization framework and content of the International Guidelines for Industrial Parks - environmental indicators

Table 3-24 Environmental indicator system for adaptation of the International Guidelines for Industrial Parks

Indicator	Quantitative input scoring basis	Score
1. Environmentally suitable site		
Site EIA conducted and filed with appropriate authorities	(Yes=1; no=0)	
Compliance of the site with the "three lines and one list"(ecological protection red line, environmental quality bottom line, resource utilization upline, and environmental access list) requirements	(Yes=1; no=0)	
Adoption of specific internal zone planning	(Yes=1; no=0)	
[% plots actually allocated to green industry or non-industrial production activities in industrial park / % of GDP represented by green industry or non-industrial production activities nationally]	(≥1=1; <1=0)	
Industrial Park situated on redeveloped brownfield site, with the effective possibility of reusing, re-purposing and converting existing infrastructure or buildings	(Yes=1; no=0)	
Environmentally appropriate site score: (scale of 0–5)		

2. Green infrastructure		
Water, electrical and gas meters and load management systems in place, as appropriate to the services offered	(Yes=1; no=0)	
Air quality monitoring (remote controlling and recording) system and infrastructure in place in industrial park	(Yes=1; no=0)	
Presence of an off-site landfill for industrial park solid waste management	(Yes=1; no=0)	
Presence of hazardous waste collection, storage and treatment or disposal management system	(Yes=1; no=0)	
Presence of central sewage treatment facilities (inside or outside the park)	(Yes=1; no=0)	
Presence of sustainable rain and storm water collection / harvesting (i.e., culverts/drains, cisterns/tanks), management, treatment (e.g., filter, water hyacinth) and reuse systems	(Yes=1; no=0)	
Presence provision of garbage sorting and recycling devices	(Yes=1; no=0)	
% of buildings with Leadership in Energy and Environmental Design(LEED) certification	(≥51%=1; ≤49%=0)	
% of buildings with German Sustainable Building Council (DGNB) certification	(≥51%=1; ≤49%=0)	
% of buildings with Building Research Establishment Environmental Assessment Method (BREAM) certification	(≥51%=1; ≤49%=0)	
% of buildings with World Green Building Council (WGBC) certification	(≥51%=1; ≤49%=0)	
[% firms with one of the listed WGBC certifications in industrial park for on-site buildings / % firms having obtained such a certification nationally]	(≥1=1; ‹1=0)	
Anti-seismic, anti-flood, or anti-avalanche resilient construction techniques used, as applicable to site conditions	(Yes=1; no=0)	
Presence of solar street lighting	(Yes=1; no=0)	
Presence of waste exchange clearinghouse in the industrial park, promoting industrial symbiosis and economic circularity	(Yes=1; no=0)	
Low-voltage (ideally photovoltaic) power electrical systems	(Yes=1; no=0)	
Walking and bicycle paths, and racks, inside park for workforce	(Yes=1; no=0)	
Presence of bicycle-sharing system in industrial park	(Yes=1; no=0)	
Electrical and hybrid vehicle power plug-in points in industrial park	(Yes=1; no=0)	

Non-potable and "grey" water usage for industrial park irrigation	(Yes=1; no=0)	
Operator or users association shared "efficient manufacturing" systems and technologies (i.e., cloud-based systems; value networks and joint purchasing; rapid prototyping, CAD, 3D-printing; smart technology, M2M, smart grid, and internet of things; etc.)	(Yes=1; no=0) (depending on degree of tech and systems adoption)	
Green infrastructure score: (scale of 0–21)		
3. Green systems		
Presence of team of dedicated on-site environmental engineers and/or of staffed unit in the employ of the regulator or operator	(Yes=1; no=0)	
Formal operator schedule for verification of pipes and drains inside park, in place and applied	(Yes=1; no=0)	
% of the implementation of enterprises carrying out annual environmental audit in industrial parks	(≥51%=1; ≤49%=0)	
Operator annual environmental report released to public	(Yes=1; no=0)	
[% firms having obtained a "Green" (e.g., "National Eco-industrial Park", "Green Label", etc. 20), ISO14001, ISO 50001, International Sustainability and Carbon (ISCC)21 certification or Global Reporting Initiative (GRI)22 Guidelines G3.1 rating (for recycled materials and wastewater, clean energy, sustainable alternative transport systems, etc.) or registration in industrial park / % firms having obtained such a certification nationally]	(≥1=1; ‹1=0)	
[Expenditure on environmental management/ha in industrial park / (expenditure on environmental management/ha) nationally]	(≥1=1; ‹1=0)	
Natural disaster assessment and risk management plan and system in place, as appropriate	(Yes=1; no=0)	
Management institution of the industrial park possesses UN Global Compact Registration	(Yes=1; no=0)	
Management institution of the industrial park has passed the possesses ISO14001	(Yes=1; no=0)	
Management institution of the industrial park possesses International Sustainability and Carbon certification (ISCC)	(Yes=1; no=0)	
Management institution of the industrial park having been granted ISO50001 or Green certification	(Yes=1; no=0)	
Management institution of the industrial park having been granted GRI rating	(Yes=1; no=0)	
Availability of dedicated financial or tax incentives for green building within the industrial park	(Yes=1; no=0)	

Dedicated or enhanced industrial park internal environmental regulations, including biodiversity rules, environmental management system (EMS) requirements	(Yes=1; no=0)	
Dedicated internal operating regulations with respect to odour, smoke, light, dust, vibration and noise, as well as hours of activity	(Yes=1; no=0)	
[% firms that are UN Global Compact registered participants or signatories in the industrial park / % firms having signed the UNGC or obtained such a registration nationally]	(≥1=1; ‹1=0)	
Employee car-sharing or car-pooling system in place	(Yes=1; no=0)	
Green systems score: (scale of 0–17)		
4. Efficient and clean production, emissions and waste management		
Presence of solid waste collection service	(Yes=1; no=0)	
[% energy from renewable (e.g., solar, wind, biomass/biogas/ biofuel, geothermal, tidal, hydroelectric, waste-to-power) sources in industrial park / % energy acquired from renewable sources nationally]	(≥1=1; ‹1=0)	
[Comprehensive energy consumption (tons of standard coal/ industrial added value (10,000 yuan) of the industrial park / national comprehensive energy consumption (tons of standard coal)/industrial added value (10,000 yuan)]	(≥1=0; ‹1=1)	
[Freshwater consumption (m3)/industrial added value (10,000 yuan) of the industrial park/national freshwater consumption (m3)/industrial added value (10,000 yuan)]	(≥1=0; ‹1=1)	
[Reuse volume of recycled (reclaimed) water from recycled wastewater (ton)/industrial added value (10,000 yuan) of the industrial park/national (reuse volume of recycled (reclaimed) water from recycled wastewater (ton)/industrial added value (10,000 yuan)]	(≥1=1; ‹1=0)	
[Solid waste (including hazardous waste) generated/industrial added value (10,000 yuan) of the industrial park/national solid waste (including hazardous waste) generated/industrial added value (10,000 yuan)]	(≥1=0; ‹1=1)	
[Comprehensive utilization of industrial solid waste (ton)/ industrial added value (10,000 yuan) of the industrial park/ national (comprehensive utilization of industrial solid waste (ton)/industrial added value (10,000 yuan)]	(≥1=1; ‹1=0)	

[SO2, NOx and particulate emissions (tons) of the industrial park/industrial added value (10,000 yuan)/ SO2, NOx and particulate emissions (tons)/GDP (10,000 yuan)]	(≥1=0; <1=1)	
[Hazardous waste generated/industrial added value (10,000 yuan) of the industrial park/national hazardous waste generated/ industrial added value (10,000 yuan)]	(≥1=0; <1=1)	
[(Added value of heavy industry (10,000 yuan/year) /hectare of the industrial park]/[national added value of heavy industry (10,000 yuan/year)/hectare]	NA	
[% solid waste sent to landfills in industrial park / % of solid waste sent to landfills nationally]	(≥1=0; <1=1)	
[# days failing National Air Quality Safety Standards in industrial park / # days failing National Air Quality Safety Standards nationally]	(≥1=0; <1=1)	
[% firms that invest in industrial symbiosis in industrial park / % firms that invest in industrial symbiosis nationally]	(≥1=1; <1=0)	
Efficient and clean production, emissions and waste management score: (scale of 0–13)		
Environmental performance score: (scale of 0–56)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones

3.6 Adaptation verification

3.6.1 Revised verification of the park selection

In order to ensure the scientific and effective localization verification of the International Guidelines, we shall not only ensure an adequate number of samples but also pay attention to the comprehensiveness and representativeness of the cases when selecting parks as verification cases. In terms of the number of samples, three to five parks in China are selected as verification cases in this study; in the case selection, considering the diversified industrial parks in China and the development differences between different regions in China, consideration is given the following points of principle.

(a) Balance of the area where the park is located

The case-study parks selected shall be those in the eastern, central, and western regions of China; according to applicable national policies, the eastern region covers 11 provinces (or municipalities): Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan; the central regions cover 8 provinces (or municipalities): Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, and Hunan; the western region covers 12 provinces (or municipalities and autonomous regions): Sichuan, Chongqing, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Inner Mongolia and Guangxi.

(b) Difference in park level

In China, industrial parks are usually classified into national industrial parks, provincial industrial parks, local parks and so on, by level.

Table 3-25 Economic indicator system for a modified version of the International Guidelines for Industrial Parks

Type	Characteristics
National industrial park	Special economic zones, economic and technological development zones, high-tech industrial development zones, export processing zones and bonded zones approved by the State Council, which are industrial parks at the highest level
Provincial industrial park	Specific areas approved by the local people's government and under the direct jurisdiction of the local government, which observe special economic policies and are subject to centralized development and construction. Compared with the national industrial parks, these parks have certain shortcomings in terms of software and hardware conditions, regional level and favourable policies.
Local parks	Parks at the basic level, represented by some economic and technological development zones, some high-tech industrial development zones, some industrial parks and some agricultural parks. Parks of this type are more closely related to small and medium-sized cities and are reserve areas for the economic development layout of national parks and provincial parks.

(c) Diversified types of industry in the park

According to the type of industries, industrial parks in China are usually classified into science and technology parks, general industrial parks and specialized parks.

Science and technology parks mainly refer to the industrial parks where there are clusters primarily of high-tech enterprises, which are important vehicles for the attraction of high-tech industries and promotion of economic development;

The general industrial park is an area designated by the national or local government through administrative means according to the inherent requirements of its economic development and in which there is a cluster of various production elements so that it becomes a modern industrial specialization and cooperation production zone adaptive to market competition and industrial upgrading. These parks mainly include the national economic and technological development zones, bonded zones, export processing zones and various provincial industrial parks;

Specialized parks are mainly designated areas under centralized and unified planning by the government, in which special enterprises and companies of certain industries and forms are provided and managed in a centralized manner, mainly including agricultural parks, logistics parks, creative industry parks and headquarters economy parks.

(d) Difference in development level of the parks

Mainly based on the economic and industrial development level, industrial parks at different development levels are selected.

(e) Availability of data on the parks

To ensure a smooth study, industrial parks with relatively complete data and high responsiveness are included in the study.

The case parks are selected mainly on the basis of the region where the park is located and the level of the park. On this basis, the park case-study database is finalized by taking into account the diversified types of industry, the difference in development level of parks and the availability of data on the parks. In this study, Tianjin Economic and Technological Development Area, Hefei National High-tech Industry Development Zone, and Suzhou Industrial Park are selected for adaptation verification.

3.6.2 Tianjin Economic and Technological Development Area

3.6.2.1 Overview of TEDA

The Tianjin Economic and Technological Development Area (TEDA) is located in the centre of the Bohai Economic Circle. It is an important part of Tianjin Binhai New Area and a part of the national comprehensive reform pilot zone. Established on 6 December 1984, with the approval of the State Council of China, it is one of the first national economic and technical development zones in China. TEDA has been ranked first in the comprehensive evaluation of national economic and technological development zones for 14 consecutive years, and it is also the first development zone in China with a GDP exceeding 300 billion yuan. At present, more than 3,300 foreign-invested firms have been established in TEDA, with a total investment larger than 15 billion US dollars. With Nestlé, SEW, Novo Nordisk, and other international firms as representatives, it has formed four pillar industries: electronic communication, food, machinery, and biological medicine, and the per capita GDP has reached the level of moderately developed countries.

Figure 3-10 Location and transport links of Tianjin Economic and Technological Development Area

3.6.2.2 Economic performance

With a clear direction for its development, TEDA has 11 sub-parks, namely, the east district, the west district, the micro-electronic industrial zone, the intelligent industrial zone, the central business district, the FAW Volkswagen North China production base, the Binhai Zhongguancun, the Nangang Industrial Zone, the Yat-Sen Scientific and Industrial Park, the central district and the southern emerging industrial zone. It covers a total area of 403 km2, forming a new development pattern of one zone with multiple parks.

After more than 30 years of rapid development, TEDA has developed from a salt marsh with an annual output value of just 3 million yuan to a new industrial town and an important window for China to join economic globalization and regional economic integration. In 2019, TEDA achieved a GDP of 200.906 billion yuan, an increase of 9.7 per cent over the previous year at comparable prices. Among the industries above designated size, the five pillar industries, including automobile manufacturing, electronic information, modern petrochemical, equipment manufacturing, and medical health, achieved a total industrial output value of 472.349 billion yuan, an increase of 8.4 per cent, accounting for 92.1 per cent of the total industrial output value above designated size in the whole TEDA.

In 2019, TEDA achieved actual utilization of foreign capital of 1.178 billion US dollars and actual utilization of domestic capital of 30.356 billion yuan. In that year, the registered capital of domestic enterprises increased to 96.879 billion yuan. There are 10487 new additional market players, including 6140 enterprises. The full-coverage fiscal revenue of the whole TEDA is 68.725 billion yuan, and the general public budget revenue at the TEDA level is 15.997 billion yuan.

Table 3-26 Output value of dominant industries of TEDA and respective proportions in the total output value of the entire TEDA (2019)

Dominant industry of TEDA	Output value of dominant industries (100 million yuan)	Proportion in the total output value of the entire TEDA
Automobile manufacturing	1603.2	20.0
Equipment manufacturing	614.3	7.7
Electronic information	1103	13.8
Petrochemical, new energy, and new materials	909	11.4
Medicine and health	493	6.2

The following table shows the application of framework and content for adaptation of the International Guidelines for Industrial Parks to Tianjin Economic and Technological Development Area – evaluation of economic indicators.

Table 3-27 Evaluation score of economic performance indicators of Tianjin Economic and Technological Development Area

Indicator	Quantitative input scoring basis	Score
1. Good economic governance		
Robust economic system tracking economic analysis quantitatively showing a positive economic return (i.e., in terms of employment, taxes, net exports, forex, local supplies), after such factors as land, CAPEX and OPEX costs and subsidies are taken into account.	(Yes =1; no=0)	1
Private participation in industrial park planning	(Yes =1; no=0)	0
Private sector represented on Board of Regulator	(Yes =1; no=0)	0
Land utilization rate≥60%	(Yes =1; no=0)	1
Existence and functioning of a formal industrial park marketing department/unit	(Yes =1; no=0)	1
User Maintenance and Operation fees or charges collected by the Operator	(Yes =1; no=0)	1
% user enterprise satisfaction with the services provided by the industrial park operator	(≥51%=1; <49%=0)	1

Operator customer relationship management (CRM) system in place	(Yes =1; no=0)	1
Operator ISO 9001 certification	(Yes =1; no=0)	1
Good economic governance score: (scale of 0–9)		
2. Economically enabling site and infrastructure hardware (appropriate site selection)		
Unencumbered land title	(Yes =1; no=0)	1
Phased site development strategy and implementation	(Yes =1; no=0)	1
Park liveability and perfection of urban service functions	(Yes =1; no=0)	1
Proximity to appropriate highway	(Yes =1; no=0)	1
Proximity to power transmission or distribution grid	(Yes =1; no=0)	1
Proximity to gas transmission mains and gas 'city-gate'	(Yes =1; no=0)	1
Proximity to microwave tower for broadband GSM mobile telephony and Wi-Fi connectivity	(Yes =1; no=0)	1
Appropriately-sized (wide) internal roads	(Yes =1; no=0)	1
Proximity operational public port, airport and high-speed of use and of interest to the industrial park's users	(Yes =1; no=0)	1
[% hours power outage per period in industrial park / % hours power outage nationally]	(≥ 1=0; ‹1=1)	1
[% hours of interruption of water supply, quality or quality in industrial park / % hours of interruption of water supply, quality or quality nationally]	(≥ 1=0; ‹1=1)	1
Economically enabling site and hardware score: (scale of 0–11)		
3. Economic supporting service software		
Regular, scheduled maintenance of buildings, as well as dedicated rapid-response or emergency maintenance, repair, rectification and restoration service, including for utilities and superstructure assets	(Yes=1; no=0)	1
Dedicated or localized industrial park business support, business association support, incubation, innovation or competitiveness programmes on effective offer	(Yes=1; no=0) (depending on # of programmes available)	1
Industrial park user enterprises have access to specific financial support programmes	(Yes=1; no=0)	1
Dedicated one-stop shop/single window in industrial park	(Yes=1; no=0)	1
E-government services dedicated to the industrial park	(Yes=1; no=0)	1
Online approval rate of (one-stop) government service hall	(≥51%=1; ‹49%=0)	1

Formal industrial park B2B gatherings held on formal industrial park B2B platforms on regular basis	(Yes=1; no=0)	1
Operator landscaping, gardening, and cleaning services	(Yes=1; no=0)	1
Presence of mechanical cargo loading and off-loading services for users	(Yes=1; no=0)	1
Operation of product exhibition centres, product display areas, conference centres, and/or auditoria	(Yes=1; no=0) (depending on # and variety)	1
Presence of on-site banking, bureaux-de-change and ATM facilities	(Yes=1; no=0) (depending on # and variety)	1
Presence of human resources agency and recruiting services	(Yes=1; no=0)	1
Presence of manpower training services, in coordination with recognized specialized technical training institutions in various fields	(Yes=1; no=0)	1
Presence of dedicated on-site R&D, patenting, and product commercialisation services, in conjunction with recognized universities and/or legal services providers	(Yes=1; no=0)	1
Presence of dedicated on-site matching, twinning, and local supplier and buyer forward and backward linkages schemes	(Yes=1; no=0) (depending on # and sophistication of schemes)	1
Presence of quality, product, process standards and/or trade certification services	(Yes=1; no=0)	1
Economically enabling software and services score: (scale of 0–16)		
4. Economic impact: employment, investment, and turnover		
[Per capita income in the industrial park / per capita income nationally]	(1=1; <1=0)	1
[Full-time equivalent employment/hectare in industrial park] / full-time equivalent employment/hectare / in industrial parks nationally]	(1=1; <1=0)	1
[Regional GDP/ha in industrial park/regional GDP/ha nationally]	(1=1; <1=0)	1
[US$ sales revenues/ha in industrial park /US$ sales revenues/ha nationally]	(1=1; <1=0)	1
[% manufacturing inputs sourced domestically in industrial park/ % manufacturing inputs sourced domestically nationally]	(1=1; <1=0)	1

[(output value of high-tech manufacturing / gross output) in industrial park/(output value of high-tech manufacturing / gross output) nationally]	(1=1; <1=0)	1
[US$ Economic value addition (EVA, calculated as output-inputs) per capita in industrial park/US$ per capita nationally]	(1=1; <1=0)	1
[Exports minus imports in industrial park / exports minus imports nationally]	(1=1; <1=0)	1
[FDI % of total investment (or GFCF) in industrial park/FDI % of total investment (or GFCF) nationally]	(1=1; <1=0)	1
[US$ exports/ha in industrial park / US$ exports/ha nationally]	(1=1; <1=0)	1
[Enterprises/ha in industrial park / enterprises/ha nationally]	(1=1; <1=0)	1
[IPR registrations/year/company in industrial park/ IPR registrations/ year/company nationally]	(1=1; <1=0)	1
Economically impactful nature score: (scale of 0–12)		
Economic performance score: (scale of 0–48)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones.

3.6.2.3 Social performance

TEDA is located 40 km to the east of Tianjin's central business district. It is the core and symbol of the Binhai New Area. Binhai New Area has jurisdiction over an area of 2.270 km2 with a coastline of 153 km, which consists of five national development zones and 21 towns, including Tianjin Economic and Technological Development Area, Tianjin Harbour Bonded Zone, Binhai High-tech Zone, Dongjiang Bonded Port Area, and Tianjin Eco-city, with permanent residents of 3 million. Among them, TEDA has a permanent resident population of 200,000 and a working population of 570,000.

TEDA is adjacent to Tianjin Port (the largest international trade port in North China) to the east and Tianjin Binhai International Airport (an air cargo base and passenger trunk airport in North China) to the west. The expressways, light rail trains, intercity express, and freight railways passing through TEDA link it with the domestic railway arteries, as well as the expressway network leading to the whole country. TEDA is 1.5 hours' drive to Beijing via the Beijing-Tianjin-Tanggu Expressway.

Infrastructure in TEDA is constructed to high standards and appropriate future-proofing. After more than 30 years of development and construction, the infrastructure has been gradually improved, and the capacity of supporting facilities has been significantly enhanced, forming complete facilities for water supply, electricity, gas, heating, drainage, transportation, communication, and urban utilities, realizing the leap from the traditional level to the aspired level of "Nine Availabilities and One Platform" (availability of information, registration, support, logistics, financing, talent, market, connections and service, and comprehensive community service platform) through continuous establishment and improvement.

Owing to the regional functions of TEDA, the educational institutions in TEDA mainly focus on the education and training for managers, technical professionals, enterprise employees and other areas, in order to support the employment needs of enterprises in TEDA. In addition, education in TEDA has also been internationalized. With a large number of foreigners based in TEDA who invest or work in Tianjin, education for their children encourages the international development of the educational institutions in TEDA, presenting a high-end and diverse development mode.

The following table shows the application of the modified version of the framework and content of the International Guidelines for Industrial Parks to Tianjin Economic and Technological Development Area – evaluation of social indicators.

Table 3-28 Evaluation score of social performance indicators of Tianjin Economic and Technological Development Area

Indicator	Quantitative input scoring basis	Score
1. Socially suitable site and social infrastructure		
Project ESIA conducted and filed with appropriate authorities	(Yes=1; no=0)	1
Childcare facilities	(Yes=1; no=0) (depending on # and type of service)	1
Park or greenspace as % of total area (as per international standard)	(Yes=1; no=0)	1
Presence of on-site incident response centre and public announcement (PA) system	(Yes=1; no=0)	1
Disabled-inclusive building design (i.e., access ramp and elevator in each building	(Yes=1; no=0)	0
[Average commute time to industrial park workplace for employees /average commute time in major cities nationally]	(≥1=1; <1=0)	0
Construction materials are domestically sourced	(Yes=1; no=0)	1
Industrial park provision of utilities to adjacent communities	(Yes=1; no=0)	1
ILO/IFC standard worker accommodations on-site	(Yes=1; no=0)	0
Drinking fountains in place throughout industrial park buildings	(Yes=1; no=0)	1
On-site multi-purpose athletic fields, gym, recreation, leisure, entertainment, community and cultural facilities	(Yes=1; no=0)	1
Availability of vocational skill training institution in the industrial park	(Yes=1; no=0)	1

Proportion of public service expenditure in public budget expenditure	(≥national average proportion in the said year =1; ≤the national average proportion in the said year =0)	1
Socially appropriate site and social infrastructure score: (scale of 0–13)		
2. Quality social management system and services		
Social impact management and monitoring system (SMS) in place in the industrial park	(Yes=1; no=0)	1
Social audits of each firm on at least biennial basis	(Yes=1; no=0)	0
Existence of emergency preparedness and response system in industrial park	(Yes=1; no=0)	1
Industrial park community solidarity programme and Involvement in community projects	(Yes=1; no=0)	1
Annual public/published social performance report for industrial park	(Yes=1; no=0)	1
% firms with ISO 26000 certification	(≥51% =1; ≤49% =0)	0
% firms with ISO 9001 certification	(≥51% =1; ≤49% =0)	0
% firms with SA 8000 certification	(≥51% =1; ≤49% =0)	0
% firms with AA1000AP certification	(≥51% =1; ≤49% =0)	0
% firms with AA1000AS Sustainability or AA1000SES Stakeholder Engagement Standard certification	(≥51% =1; ≤49% =0)	0
% Employees satisfied with social systems and services	(≥50% =1; ≤49% =0)	1
Dedicated/enhanced industrial park social regulations, including S-IA requirements, and community dialogue mechanism	(Yes=1; no=0)	1
Industrial Park Operator ISO 26000 certifications	(Yes=1; no=0)	0
Industrial Park Operator ISO 9001 certifications	(Yes=1; no=0)	1
Industrial Park Operator SA 8000 certifications	(Yes=1; no=0)	0
Industrial Park Operator AA1000AP certifications	(Yes=1; no=0)	0
Industrial Park Operator AA1000AS Sustainability or AA1000SES Stakeholder Engagement Standard certifications	(Yes=1; no=0)	0
Existence of industrial park dedicated internal ombudsman	(Yes=1; no=0)	1
Quality social management system and social services score: (scale of 0–18)		

3. Occupational health and safety		
[Expenditure on health and safety (EHS) per capita in industrial park /EHS per capita nationally]	(≥1=0; <1=1)	1
% firms with OHSAS 18001 certification in industrial park	(≥51% =1; ≤49% =0)	0
Existence of internal park operation fire safety guidelines	(Yes=1; no=0)	1
Public or common night transportation or blue-light system in place in industrial park	(Yes=1; no=0)	1
[(# fire alarms/building) in industrial park /(# fire alarms/building) in accordance with Chinese standards]	(≥1=1; <1=0)	1
[# sprinklers/building in industrial park / # sprinklers/building in accordance with Chinese standards]	(≥1=1; <1=0)	1
[# crimes reported per capita in industrial park / # crimes reported per capita nationally]	(≥1=1; <1=0)	1
Access by fire services to all parts of industrial park	(Yes=1; no=0)	1
[% employees with social health insurance coverage in industrial park / % employees with social health insurance coverage nationally]	(≥1=1; <1=0)	1
[# of nurses per capita in park / # of nurses per capita nationally]	(≥1=1; <1=0)	1
First-aid room or kit in each building	(Yes=1; no=0)	1
Dedicated, 24/7 health services inside the industrial park	(Yes=1; no=0)	1
Defibrillator in every building	(Yes=1; no=0)	0
[Mean emergency (police, fire, ambulance) response time in industrial park / mean emergency (police, fire, ambulance) response nationally]	(≥1=1; <1=0)	1
Provision of an independent safety production organization	(Yes=1; no=0)	1
Occupational health and safety score: (scale of 0–15)		
4. Good labour relations and welfare		
Presence of aggregated, publicly accessible labour complaints or incidents and complaint measurement mechanism data available	(Yes=1; no=0) (depending on sophistication and transparency of system)	0
Presence of on-site regulator, operator or third-party authorized labour inspectors or counsellors	(Yes=1; no=0)	1

Absence of instances of child labour and forced labour	(No=1; yes=0)	1
Rights to assemble, unionize, engage in collective bargaining, and strike	(Yes=1; no=0)	1
[% workforce unionized in industrial park / % workforce unionized nationally	(≥1=1 ‹1=0)	1
[Average salary in industrial park / average salary nationally]	(≥1=1 ‹1=0)	1
[% employees on term or open-ended contracts in industrial park / % employees on term or open-ended contracts nationally]	(≥1=1; ‹1=0)	1
[# annual complaints per capita about working conditions received in industrial park/ # annual complaints per capita about working conditions nationally]	(≥1=0; ‹1=1)	1
[# annual complaints per capita resolved in industrial park / # annual complaints per capita resolved nationally]	(≥1=1; ‹1=0)	0
% industrial park workers satisfaction with industrial park labour relations	(≥51% =1; ≤49% =0)	1
[Average commuting distance of employees in the industrial park/average commuting distance in major cities nationally]	(≥1=1; ‹1=0)	0
[% employee annual turnover in industrial park / % employee annual turnover nationally]	(≥1=0; ‹1=1)	1
Good labour relations and welfare score: (scale of 0–12)		
5. Social inclusiveness		
[% employees from legally-recognized disadvantaged groups or with disabilities in industrial park / % employees from legally-recognized disadvantaged groups or with disabilities nationally]	(≥1=1; ‹1=0)	1
[% female workforce in industrial park / % female workforce nationally]	(≥1=1; ‹1=0)	1
[% women in management of operator and resident firms / % women in management nationally]	(≥1=1; ‹1=0)	1
[Female wages as % of male wages in industrial park / female wages as % of male wages nationally]	(≥1=1; ‹1=0)	1
Industrial park operator-organized inclusiveness or sensitivity training or events	(Yes=1; no=0)	1
[% employees between ages of 16 and 30 in industrial park / % employees between ages of 16 and 30 nationally]	(≥1=1; ‹1=0)	1
[# new domestic MSMEs/year/ha in industrial park / # new domestic MSMEs/year/ha nationally]	(≥1=1; ‹1=0)	1

Establishment of a financing promotion platform for MSMEs	(Yes=1; no=0)	1
[Domestic MSME % total investment in industrial park /MSME % total investment nationally]	(≥1=1; <1=0)	1
[Domestic MSME % of US$ in sales in industrial park /MSME % of US$ GDP nationally]	(≥1=1; <1=0)	1
[Domestic MSME % of US$ in exports in industrial park /MSME % of US$ in exports nationally]	(≥1=1; <1=0)	1
Social inclusiveness score: (scale of 0–11)		
Social performance score: (scale of 0–69)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones

3.6.2.4 Environmental performance

Tianjin Economic and Technological Development Area is an industrial park using external resources and selling goods to external markets. Water resources, energy, and various basic raw material resources needed by the industry are mainly obtained from external sources. Freshwater resources mainly come from the Luanhe River of Water Diversion Project from Luanhe River to Tianjin City and Yangtze River of Middle Route of the South Water to North Project. Electric power is transmitted to TEDA by North China Power Grid, while gas is mainly sourced from north Shaanxi and Boxi Oil Field. Accordingly, TEDA always attaches importance to the green and efficient utilization of resources and energy.

Since its establishment, TEDA has invested more than 2 per cent of its GDP in the construction of environmental protection infrastructure every year and has successively built a series of green infrastructure, which effectively supports the rapid economic development of TEDA while maintaining excellent and stable environmental quality. Since its establishment, TEDA has been honoured by inclusion in one of the first groups of Circular Economy Pilot Parks, National Eco-industrial Demonstration Parks, Transformation Demonstration Parks, National Low-carbon Industrial Parks, Green Parks and others. It is the only industrial park in China that has been awarded all the national green honour badges.

In recent years, by following applicable national and local laws, regulations, policies, and standards on green environmental protection, recycling, and low-carbonization, TEDA has established and observed various management systems, established and improved the long-term mechanism for phasing out backward production capacity in order to promote the adjustment, optimization and upgrading of its industrial structure. As a result, various resources and energy have achieved an excellent output level. In 2019, water resources in TEDA achieved an output ratio of 3,244 yuan/m3. The output rate of land resources is steadily increasing to 2.2 billion yuan/km2, far higher than that of similar parks. The reclaimed water reuse rate was 43.25 per cent in 2019, higher than the guiding value for national green parks set by the Ministry of Industry and Information Technology, and significantly higher than the average level of Tianjin and Binhai New Area.

Over the years, with development in the direction of green energy in TEDA, the overall energy output ratio has improved. In 2019, the energy output rate of TEDA was 21,000 yuan per ton of coal equivalent (TCE). To ensure success in pollution prevention and control, key enterprises in TEDA are accelerating the realization of clean energy transformation, resulting

in an increased utilization rate of clean energy. The proportion of natural gas and electricity use has increased significantly, with the utilization rate of clean energy increasing from 27.76 per cent in 2014 to 62.75 per cent in 2018.

TEDA has achieved an excellent outcome in industrial pollution control, which is reflected by constant improvements in environmental quality and green indicators of the environment at the leading level compared to the same type of parks in China. In 2019, TEDA achieved a composite index of ambient air quality of 5.49, with an improvement rate of 5.2 per cent, and a proportion of 62.7 per cent for days meeting applicable air quality standards; a PM2.5 concentration of 50 μg/m3, ranking the third in Tianjin. Air quality in TEDA is steadily improving. Effluent from the sewage treatment plant maintains a compliance rate of 100 per cent.

At the same time, concerted efforts are being made to achieve the goal of "blue sky, clear water, pure land and comprehensive management of Bohai Sea". Promotion of the "Blue Sky Protection Campaign" will be continued. In 2019, 20 gas-fired boilers were provided with low-nitrogen transformation, the improvement of 10 enterprises handling volatile organic compounds (VOCs) was completed, and intensified treatment of flue gas condensation in three heat source plants was completed. Online approval of hazardous waste management plan and transfer for all 299 key hazardous waste source enterprises was realized. TEDA has maintained a solid industrial waste (including hazardous waste) disposal and utilization rate of 100 per cent. Between 2013 and 2019, the wastewater emission per unit of industrial added value has been kept below 1.5t/10,000 yuan. Air quality in the park keeps improving at an excellent pace, from 45.8 per cent in 2013 to 62.7 per cent in 2019. More than 560 enterprises in TEDA have been certified with the ISO14001 environmental management standard, continuously improving the environmental management capability from the enterprise level to the park level and from one point to the whole area.

The following table shows the application of the modified framework and content of International Guidelines for Industrial Parks to Tianjin Economic and Technological Development Area – evaluation of environmental indicators.

Table 3-29 Evaluation score of environmental performance indicators of Tianjin Economic and Technological Development Area

Indicator	Quantitative input scoring basis	Score
1. Environmentally suitable site		
Site EIA conducted and filed with appropriate authorities	(Yes=1; no=0)	1
Compliance of the site with the "three lines and one list"(ecological protection red line, environmental quality bottom line, resource utilization upline, and environmental access list) requirements	(Yes=1; no=0)	1
Adoption of specific internal zone planning	(Yes=1; no=0)	1

[% plots actually allocated to green industry or non-industrial production activities in industrial park / % of GDP represented by green industry or non-industrial production activities nationally]	(≥1=1; <1=0)	1
Industrial park situated on redeveloped brownfield site, with the effective possibility of reusing, re-purposing and converting existing infrastructure or buildings	(Yes=1; no=0)	1
Environmentally appropriate site score: (scale of 0–5)		
2. Green infrastructure		
Water, electrical and gas meters and load management systems in place, as appropriate to the services offered	(Yes=1; no=0)	1
Air quality monitoring (remote controlling and recording) system and infrastructure in place in industrial park	(Yes=1; no=0)	1
Presence of an off-site landfill for industrial park solid waste management	(Yes=1; no=0)	1
Presence of hazardous waste collection, storage and treatment or disposal management system	(Yes=1; no=0)	1
Presence of central sewage treatment facilities (inside or outside the park)	(Yes=1; no=0)	1
Presence of sustainable rain and storm water collection / harvesting (i.e., culverts/drains, cisterns/tanks), management, treatment (e.g., filter, water hyacinth) and reuse systems	(Yes=1; no=0)	1
Presence provision of garbage sorting and recycling devices	(Yes=1; no=0)	1
% of buildings with Leadership in Energy and Environmental Design (LEED) certification	(≥51%=1; ≤49%=0)	0
% of buildings with German Sustainable Building Council (DGNB) certification	(≥51%=1; ≤49%=0)	0
% of buildings with Building Research Establishment Environmental Assessment Method (BREAM) certification	(≥51%=1; ≤49%=0)	0
% of buildings with World Green Building Council (WGBC) certification	(≥51%=1; ≤49%=0)	0
[% firms with one of the listed WGBC certifications in industrial park for on-site buildings / % firms having obtained such a certification nationally]	(≥1=1; <1=0)	1
Anti-seismic, anti-flood, or anti-avalanche resilient construction techniques used, as applicable to site conditions	(Yes=1; no=0)	1
Presence of solar street lighting	(Yes=1; no=0)	1

Presence of waste exchange clearinghouse in the industrial park, promoting industrial symbiosis and economic circularity	(Yes=1; no=0)	1
Low-voltage (ideally photovoltaic) power electrical systems	(Yes=1; no=0)	1
Walking and bicycle paths, and racks, inside park for workforce	(Yes=1; no=0)	1
Presence of bicycle-sharing system in industrial park	(Yes=1; no=0)	1
Electrical and hybrid vehicle power plug-in points in industrial park	(Yes=1; no=0)	1
Non-potable and "grey" water usage for industrial park irrigation	(Yes=1; no=0)	1
Operator or users association shared "efficient manufacturing" systems and technologies (i.e., cloud-based systems; value networks and joint purchasing; rapid prototyping, CAD, 3D-printing; smart technology, M2M, smart grid, and internet of things; etc.)	(Yes=1; no=0) (depending on degree of tech and systems adoption)	1
Green infrastructure score: (scale of 0–21)		
3. Green systems		
Presence of team of dedicated on-site environmental engineers and/or of staffed unit in the employ of the regulator or operator	(Yes=1; no=0)	1
Formal operator schedule for verification of pipes and drains inside park, in place and applied	(Yes=1; no=0)	1
% of the implementation of enterprises carrying out annual environmental audit in industrial parks	(≥51%=1; ≤49%=0)	1
Operator annual environmental report released to public	(Yes=1; no=0)	1
[% firms having obtained a "Green" (e.g., "National Eco-industrial Park", "Green Label", etc. 20), ISO14001, ISO 50001, International Sustainability and Carbon (ISCC)21 certification or Global Reporting Initiative (GRI)22 Guidelines G3.1 rating (for recycled materials and wastewater, clean energy, sustainable alternative transport systems, etc.) or registration in industrial park / % firms having obtained such a certification nationally]	(≥1=1; ‹1=0)	1
[Expenditure on environmental management/ha in industrial park / expenditure on environmental management/ha nationally]	(≥1=1; ‹1=0)	1
Natural disaster assessment and risk management plan and system in place, as appropriate	(Yes=1; no=0)	1
Management institution of the industrial park possesses UN Global Compact Registration	(Yes=1; no=0)	0
Management institution of the industrial park has passed the possesses ISO14001	(Yes=1; no=0)	1

Management institution of the industrial park possesses International Sustainability and Carbon Certification (ISCC)	(Yes=1; no=0)	0
Management institution of the industrial park having been granted ISO50001 or Green certification	(Yes=1; no=0)	00
Management institution of the industrial park having been granted GRI rating	(Yes=1; no=0)	1
Availability of dedicated financial or tax incentives for green building within the industrial park	(Yes=1; no=0)	1
Dedicated or enhanced industrial park internal environmental regulations, including biodiversity rules, environmental management system (EMS) requirements	(Yes=1; no=0)	1
Dedicated internal operating regulations with respect to odour, smoke, light, dust, vibration and noise, as well as hours of activity	(Yes=1; no=0)	1
[% firms that are UN Global Compact registered participants or signatories In the industrial park / % firms having signed the UNGC or obtained such a registration nationally]	(≥1=1; <1=0)	0
Employee car-sharing or car-pooling system in place	(Yes=1; no=0)	1
Green systems score: (scale of 0–17)		
4. Efficient and clean production, emissions and waste management		
Presence of solid waste collection service	(Yes=1; no=0)	1
[% energy from renewable (e.g., solar, wind, biomass/biogas/ biofuel, geothermal, tidal, hydroelectric, waste-to-power) sources in industrial park / % energy acquired from renewable sources nationally]	(≥1=1; <1=0)	1
[Comprehensive energy consumption (tons of standard coal)/ industrial added value (10,000 yuan) of the industrial park/ national (comprehensive energy consumption (tons of standard coal)/industrial added value (10,000 yuan)]	(≥1=0; <1=1)	1
[Freshwater consumption (m3)/industrial added value (10,000 yuan) of the industrial park/national freshwater consumption (m3)/industrial added value (10,000 yuan)]	(≥1=0; <1=1)	1
[Reuse volume of recycled (reclaimed) water from recycled wastewater (ton)/industrial added value (10,000 yuan) of the industrial park/national (reuse volume of recycled (reclaimed) water from recycled wastewater (ton)/industrial added value (10,000 yuan)]	(≥1=1; <1=0)	1

[Solid waste (including hazardous waste) generated/industrial added value (10,000 yuan) of the industrial park/national (solid waste (including hazardous waste) generated/industrial added value (10,000 yuan)]	(≥1=0; <1=1)	1
[Comprehensive utilization of industrial solid waste (ton)/ industrial added value (10,000 yuan) of the industrial park/ national comprehensive utilization of industrial solid waste (ton)/ industrial added value (10,000 yuan)]	(≥1=1; <1=0)	1
[SO2, NOx and particulate emissions (tons) of the industrial park/industrial added value (10,000 yuan)/ SO2, NOx and particulate emissions (tons)/GDP (10,000 yuan)]	(≥1=0; <1=1)	1
[Hazardous waste generated/industrial added value (10,000 yuan) of the industrial park/national hazardous waste generated/ industrial added value (10,000 yuan)]	(≥1=0; <1=1)	1
[Added value of heavy industry (10,000 yuan/year)/hectare of the industrial park]/[national added value of heavy industry (10,000 yuan/year)/hectare]	NA	-
[% solid waste sent to landfills in industrial park / % of solid waste sent to landfills nationally]	(≥1=0; <1=1)	1
[# days failing National Air Quality Safety Standards in industrial park / # days failing National Air Quality Safety Standards nationally]	(≥1=0; <1=1)	0
[% firms that invest in industrial symbiosis in industrial park / % firms that invest in industrial symbiosis nationally]	(≥1=1; <1=0)	1
Efficient and clean production, emissions and waste management score: (scale of 0–13)		
Environmental performance score: (scale of 0–56)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones.

3.6.2.5 Analysis of comprehensive performance evaluation results

The comprehensive performance of TEDA is evaluated in the economic, environmental, and social dimensions. A comprehensive evaluation score of 143 points (out of 173 points) is obtained, including 46 points (out of 48 points) for economic performance, 50 points (out of 69 points) for social performance, and 47 points (out of 56 points) for environmental performance. The higher overall score is consistent with TEDA's leading role among industrial parks in China. In the three major evaluation fields of economy, society, and environment, TEDA is the leading park in terms of the scale and development quality, so the indicators reflecting the level and scale of resource allocation and whether it is better than the national average almost get full score. In addition, the scores in many additional indicators also demonstrate that TEDA has made great achievements in actively pursuing economic quality and green development.

Comprehensive analysis of the second-level and third-level indicator entries shows that TEDA does not score mainly in the international quality management system and international green building certification, reflecting not only that industrial parks in China are still deficient in overall internationalization but also that the frequency in applying similar internationalization indicators is slightly higher when applying the Guidelines to industrial parks in China. In addition, some international assesment indicators are not scored because the proportion of applicable enterprises is lower than 50 per cent, which may be caused by the fact that it is difficult for the park management organization to conduct refined management on each enterprise because of the large number of resident enterprises in such a leading industrial park in China.

3.6.3 Hefei National High-tech Industry Development Zone (Hefei High-tech Zone)

3.6.3.1 Overview of Hefei High-tech Zone

Hefei National High-tech Industry Development Zone (Hefei High-tech Zone) is one of the first State-level high-tech zones ratified by the State Council in 1991. It covers an area of 128.32 km2 and has a permanent resident population of over 200,000. The zone has a very favourable natural environment, with lakeland and a mountainous area, in the form of Shuxi Lake, Beiyan Lake and Dashu Mountain National Forest Park, and constitutes the core area of Hefei-Wuhu-Bengbu Innovation Demonstration Zone and the core area of the western section of the urban space development strategy of Hefei City.

In 1992, the State Science and Technology Commission agreed to rename what had been called "Hefei Science and Technology Industrial Park" as "Hefei National High-tech Industry Development Zone", and in 1997, it was approved by the State Council as one of the first Chinese Science and Technology Industrial Parks under the Asia-Pacific Economic Cooperation (APEC) forum. In September 1998, Jiang Zemin, the then General Secretary of the CPC Central Committee, President of the People's Republic of China, and Chairman of the Central Military Commission, visited Hefei High-tech Zone and inscribed the zone's new name "Hefei National High-tech Industry Development Zone". In March 2000, it was recognized by the Ministry of Science and Technology and the Ministry of Foreign Trade and Economic Cooperation as one of the first high-tech product export bases of high-tech industrial development zones.

In August 2007, Hefei High-tech Zone and Shushan District concluded an agreement to jointly develop Nangang Science and Technology Park. In May 2009, Hefei High-tech Zone and Feixi County organized an official event in the municipal government affairs centre to mark conclusion of the agreement on expanding cooperative development of Baiyan Science and Technology Park. In 2010, the zone gained the status of a national innovative science and technology park and embarked on its second round of development.

Since 2017, it has constituted the core area of Hefei Comprehensive National Science Centre and, as one of the three major science centres in China, it will represent China at the global level as a showcase science and technology centre. In April 2018, Hefei High-tech Zone was included among the parks identified for development as world-class high-tech parks by the Torch High Technology Industry Development Centre under the Ministry of Science and Technology.

3.6.3.2 Economic performance

(a) Economic development level

Over nearly 30 years of concerted endeavour, Hefei High-tech Zone has achieved numerous national honours, including as one of the first National Innovation and Entrepreneurship Demonstration Bases, a National Innovation Demonstration Zone, a National Innovative Science and Technology Park, a National Intellectual Property Demonstration Zone, the first National Comprehensive Security Industry Demonstration Zone, a National Model Labour Relations Harmonious Industrial Park and a National Eco-industry Demonstration Zone.

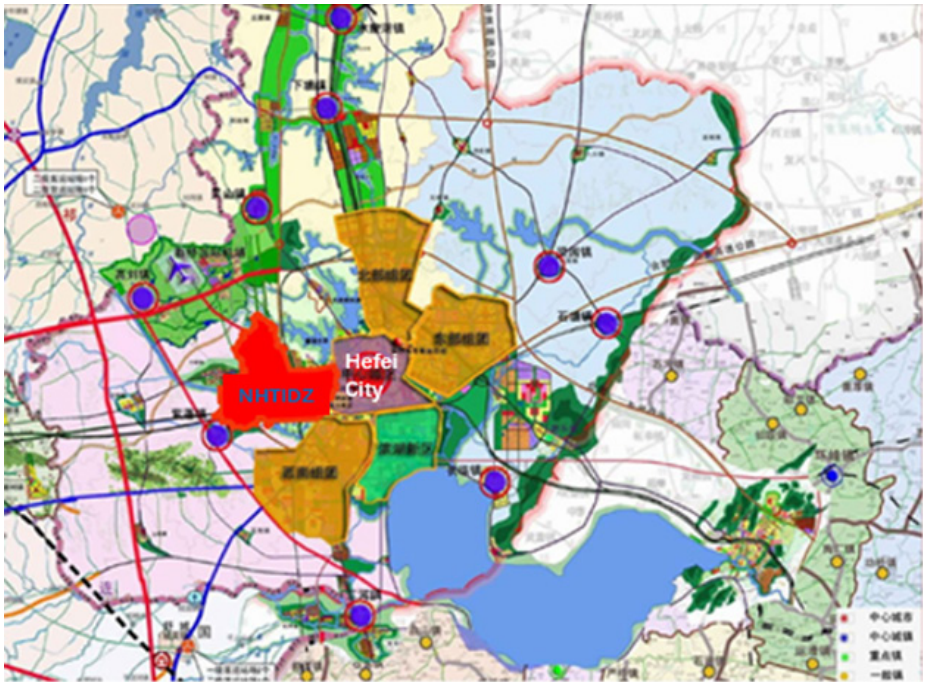


Figure 3-11 Location of Hefei National High-tech Industry Development Zone

The zone has expedited the development of new industries and new industry patterns by strengthening the transformation of local innovation achievements, promoting cross-industry integration, undertaking a national strategic layout and other tasks, and the zone's original leading industries, such as artificial intelligence and quantum information, are playing an increasingly important role at home and abroad. The zone has made major breakthroughs in the new generation of artificial intelligence, quantum information and other cutting-edge technologies, revolutionary technologies, and industrialization. The information technology company iFLYTEK, which operates in the zone, has been included in the first group of four national AI open innovation platforms. As the only national quantum information laboratory, iFLYTEK is undergoing rapid development in the zone, thereby contributing to the forming of the zone's China Speech Valley, Quantum Centre brand. In April 2018, Hefei High-tech Zone was included by the Torch High Technology Industry Development Centre in the list of world-class high-tech parks under development.

Hefei High-tech Zone is undergoing rapid economic growth. In 2018, it achieved a GDP of 87.2 billion yuan, a gross industrial output value of 177.2 billion yuan, including an added value of 31.8 billion yuan for industries above designated size, a year-on-year increase of 13 per cent; an output value of 81.1 billion yuan for strategic emerging industries, a year-on-year increase of 13.7 per cent; its investment in fixed assets reached 29.6 billion yuan, a year-on-year increase of 50 per cent; value added of service industry reached 21 billion yuan, a year-on-year increase of 10.5 per cent; the total retail sales of social consumer goods reached 13.38 billion yuan, a year-on-year increase of 11.5 per cent; total import and export values reached 3.3 billion US dollars, a year-on-year increase of 15.7 per cent. The zone's

full-coverage fiscal revenue exceeded 19 billion yuan, with a year-on-year growth of 15.8 per cent, ranking it first in terms of revenue and growth rate among development zones.

In 2018, 125 provincial and municipal large-scale projects, emerging industry projects and specialized projects with a total investment of 163 billion yuan were initiated. The annual investment was planned to be 22.8 billion yuan in the year, with compliance with all assessment indicators determined at the beginning of the year. A total of 40 projects under the "Three Major and One Innovation" campaign, major "Internet plus" projects, projects in the field of civil-military integration and other special provincial and municipal projects were launched, attracting over 300 million yuan in funding from higher-level governments. Dayuan Pumps, Guofeng Phase II, Meiya Optoelectronics, and other key projects have been launched, and civil-military integration projects, including CASC 12, Chinese Institute of Electronics, Anhui Guoke Juntong, and Donghuo Technology.

In 2018, the total number of market participants in the zone reached 33,935, with an average annual growth rate above 40 per cent; there were 1,025 national high-tech enterprises and 22 listed companies independently cultivated, accounting for one fifth of the same in the province; R&D expenditure accounted for 8.9 per cent of GDP, which was three times that at the national level. The construction of the zone's innovation and entrepreneurship demonstration base was commended by the State Council and, in terms of the number of national R&D institutions, engineering laboratories and engineering research centres above the provincial level, the zone ranks first in the province.

(b) Industrial base

Currently, Hefei High-tech Zone has gradually formed a 4-2-1 industrial system on the lines of "strategic emerging industries – pillar industry – service industry" in parallel development, which means that strategic emerging industries are represented by the new generation of information technology, biomedicine, new energy of PV power and public security, and pillar industries represented by the home appliance and automobile industry and modern service industry, as shown in the figure below.

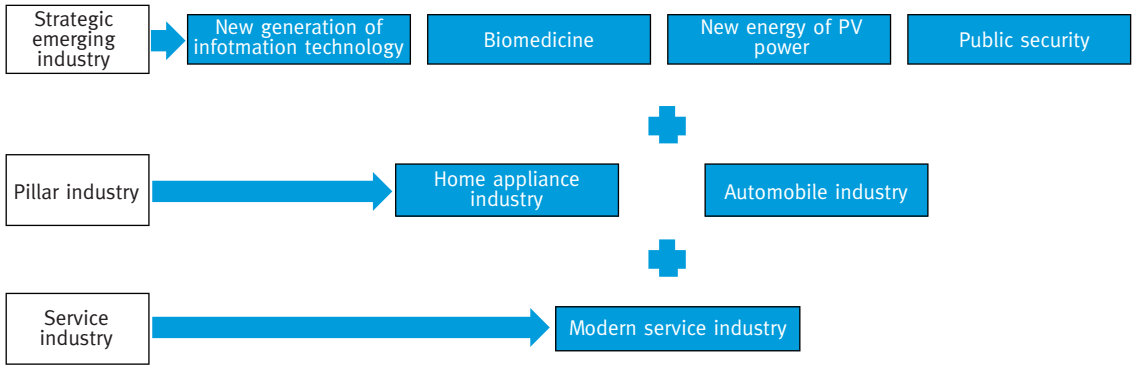


Figure 3-12 "4-2-1" industry system in Hefei High-tech Zone

New generation of information technology

The new generation of the information technology industry focuses on integrated circuits, artificial intelligence, intelligent voice, big data, quantum technologies and other fields. Among them, integrated circuits and intelligent voices have been prioritized as the strategic emerging industry cluster development base in Anhui Province, and are supported with favourable policies from the province and the city. More than 100 leading enterprises in the integrated circuit industry, including ARM Innovation Centre, Mediatek Technology, AutoChips and Phison Electronics, engaged in the fields of design, manufacturing, packaging, testing, equipment and materials, operate in the zone.

Where artificial intelligence and intelligent voice technology is concerned, the USTC National Engineering Laboratory of brain-inspired intelligence technology and application provides basic research and talent support for industrial development. iFLYTEK has been approved as a national open innovation platform for a new generation of artificial intelligence, and the construction of "China Speech Valley" is beginning to take shape. Hefei High-tech Zone is also a national torch software industry base with 397 recognized software enterprises, accounting for 65 per cent of the total in the province. With regard to quantum technologies, focusing on three areas: quantum communication, quantum computing and quantum measurement, an international leading quantum industry pilot zone will be established.

Biomedicine

The biomedicine industry is one of the key emerging industries in the Hefei High-tech Zone. In 2016, the zone was approved as the Anhui biomedical and high-end medical device industry cluster development base. With the support of the central regional centre of health and medical big data, the ion medicine centre and the big gene centre, the zone focuses on gene detection, biological agents, traditional Chinese medicines, high-end medical devices, precision medicine and other segments. At present, there are 433 biomedical enterprises in the zone, accounting for about one third of those in Anhui Province.

New energy of PV power

Supported by proactive industrial policies, Hefei High-tech Zone aims to introduce and cultivate a number of representative leading enterprises both with investment promotion and base incubation. Based on technological innovation, the PV new energy industry is constantly expanding its industrial chain by independently cultivating SUNGROW, a leading manufacturer of PV inverters, and successfully introducing well-known enterprises at home and abroad, including JA Solar, Tongwei, Samsung, and 3M, for the purpose of establishing a vertical integrated whole industrial chain development mode stretching from raw material solar cells, modules and energy storage to the application of installed PV power capacity, forging connections in each link of the industrial chain. There are 46 resident PV enterprises, which are capable of producing solar cells and modules up to 9.5GW.

Public security

Hefei High-tech Zone is the largest cluster base of the public security industry in Anhui Province. It has been approved as a national public security innovative industrial cluster pilot base, a national emergency industry demonstration base, and a national security industry demonstration park. Leading enterprises are installed in the zone, such as CETC 38, SUN CREATE, QuantumCTek, and H3C, together with more than 220 other enterprises with a total workforce of some 15,000 employees. The core of the industrial chain is based on the application and innovation of information technology, which is involved with monitoring and early warning, prevention and protection, handling and rescue, emergency services, and other services.

Home appliances

Hefei has replaced Qingdao and Shunde as the largest home appliance industry base in the world, with the output of the four major home appliances

ranking first in China for five consecutive years. Currently, such brands as Whirlpool, Gree, Midea, Sanyo and Rongshida have set up operations in Hefei High-tech Zone, and their industrial lines cover four major appliance packages, central air conditioners, motors, compressors, and many other products.

Automobile manufacturing

At present, more than 100 automobile and equipment manufacturing enterprises are installed in Hefei High-tech Zone, represented by Chang'an Automobile, Continental, and NSK, as well as R&D and production of new energy vehicle and energy storage battery technology. The Chang'an automobile project currently has a manufacturing capacity of 190,000 vehicles and aims to reach 240,000 vehicles when the second phase is completed. Main product lines have been established for high-end models of the brand.

The following table shows the application of the modified framework and content of the International Guidelines for Industrial Parks to Hefei National High-tech Industry Development Zone – evaluation of economic indicators.

Table 3-30 Evaluation score of economic performance indicators of Hefei National High-tech Industry Development Zone

Indicator	Quantitative input scoring basis	Score
1. Good economic governance		
Robust economic system tracking economic analysis quantitatively showing a positive economic return (i.e., in terms of employment, taxes, net exports, forex, local supplies), after such factors as land, CAPEX and OPEX costs and subsidies are taken into account.	(Yes=1; no=0)	1
Private participation in industrial park planning	(Yes=1; no=0)	Not applicable
Private sector represented on Board of Regulators	(Yes=1; no=0)	Not applicable
Land utilization rate≥60%	(Yes=1; no=0)	1
Existence and functioning of a formal industrial park marketing department/unit	(Yes=1; no=0)	1
User Maintenance and Operation fees or charges collected by the Operator	(Yes=1; no=0)	Not applicable
% user enterprise satisfaction with the services provided by the industrial park operator	(≥51%=1; <49%=0)	1
Operator customer relationship management (CRM) system in place	(Yes=1; no=0)	Not applicable
Operator ISO 9001 certification	(Yes=1; no=0)	Not applicable
Good economic governance score: (scale of 0–9)		

2. Economically enabling site and infrastructure hardware (appropriate site selection)		
Unencumbered land title	(Yes=1; no=0)	1
Phased site development strategy and implementation	(Yes=1; no=0)	1
Park liveability and perfection of urban service functions	(Yes=1; no=0)	1
Proximity to appropriate highway	(Yes=1; no=0)	1
Proximity to power transmission or distribution grid	(Yes=1; no=0)	1
Proximity to gas transmission mains and gas 'city-gate'	(Yes=1; no=0)	1
Proximity to microwave tower for broadband GSM mobile telephony and Wi-Fi connectivity	(Yes=1; no=0)	1
Appropriately-sized (wide) internal roads	(Yes=1; no=0)	1
Proximity operational public port, airport and high-speed of use and of interest to the industrial park's users	(Yes=1; no=0)	1
[% hours power outage per period in industrial park / % hours power outage nationally]	(≥ 1=0; <1=1)	1
[% hours of interruption of water supply, quality or quality in industrial park / % hours of interruption of water supply, quality or quality nationally]	(≥ 1=0; <1=1)	1
Economically enabling site and hardware score: (scale of 0–11)		
3. Economically enabling services software		
Regular, scheduled maintenance of buildings, as well as dedicated rapid-response or emergency maintenance, repair, rectification and restoration service, including for utilities and superstructure assets	(Yes=1; no=0)	1
Dedicated or localized industrial park business support, business association support, incubation, innovation or competitiveness programmes on effective offer	(Yes=1; no=0) (depending on # of programmes available)	1
Industrial park user enterprises have access to specific financial support programmes	(Yes=1; no=0)	1
Dedicated one-stop shop/single window in industrial park	(Yes=1; no=0)	1
E-government services dedicated to the industrial park	(Yes=1; no=0)	1
Online approval rate of (one-stop) government service hall	(≥51%=1; <49%=0)	1
Formal industrial park B2B gatherings held on formal industrial park B2B platforms on regular basis	(Yes=1; no=0)	0
Operator landscaping, gardening, and cleaning services	(Yes=1; no=0)	1

Presence of mechanical cargo loading and off-loading services for users	(Yes=1; no=0)	0
Operation of product exhibition centres, product display areas, conference centres, and/or auditoria	(Yes=1; no=0) (depending on # and variety)	1
Presence of on-site banking, bureaux-de-change and ATM facilities	(Yes=1; no=0) (depending on # and variety)	1
Presence of human resources agency and recruiting services	(Yes=1; no=0)	1
Presence of manpower training services, in coordination with recognized specialized technical training institutions in various fields	(Yes=1; no=0)	1
Presence of dedicated on-site R&D, patenting, and product commercialisation services, in conjunction with recognized universities and/or legal services providers	(Yes=1; no=0)	1
Presence of dedicated on-site matching, twinning, and local supplier and buyer forward and backward linkages schemes	(Yes=1; no=0) (depending on # and sophistication of schemes)	1
Presence of quality, product, process standards and/or trade certification services	(Yes=1; no=0)	1
Economically enabling software and services score: (scale of 0–16)		
4. Economically impactful nature: employment, investment, turnover		
[Per capita income in the industrial park / per capita income nationally]	(1=1; <1=0)	1
[Full-time equivalent employment/hectare in industrial park]/ full-time equivalent employment/hectare / in industrial parks nationally]	(1=1; <1=0)	1
[Regional GDP/ha in industrial park/regional GDP/ha nationally]	(1=1; <1=0)	1
[US$ sales revenues/ha in industrial park /US$ sales revenues/ha nationally]	(1=1; <1=0)	1
[% manufacturing inputs sourced domestically in industrial park/ % manufacturing inputs sourced domestically nationally]	(1=1; <1=0)	1
[(output value of high-tech manufacturing / gross output) in industrial park/(output value of high-tech manufacturing / gross output) nationally]	(1=1; <1=0)	1
[US$ Economic value addition (EVA, calculated as output-inputs) per capita in industrial park/US$ per capita nationally]	(1=1; <1=0)	1

[Exports minus imports in industrial park / exports minus imports nationally]	(1=1; <1=0)	1
[FDI % of total investment (or GFCF) in industrial park/FDI % of total investment (or GFCF) nationally]	(1=1; <1=0)	1
[US$ exports/ha in industrial park / US$ exports/ha nationally]	(1=1; <1=0)	1
[Enterprises/ha in industrial park / enterprises/ha nationally]	(1=1; <1=0)	1
[IPR registrations/year/company in industrial park/ IPR registrations/year/company nationally]	(1=1; <1=0)	1
Economically impactful nature score: (scale of 0–12)		
Economic performance score: (scale of 0–48)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones.

3.6.3.3 Social performance

(a) Population

According to the statistics of the Administration Service Centre of Hefei High-tech Zone Public Security Bureau, as of December 31, 2018, there were 272,413 permanent residents in Hefei High-tech Zone.

(b) Science, education, culture and health

A technology-based business incubation service system has been established and improved in Hefei High-tech Zone, in line with the "innovators space – incubator – accelerator – entrepreneurial community" model, and there are now more than 300 science and technology service institutions in the zone and 135 science and technology business incubators and accelerators, including 60 innovator spaces (20 of which are at the national level), 53 incubators (9 of which are at the national level), and 20 accelerators, with an incubation area of 1,200,000 m2 and more than 2,000 enterprises under incubation. There are some 30,000 market participants in the zone, among which a large number of leading enterprises in the industry, including iFLYTEK, QuantumCTek, Sungrow, and AnkeBio, have been set up by scientific research institutes or scientific researchers. Enterprises founded by overseas-trained Chinese specialists, including Nuwacell, Precedo, Cybersecurity Defender, and OVCTEK, have emerged with their technological advantages.

Hefei High-tech Zone has become one of the regions with the most concentrated innovation resources and the best original innovation capacity in China. To date, 852 high-tech enterprises have settled in Hefei High-tech Zone, accounting for 51 per cent of those in Hefei City and 16 per cent of those in Anhui Province; R&D investment accounts for 8.9 per cent of GDP, which is 2.5 times that of Hefei City and 3 times that of the national average; enterprises in the zone have established 36 key (engineering) laboratories and 84 technology (engineering) research centres at or above the provincial level; there are 375 invention patents per 10,000 people, and the number of patent applications and grants consistently ranks first in Anhui Province; there are 49 talents included in the national talent programme and 234 provincial and municipal leading talents, and the zone has been approved as an "innovative talent training demonstration base" by the Ministry of Science and Technology.

In the zone, there are 16 public schools for compulsory education. Currently, 10 schools in the zone have been accepted as new high-quality schools in Hefei, 4 schools have passed the municipal acceptance, 3 schools have been recognized as all-round development education model schools in Hefei, 2 schools have been recognized as standardized management model schools for compulsory education, 13 schools have been recognized as safe campuses, and 9 schools have been recognized as "green schools" at or above the municipal level. There are currently four private schools for compulsory education, with nearly 3,000 students and more than 300 teachers. At present, there are 30 kindergartens, including 6 public kindergartens, 9 universally beneficial kindergartens (including 8 public-private kindergartens), and 15 private kindergartens. In the zone, the public kindergartens can provide education for 29.9 per cent of the total number of pupils in kindergartens, while the universally beneficial kindergartens (including public kindergartens) can provide education for 63.5 per cent of the total number of pupils in kindergartens.

The zone has one cultural facility, the provincial science and technology museum; three cultural facilities under construction, the international talent city, the quantum culture and sports centre and the Hefei Science and Technology Museum; one cultural block, Banbianjie. The zone's community-level cultural facilities are deemed to be insufficient for its current needs.

In the zone there is one sports park, Shufengwan Sports Park; a gymnasium under construction in the zone's campus of the University of Science and Technology of China; and several open stadiums shared with universities and scientific research institutions, including the Institute of Advanced Technology, USTC, Hefei No.7 Middle School and Xinhua University. As things stand, given the lack of zone-level sports venues and national fitness centres, and the relatively slow construction of community-level sports facilities, the overall construction of sports facilities needs to be improved.

A comprehensive diagnosis and treatment service system has been established in the Hefei High-tech Zone, which can basically satisfy the medical needs of the people. At present, there are 92 medical institutions, including 1 general hospital, 5 specialized hospitals, 5 community health service centres, 13 medical examination laboratories, 13 medical beauty clinics, and 55 other medical institutions (comprehensive outpatient department, stomatology clinic, and others). By the end of 2018, there were 1,500 health technicians in the zone, with 7.5 medical workers per 1,000 people of the population.

(c) Infrastructure

Power supply

A 500KV high-voltage corridor and a 220 kV high-voltage corridor pass through the Hefei High-tech Zone, both of which are connected with the 500 kV Feixi Substation in the south and the 500 kV Feibei Substation in the north. There are four 220 kV substations, namely, Kexuecheng Substation, Nangang Substation, Youle Substation, and Zhenning Substation, with a total capacity of 1,680 MVA; ten 110 kV substations have been completed or under construction, namely, Xuetian Substation, Xiyoulu Substation, Fangxing Substation, Keda Substation, Chuangxin Substation, Qianshui Substation, Yinxing Substation, Kejiyuan Substation and Haiguan Substation, with a total capacity of 1,082 MVA, which is sufficient to ensure the current power supply reliability.

Water supply

At present, there is one waterworks facility in Hefei High-tech Zone, which is located to the north-east of the intersection between Jiangjunling Road and Mozitan Road. The facility is capable of supplying 400,000 m3 of water per day. It is connected with other waterworks in Hefei to meet the zone's water demand.

Drainage

Separate rainwater drainage and sewerage systems have been laid in Hefei High-tech Zone. Currently, the zone is divided into four sewage discharge sectors. The sewage from the area to the east of the expressway and to the north of Huangshan Road is discharged into Wangtang sewage treatment plant in Shushan District (with a capacity of 80,000 m3/d in phase I and 100,000 m3/d in phase II – namely, total treatment capacity: 180,000 m3/d, now in full-load operation); the sewage from the area to the south of Huangshan Road up to the ring expressway is discharged into Shiwulihe sewage treatment plant (with a capacity of 200,000 m3/d); for the area to the west of the ring expressway: part of the current sewage is discharged into the sewage treatment plant of the economic and technological development zone (with a current treatment capacity of 300,000 m3/d, and long-term treatment capacity of 400,000 m3/d) to the south, and part of the current sewage is discharged into the western sewage treatment plant of Feixi County (with a current treatment capacity of 100,000 m3/d, and long-term treatment capacity of 350,000 m3/d). At present, the sewage discharge demand is satisfied.

Heat supply

There are two thermal power plants in Hefei High-tech Zone: Tianyuan and Xinneng power plants. The installed capacity of Tianyuan Thermal Power Plant consists of four 75 t/h medium-temperature and medium-pressure circulating fluidized bed boilers and two 6 MW back-pressure steam turbine generator units. The plant is equipped with bag dust collectors, limestone desulphurization facilities, and selective non-catalytic reduction (SNCR) denitration facilities, together with online waste gas monitoring devices. The installed capacity of bid section A of Xinneng Thermal Power Plant, phase I includes two 75 t/h high-temperature and high-pressure circulating fluidized bed boilers and two 9 MW extraction back-pressure steam turbine generator units. The plant is equipped with a high-frequency power supply, electric dust collectors, limestone-gypsum wet desulphurization, low nitrogen combustion technology and selective catalytic reduction (SCR) denitrification facilities, together with online waste gas monitoring devices.

Gas

A high-pressure gas pipeline network is installed along Fangxing Avenue in Hefei High-tech Zone, connected with the ring high-pressure pipeline network of Hefei City; there are two high and medium-pressure gas pressure regulating stations on Fangxing Avenue for the purpose of supplying gas to Hefei High-tech Zone by reducing the pressure.

Environmental sanitation

At present, there are three waste-transfer stations in Hefei High-tech Zone, with the current capacity of 360 t/d; two stations in Baiyan, with the current capacity of 100 t/d; and two stations in Nangang, both out of service.

Fire control

At present, there are three fire stations, which are located at the intersections between Tianzhi Road and Tianda Road, between Caihong East Road and Yanglin Road, and between Xiyou Road and Kexue Avenue. These fire stations have jurisdiction over an average area of 23 km2, which is much larger than the required jurisdiction area of 7–15 km2 under each fire station. This is primarily attributable to the absence of any fire station in the western part of the city.

Transportation

Hefei High-tech Zone is located in Hefei City, which has an extensive water, land and air transport network. Its position as a regional transport hub is well established, and the city has very convenient external transport links, as shown in the figure below.

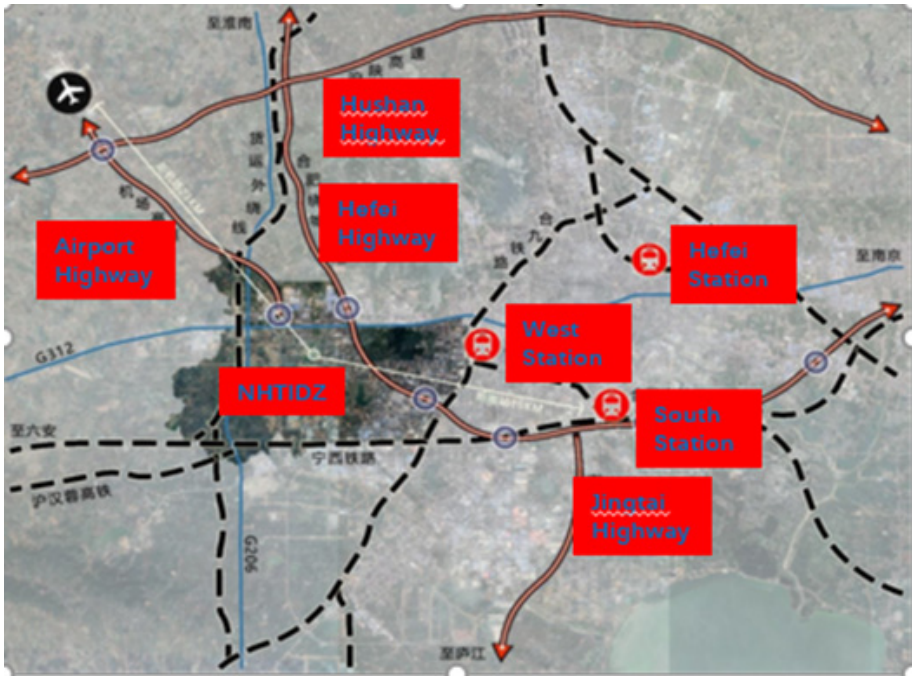


Figure 3-13 Transport links of Hefei High-tech Zone

The following table shows the application of the modified framework and content of the International Guidelines for Industrial Parks to Hefei National High-tech Industry Development Zone – evaluation of social indicators.

Table 3-31 Evaluation score of social performance indicators of Hefei National High-tech Industry Development Zone

Indicator	Quantitative input scoring basis	Score
1. Socially suitable site and social infrastructure		
Project ESIA conducted and filed with appropriate authorities	(Yes=1; no=0)	1
Childcare facilities	(Yes=1; no=0) (depending on # and type of service)	1
Park or greenspace as % of total area (as per international standard)	(Yes=1; no=0)	1
Presence of on-site incident response centre and public announcement (PA) system	(Yes=1; no=0)	1

Disabled-inclusive building design (i.e., access ramp and elevator in each building	(Yes=1; no=0)	1
[Average commute time to industrial park workplace for employees /average commute time in major cities nationally]	(≥1=1; <1=0)	1
Construction materials are domestically sourced	(Yes=1; no=0)	1
Industrial park provision of utilities to adjacent communities	(Yes=1; no=0)	1
ILO/IFC standard worker accommodations on-site	(Yes=1; no=0)	1
Drinking fountains in place throughout industrial park buildings	(Yes=1; no=0)	1
On-site multi-purpose athletic fields, gym, recreation, leisure, entertainment, community and cultural facilities	(Yes=1; no=0)	1
Availability of vocational skill training institution in the industrial park	(Yes=1; no=0)	1
Proportion of public service expenditure in public budget expenditure	(≥national average proportion in the said year =1; ≤the national average proportion in the said year =0)	1
Socially appropriate site and social infrastructure score: (scale of 0–13)		
2. Quality social management system and services		
Social impact management and monitoring system (SMS) in place in the industrial park	(Yes=1; no=0)	1
Social audits of each firm on at least biennial basis	(Yes=1; no=0)	0
Existence of emergency preparedness and response system in industrial park	(Yes=1; no=0)	1
Industrial park community solidarity programme and Involvement in community projects	(Yes=1; no=0)	1
Annual public/published social performance report for industrial park	(Yes=1; no=0)	0
% firms with ISO 26000 certification	(≥51% =1; ≤49% =0)	Unavailable
% firms with ISO 9001 certification	(≥51% =1; ≤49% =0)	Unavailable
% firms with SA 8000 certification	(≥51% =1; ≤49% =0)	Unavailable
% firms with AA1000AP certification	(≥51% =1; ≤49% =0)	Unavailable
% firms with AA1000AS Sustainability or AA1000SES Stakeholder Engagement Standard certification	(≥51% =1; ≤49% =0)	Unavailable
% Employees satisfied with social systems and services	(≥50% =1; ≤49% =0)	1

Dedicated/enhanced industrial park social regulations, including S-IA requirements, and community dialogue mechanism	(Yes=1; no=0)	0
Industrial Park Operator ISO 26000 certifications	(Yes=1; no=0)	0
Industrial Park Operator ISO 9001 certifications	(Yes=1; no=0)	0
Industrial Park Operator SA 8000 certifications	(Yes=1; no=0)	0
Industrial Park Operator AA1000AP certifications	(Yes=1; no=0)	0
Industrial Park Operator AA1000AS Sustainability or AA1000SES Stakeholder Engagement Standard certifications	(Yes=1; no=0)	0
Existence of industrial park dedicated internal ombudsman	(Yes=1; no=0)	1
Quality social management system and social services score: (scale of 0–18)		
3. Occupational health and safety		
[Expenditure on health and safety (EHS) per capita in industrial park /EHS per capita nationally]	(≥1=0; <1=1)	1
% firms with OHSAS 18001 certification in industrial park	(≥51% =1; ≤49% =0)	1
Existence of internal park operation fire safety guidelines	(Yes=1; no=0)	1
Public or common night transportation or blue-light system in place in industrial park	(Yes=1; no=0)	1
[(# fire alarms/building) in industrial park /(# fire alarms/building) in accordance with Chinese standards]	(≥1=1; <1=0)	1
[# sprinklers/building in industrial park / # sprinklers/building in accordance with Chinese standards]	(≥1=1; <1=0)	1
[# crimes reported per capita in industrial park / # crimes reported per capita nationally]	(≥1=1; <1=0)	1
Access by fire services to all parts of industrial park	(Yes=1; no=0)	1
[% employees with social health insurance coverage in industrial park / % employees with social health insurance coverage nationally]	(≥1=1; <1=0)	1
[# of nurses per capita in park / # of nurses per capita nationally]	(≥1=1; <1=0)	1
First-aid room or kit in each building	(Yes=1; no=0)	1
Dedicated, 24/7 health services inside the industrial park	(Yes=1; no=0)	1
Defibrillator in every building	(Yes=1; no=0)	1
[Mean emergency (police, fire, ambulance) response time in industrial park / mean emergency (police, fire, ambulance) response nationally]	(≥1=1; <1=0)	0

Provision of an independent safety production organization	(Yes=1; no=0)	1
Occupational health and safety score: (scale of 0–15)		
4. Good labour relations and welfare		
Presence of aggregated, publicly accessible labour complaints or incidents and complaint measurement mechanism data available	(Yes=1; no=0) (depending on sophistication and transparency of system)	1
Presence of on-site regulator, operator or third-party authorized labour inspectors or counsellors	(Yes=1; no=0)	1
Absence of instances of child labour and forced labour	(No=1; yes=0)	1
Rights to assemble, unionize, engage in collective bargaining, and strike	(Yes=1; no=0)	1
[% workforce unionized in industrial park / % workforce unionized nationally	(≥1=1 ‹1=0)	1
[Average salary in industrial park / average salary nationally]	(≥1=1 ‹1=0)	1
[% employees on term or open-ended contracts in industrial park / % employees on term or open-ended contracts nationally]	(≥1=1; ‹1=0)	1
[# annual complaints per capita about working conditions received in industrial park/ # annual complaints per capita about working conditions nationally]	(≥1=0; ‹1=1)	1
[# annual complaints per capita resolved in industrial park / # annual complaints per capita resolved nationally]	(≥1=1; ‹1=0)	1
% industrial park workers satisfaction with industrial park labour relations	(≥51% =1; ≤49% =0)	1
[Average commuting distance of employees in the industrial park/average commuting distance in major cities nationally]	(≥1=1; ‹1=0)	1
[% employee annual turnover in industrial park / % employee annual turnover nationally]	(≥1=0; ‹1=1)	1
Good labour relations and welfare score: (scale of 0–12)		
5. Social inclusiveness		
[% employees from legally-recognized disadvantaged groups or with disabilities in industrial park / % employees from legally-recognized disadvantaged groups or with disabilities nationally]	(≥1=1; ‹1=0)	1
[% female workforce in industrial park / % female workforce nationally]	(≥1=1; ‹1=0)	1

[% women in management of operator and resident firms / % women in management nationally]	(≥1=1; <1=0)	1
[Female wages as % of male wages in industrial park / female wages as % of male wages nationally]	(≥1=1; <1=0)	1
Industrial park operator-organized inclusiveness or sensitivity training or events	(Yes=1; no=0)	1
[% employees between ages of 16 and 30 in industrial park / % employees between ages of 16 and 30 nationally]	(≥1=1; <1=0)	1
[# new domestic MSMEs/year/ha in industrial park / # new domestic MSMEs/year/ha nationally]	(≥1=1; <1=0)	1
Establishment of a financing promotion platform for MSMEs	(Yes=1; no=0)	1
[Domestic MSME % total investment in industrial park /MSME % total investment nationally]	(≥1=1; <1=0)	1
[Domestic MSME % of US$ in sales in industrial park /MSME % of US$ GDP nationally]	(≥1=1; <1=0)	11
[Domestic MSME % of US$ in exports in industrial park /MSME % of US$ in exports nationally]	(≥1=1; <1=0)	
Social inclusiveness score: (scale of 0–11)		
Social performance score: (scale of 0–69)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones.

3.6.3.4 Environmental performance

(a) Consumption of major energy and resources

According to the distribution characteristics of industries, sectors and enterprises in the Hefei High-tech Zone, the bulk of the zone's energy and resource consumption is accounted for by the following: freshwater consumption for industrial use, wastewater generated, and total energy consumption. Taking the energy and resource consumption of Hefei High-tech Zone in 2018 as the reference point, a comprehensive evaluation is made of the overall consumption level of Hefei High-tech Zone by comparing it with similar parks at home and abroad (with 44.1 billion yuan taken as the industrial value added of Hefei High-tech Zone in 2018).

Table 3-32 Comparison of energy and resource consumption in high-tech zones (2018)

Name	Hefei High-tech Zone		Representative value of domestic comprehensive parks	Representative value of foreign comprehensive parks
	Consumption level	Change in unit industrial added value		
Consumption of freshwater for industrial use (10,000 tons)	1,122.4	2.55 (t/10,000 yuan)	≤9 (t/10,000 yuan)	——
Wastewater generated (10,000 tons)	886.6	2.01 (t/10,000 yuan)	≤8 (t/10,000 yuan)	≤13 (t/10,000 yuan)
Total energy consumption (tons of standard coal)	228,738.4	0.05 (tons of standard coal/10,000 yuan	≤0.5 (tons of standard coal/10,000 yuan	≤0.2 (tons of standard coal/10,000 yuan

From the above indicators, it may be seen that, while in recent years Hefei High-tech Zone has focused on economic development, is has also achieved the further transformation of its economic growth pattern by changing the extensive resource utilization pattern and promoting instead an intensive and circular economy mode, so that industrial structure adjustment and traditional industrial technology transformation are completed according to the sustainable development requirements. This has significantly improved the resource and energy utilization efficiency, and reduced the generation of pollutants. Compared with the parks at home and abroad, the above indicators are all at a relatively high level.

(b) Pollution sources

In 2018, an assessment tracking environmental impact was performed on Hefei High-tech Zone. Based on the environmental statistics, pollutant discharge permit, field investigation, enterprise environmental impact assessment and official responses, an evaluation of the pollution sources has been carried out with the equivalent pollution load method in order to investigate the key pollution sources and key pollutants. Given the very large number of small and medium-sized enterprises in Hefei National High-tech Industry Development Zone, 194 production-oriented enterprises were selected by a double random sampling exercise. During the statistical analysis, those enterprises with large pollutant discharge volumes were selected, while considering the discharge of specific factors. Ultimately, 45 entities were selected as the wastewater pollution source, accounting for above 80–95 per cent of the wastewater pollutant discharge load in Hefei High-tech Zone; and 35 entities were selected as the waste gas pollution source, accounting for above 80–95 per cent of the waste gas pollutant in Hefei High-tech Zone.

Air pollution source and pollutant discharge

Pollutants emitted by Hefei High-tech Zone mainly include SO2, NOx, smoke, dust and volatile organic compounds (VOCs). In 2018, the volume of SO2 emitted is 216.92 tons, and 462.42 tons for NOx, 41.51 tons for smoke and dust, and 85.19 tons for VOCs.

Major air pollution sources of enterprises in Hefei High-tech Zone include the Tianyuan Branch of Hefei Thermal Power Group Co., Ltd., CNBM (Hefei) New Energy Co., Ltd., Hefei Lingda Compressor Co., Ltd., Tongwei Solar Energy (Hefei) Co., Ltd., Anhui Guofeng Plastic Industry Co., Ltd., Anhui Meizhi Compressor Co., Ltd. and Hefei Chang'an Automobile Co., Ltd. The equivalent load of waste gases from these enterprises accounts for more than 80 per cent of the total waste gas emission.

Water pollution source and pollutant discharge

Main water pollutants from Hefei High-tech Zone include chemical oxygen demand (COD), ammonia nitrogen, petroleum, and total phosphorus. In 2018, the volumes of COD, ammonia nitrogen, petroleum and total phosphorus discharged from the Hefei High-tech Zone were 227.11 tons, 35.88 tons, 4.6 tons and 2.27 tons, respectively.

The equivalent load of wastewater pollutants discharged by companies is unevenly distributed, and the enterprises with the heaviest wastewater discharge include Tongwei Solar Energy (Hefei) Co., Ltd., Gree Electric Appliance (Hefei) Co., Ltd., Hefei Lingda Compressor Co., Ltd., Hefei Cigarette Factory of China Tobacco Anhui Industrial Co., Ltd., Anhui Jiangnan Machinery Co., Ltd., Hefei Midea Washing Machine Co., Ltd., Anhui Hualing Co., Ltd., Hefei Wantwant Foods Co., Ltd., Anhui Meizhi Compressor Co., Ltd., Hefei Chang'an Automobile Co., Ltd., Hefei Midea Refrigerator Co., Ltd., Hefei Midea Heating and Ventilating Equipment Co., Ltd. and Hefei Wahaha Beverage Co., Ltd. The wastewater pollution load from these enterprises accounts for more than 70 per cent of the total.

Solid waste pollution sources

Instead of a solid waste treatment and disposal centre, Hefei High-tech Zone established a central management system for collection, storage, transportation, comprehensive recycling and safe disposal of solid waste. Domestic waste is mainly transported by the local environmental sanitation departments and sent to landfills for sanitary disposal. The hazardous wastes collected from all enterprises are mainly sent to Anhui Haoyue Environmental Technology Co., Ltd. and Anhui Chaoyue Environmental Technology Co., Ltd. for disposal.

In 2018, 250,600 tons of solid wastes and 241,600 tons of general industrial solid wastes were generated in Hefei High-tech Zone. The enterprises generating the most solid waste include Tianyuan Branch of Hefei Thermal Power Group Co., Ltd., Hefei Lingda Compressor Co., Ltd., Hefei Chang'an Automobile Co., Ltd., Tongwei Solar Energy (Hefei) Co., Ltd., Anhui Meizhi Compressor Co., Ltd., Hefei KaiBang Motor Co., Ltd., Gree Electric Appliance (Hefei) Co., Ltd., Xinneng Thermal Power Co., Ltd.

The following table shows the application of modified framework and content of the International Guidelines for Industrial Parks to Hefei National High-tech Industry Development Zone – evaluation of environmental indicators.

Table 3-33 Evaluation score of environmental performance indicators of Hefei National High-tech Industry Development Zone

Indicator	Quantitative input scoring basis	Score
1. Environmentally suitable site		
Site EIA conducted and filed with appropriate authorities	(Yes=1; no=0)	1
Compliance of the site with the "three lines and one list"(ecological protection red line, environmental quality bottom line, resource utilization upline, and environmental access list) requirements	(Yes=1; no=0)	1
Adoption of specific internal zone planning	(Yes=1; no=0)	1
[% plots actually allocated to green industry or non-industrial production activities in industrial park / % of GDP represented by green industry or non-industrial production activities nationally]	(≥1=1; <1=0)	1
Industrial Park situated on redeveloped brownfield site, with the effective possibility of reusing, re-purposing and converting existing infrastructure or buildings	(Yes=1; no=0)	1
Environmentally appropriate site score: (scale of 0–5)		
2. Green infrastructure		
Water, electrical and gas meters and load management systems in place, as appropriate to the services offered	(Yes=1; no=0)	1
Air quality monitoring (remote controlling and recording) system and infrastructure in place in industrial park	(Yes=1; no=0)	1
Presence of an off-site landfill for industrial park solid waste management	(Yes=1; no=0)	0
Presence of hazardous waste collection, storage and treatment or disposal management system	(Yes=1; no=0)	1
Presence of central sewage treatment facilities (inside or outside the park)	(Yes=1; no=0)	1
Presence of sustainable rain and storm water collection / harvesting (i.e., culverts/drains, cisterns/tanks), management, treatment (e.g., filter, water hyacinth) and reuse systems	(Yes=1; no=0)	0
Presence provision of garbage sorting and recycling devices	(Yes=1; no=0)	1
% of buildings with Leadership in Energy and Environmental Design(LEED) certification	(≥51%=1; ≤49%=0)	0
% of buildings with German Sustainable Building Council (DGNB) certification	(≥51%=1; ≤49%=0)	0

% of buildings with Building Research Establishment Environmental Assessment Method (BREAM) certification	(≥51%=1; ≤49%=0)	0
% of buildings with World Green Building Council (WGBC) certification	(≥51%=1; ≤49%=0)	0
[% firms with one of the listed WGBC certifications in industrial park for on-site buildings / % firms having obtained such a certification nationally]	(≥1=1; <1=0)	1
Anti-seismic, anti-flood, or anti-avalanche resilient construction techniques used, as applicable to site conditions	(Yes=1; no=0)	1
Presence of solar street lighting	(Yes=1; no=0)	1
Presence of waste exchange clearinghouse in the industrial park, promoting industrial symbiosis and economic circularity	(Yes=1; no=0)	0
Low-voltage (ideally photovoltaic) power electrical systems	(Yes=1; no=0)	1
Walking and bicycle paths, and racks, inside park for workforce	(Yes=1; no=0)	1
Presence of bicycle-sharing system in industrial park	(Yes=1; no=0)	1
Electrical and hybrid vehicle power plug-in points in industrial park	(Yes=1; no=0)	1
Non-potable and "grey" water usage for industrial park irrigation	(Yes=1; no=0)	1
Operator or users association shared "efficient manufacturing" systems and technologies (i.e., cloud-based systems; value networks and joint purchasing; rapid prototyping, CAD, 3D-printing; smart technology, M2M, smart grid, and internet of things; etc.)	(Yes=1; no=0) (depending on degree of tech and systems adoption)	0
Green infrastructure score: (scale of 0–21)		
3. Green systems		
Presence of team of dedicated on-site environmental engineers and/or of staffed unit in the employ of the regulator or operator	(Yes=1; no=0)	1
Formal operator schedule for verification of pipes and drains inside park, in place and applied	(Yes=1; no=0)	1
% of the implementation of enterprises carrying out annual environmental audit in industrial parks	(≥51%=1; ≤49%=0)	1
Operator annual environmental report released to public	(Yes=1; no=0)	1
[% firms having obtained a "Green" (e.g., "National Eco-industrial Park","Green Label", etc. 20), ISO14001, ISO 50001, International Sustainability and Carbon (ISCC)21 certification or Global Reporting Initiative (GRI)22 Guidelines G3.1 rating (for recycled materials and wastewater, clean energy, sustainable alternative transport systems, etc.) or registration in industrial park / % firms having obtained such a certification nationally]	(≥1=1; <1=0)	1

[Expenditure on environmental management/ha in industrial park / expenditure on environmental management/ha nationally]	(≥1=1; <1=0)	1
Natural disaster assessment and risk management plan and system in place, as appropriate	(Yes=1; no=0)	1
Management institution of the industrial park possesses UN Global Compact Registration	(Yes=1; no=0)	0
Management institution of the industrial park has passed the possesses ISO14001	(Yes=1; no=0)	1
Management institution of the industrial park possesses International Sustainability and Carbon certification (ISCC)	(Yes=1; no=0)	0
Management institution of the industrial park having been granted ISO50001 or Green certification	(Yes=1; no=0)	0
Management institution of the industrial park having been granted GRI rating	(Yes=1; no=0)	0
Availability of dedicated financial or tax incentives for green building within the industrial park	(Yes=1; no=0)	1
Dedicated or enhanced industrial park internal environmental regulations, including biodiversity rules, environmental management system (EMS) requirements	(Yes=1; no=0)	1
Dedicated internal operating regulations with respect to odour, smoke, light, dust, vibration and noise, as well as hours of activity	(Yes=1; no=0)	1
[% firms that are UN Global Compact registered participants or signatories In the industrial park / % firms having signed the UNGC or obtained such a registration nationally]	(≥1=1; <1=0)	0
Employee car-sharing or car-pooling system in place	(Yes=1; no=0)	1
Green systems score: (scale of 0–17)		
4. Efficient and clean production, emissions and waste management		
Presence of solid waste collection service	(Yes=1; no=0)	1
[% energy from renewable (e.g., solar, wind, biomass/biogas/ biofuel, geothermal, tidal, hydroelectric, waste-to-power) sources in industrial park / % energy acquired from renewable sources nationally]	(≥1=1; <1=0)	1
[Comprehensive energy consumption (tons of standard coal)/ industrial added value (10,000 yuan) of the industrial park/ national (comprehensive energy consumption (tons of standard coal)/industrial added value (10,000 yuan)]	(≥1=0; <1=1)	1

[Freshwater consumption (m3)/industrial added value (10,000 yuan) of the industrial park/national freshwater consumption (m3)/industrial added value (10,000 yuan)]	(≥1=0; <1=1)	1
[Reuse volume of recycled (reclaimed) water from recycled wastewater (ton)/industrial added value (10,000 yuan) of the industrial park/national (reuse volume of recycled (reclaimed) water from recycled wastewater (ton)/industrial added value (10,000 yuan)]	(≥1=1; <1=0)	0
[Solid waste (including hazardous waste) generated/industrial added value (10,000 yuan) of the industrial park/national solid waste (including hazardous waste) generated/industrial added value (10,000 yuan)]	(≥1=0; <1=1)	1
[Comprehensive utilization of industrial solid waste (ton)/ industrial added value (10,000 yuan) of the industrial park/ national comprehensive utilization of industrial solid waste (ton)/ industrial added value (10,000 yuan)]	(≥1=1; <1=0)	1
[SO2, NOx and particulate emissions (tons) of the industrial park/industrial added value (10,000 yuan)/ SO2, NOx and particulate emissions (tons)/GDP (10,000 yuan)]	(≥1=0; <1=1)	1
[Hazardous waste generated/industrial added value (10,000 yuan) of the industrial park/national hazardous waste generated/ industrial added value (10,000 yuan)]	(≥1=0; <1=1)	1
[Added value of heavy industry (10,000 yuan/year)/hectare of the industrial park]/[national added value of heavy industry (10,000 yuan/year)/hectare]	NA	1
[% solid waste sent to landfills in industrial park / % of solid waste sent to landfills nationally]	(≥1=0; <1=1)	1
[# days failing National Air Quality Safety Standards in industrial park / # days failing National Air Quality Safety Standards nationally]	(≥1=0; <1=1)	1
[% firms that invest in industrial symbiosis in industrial park / % firms that invest in industrial symbiosis nationally]	(≥1=1; <1=0)	1
Efficient and clean production, emissions and waste management score: (scale of 0–13)		
Environmental performance score: (scale of 0–56)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones

3.6.3.5 Analysis of comprehensive performance evaluation results

The comprehensive performance of the Hefei High-tech Zone is evaluated from the economic, social, and environmental standpoints. A comprehensive evaluation score of 138 points (out of 173 points) is obtained, including 41 points (out of 48 points) for economic performance, 55 points (out of 69 points) for social performance, and 42 points (out of 56 points) for environmental performance. As a whole, Hefei High-tech Zone achieves higher scores in economic, environmental, and social performance evaluation, at the development level of leading industrial parks in China. The verification analysis of Hefei High-tech Zone demonstrates that the modified indicator system in the International Guidelines for Industrial Parks is well suited to Hefei High-tech Zone, although some economic performance and social performance indicators are not applicable to industrial parks in China. It is suggested that appropriate modification be made by referring to the applicable indicator system for the evaluation of industrial parks by competent national ministries and commissions according to physical conditions in China.

3.6.4 Suzhou Industrial Park

3.6.4.1 Overview of Suzhou Industrial Park

Suzhou Industrial Park, which is located in the east of Suzhou City and under the jurisdiction of Suzhou City, Jiangsu Province, was established with approval from the State Council in February 1994 and commenced in May 1994. It covers an administrative area of 278km2, including 80km2 for the China-Singapore cooperation zone. As an important cooperation project between the governments of China and Singapore, it is hailed as “an important window of reform and opening-up in China” and “a successful example of international cooperation”.

Figure 3-13 Transport links of Hefei High-tech Zone

Table 3-34 Details of Suzhou Industrial Park

Location	East of Suzhou City, Jiangsu Province	Area	278 km²
Category of administrative division	National economic and technological development zone, national high-tech industrial development zone	Population	576,000 (registered resident population by the end of 2019) 1,151,200 (permanent population by the end of 2019)
District under jurisdiction	Loufeng, Xietang, Weiting, and Shengpu Streets, and Huxi, Hudong, Dongshahu, and Yueliangwan Social Work Committees	Scenic spots	Jinji Lake Scenic Spot, Egret Park, and Yangcheng Lake Peninsula
Railway stations	Suzhou Railway Station, Suzhoubei Railway Station, and Suzhouyuanqu Railway Station	Airport	Shanghai Hongqiao International Airport, Shanghai Pudong International Airport, and Sunan Shuofang International Airport
Postal code	215000	GDP	257 billion yuan (2018) 274.3 billion yuan (2019)

3.6.4.2 Economic performance

In 2019, Suzhou Industrial Park achieved a total GDP of 274.3 billion yuan, public budget revenue of 37 billion yuan, total import and export value of 87.1 billion US dollars, total retail sales of its social consumer goods of 54.3 billion yuan, and a per capita disposable income of its urban residents of more than 77,000 yuan. By the end of 2019, Suzhou Industrial Park had created a total import and export value of more than 1.1 trillion US dollars and tax revenue of more than 700 billion yuan for the country, with a high level among comparable parks in China of economic density, innovation concentration and openness.

In 2019, Suzhou Industrial Park achieved a total industrial output value of 502.5 billion yuan, including 480.2 billion yuan for industries above designated size; an output value of 336.4 billion yuan for high-tech industries and 294.5 billion yuan for emerging industries, accounting for 70.1 and 61.3 per cent of the total industrial output value above designated Size respectively; the service industry in the zone, especially the high-end modern service industry, was developing strongly, achieving a service industry added value of 137.7 billion yuan, accounting for 50.2 per cent of GDP. There are 1,013 financial and quasi-financial institutions in the zone, and in terms of the number of foreign banks the park ranks first in the province; biomedicine, nanotechnology application, and artificial intelligence industries have begun to take shape. In 2019, they achieved an output value of 90 billion yuan, 81 billion yuan, and 32 billion yuan respectively, with an average annual growth of about 20 per cent for several consecutive years. By the end of 2019, there were more than 1,400 national high-tech enterprises, 50 Unicorns and Unicorn (developing) enterprises, and more than 6,000 scientific and technological innovation-based enterprises within the period of validity.

In the comprehensive evaluation of national economic and technological development zones announced by the Ministry of Commerce, Suzhou Industrial Park ranked first for four consecutive years (2016, 2017, 2018 and 2019), ranked fifth in the comprehensive ranking of national high-tech zones and ranked among the world-class high-tech parks established by the Ministry of Science and Technology. In 2018, Suzhou Industrial Park was selected as a leading unit of the 40th anniversary of reform and opening-up in Jiangsu Province.

The following table shows the application of the modified framework and content of the International Guidelines for Industrial Parks to Suzhou Industrial Park – evaluation of economic indicators.

Table 3-35 Evaluation score of economic performance indicators of Suzhou Industrial Park

Indicator	Quantitative input scoring basis	Score
1. Good economic governance		
Robust economic system tracking economic analysis quantitatively showing a positive economic return (i.e., in terms of employment, taxes, net exports, forex, local supplies), after such factors as land, CAPEX and OPEX costs and subsidies are taken into account.	(Yes=1; no=0)	1
Private participation in industrial park planning	(Yes=1; no=0)	1
Private sector represented on Board of Regulators	(Yes=1; no=0)	1
Land utilization rate≥60%	(Yes=1; no=0)	1
Existence and functioning of a formal industrial park marketing department/unit	(Yes=1; no=0)	1
User Maintenance and Operation fees or charges collected by the Operator	(Yes=1; no=0)	1
% user enterprise satisfaction with the services provided by the industrial park operator	(≥51%=1; <49%=0)	1
Operator customer relationship management (CRM) system in place	(Yes=1; no=0)	1
Operator ISO 9001 certification	(Yes=1; no=0)	1
Good economic governance score: (scale of 0–9)		
2. Economically enabling site and infrastructure hardware (appropriate site selection)		
Unencumbered land title	(Yes=1; no=0)	1
Phased site development strategy and implementation	(Yes=1; no=0)	1
Park liveability and perfection of urban service functions	(Yes=1; no=0)	1

Proximity to appropriate highway	(Yes=1; no=0)	1
Proximity to power transmission or distribution grid	(Yes=1; no=0)	1
Proximity to gas transmission mains and gas 'city-gate'	(Yes=1; no=0)	1
Proximity to microwave tower for broadband GSM mobile telephony and Wi-Fi connectivity	(Yes=1; no=0)	1
Appropriately-sized (wide) internal roads	(Yes=1; no=0)	1
Proximity operational public port, airport and high-speed of use and of interest to the industrial park's users	(Yes=1; no=0)	1
[% hours power outage per period in industrial park / % hours power outage nationally]	(≥ 1=0; <1=1)	1
[% hours of interruption of water supply, quality or quality in industrial park / % hours of interruption of water supply, quality or quality nationally]	(≥ 1=0; <1=1)	1
Economically enabling site and hardware score: (scale of 0–11)		
3. Economically enabling services software		
Regular, scheduled maintenance of buildings, as well as dedicated rapid-response or emergency maintenance, repair, rectification and restoration service, including for utilities and superstructure assets	(Yes=1; no=0)	1
Dedicated or localized industrial park business support, business association support, incubation, innovation or competitiveness programmes on effective offer	(Yes=1; no=0) (depending on # of programmes available)	1
Industrial park user enterprises have access to specific financial support programmes	(Yes=1; no=0)	1
Dedicated one-stop shop/single window in industrial park	(Yes=1; no=0)	1
E-government services dedicated to the industrial park	(Yes=1; no=0)	1
Online approval rate of (one-stop) government service hall	(≥51%=1; <49%=0)	1
Formal industrial park B2B gatherings held on formal industrial park B2B platforms on regular basis	(Yes=1; no=0)	1
Operator landscaping, gardening, and cleaning services	(Yes=1; no=0)	1
Presence of mechanical cargo loading and off-loading services for users	(Yes=1; no=0)	1
Operation of product exhibition centres, product display areas, conference centres, and/or auditoria	(Yes=1; no=0) (depending on # and variety)	1

Presence of on-site banking, bureaux-de-change and ATM facilities	(Yes=1; no=0) (depending on # and variety)	1
Presence of human resources agency and recruiting services	(Yes=1; no=0)	1
Presence of manpower training services, in coordination with recognized specialized technical training institutions in various fields	(Yes=1; no=0)	1
Presence of dedicated on-site R&D, patenting, and product commercialisation services, in conjunction with recognized universities and/or legal services providers	(Yes=1; no=0)	1
Presence of dedicated on-site matching, twinning, and local supplier and buyer forward and backward linkages schemes	(Yes=1; no=0) (depending on # and sophistication of schemes)	1
Presence of quality, product, process standards and/or trade certification services	(Yes=1; no=0)	1
Economically enabling software and services score: (scale of 0–16)		
4. Economically impactful nature: employment, investment, turnover		
[Per capita income in the industrial park / per capita income nationally]	(1=1; <1=0)	1
[Full-time equivalent employment/hectare in industrial park] / full-time equivalent employment/hectare / in industrial parks nationally]	(1=1; <1=0)	1
[Regional GDP/ha in industrial park/regional GDP/ha nationally]	(1=1; <1=0)	1
[US$ sales revenues/ha in industrial park /US$ sales revenues/ha nationally]	(1=1; <1=0)	1
[% manufacturing inputs sourced domestically in industrial park/ % manufacturing inputs sourced domestically nationally]	(1=1; <1=0)	0
[(output value of high-tech manufacturing / gross output) in industrial park/(output value of high-tech manufacturing / gross output) nationally]	(1=1; <1=0)	1
[US$ Economic value addition (EVA, calculated as output-inputs) per capita in industrial park/US$ per capita nationally]	(1=1; <1=0)	1
[Exports minus imports in industrial park / exports minus imports nationally]	(1=1; <1=0)	1
[FDI % of total investment (or GFCF) in industrial park/FDI % of total investment (or GFCF) nationally]	(1=1; <1=0)	1

[US$ exports/ha in industrial park / US$ exports/ha nationally]	(1=1; <1=0)	1
[Enterprises/ha in industrial park / enterprises/ha nationally]	(1=1; <1=0)	1
[IPR registrations/year/company in industrial park/ IPR registrations/year/company nationally]	(1=1; <1=0)	1
Economically impactful nature score: (scale of 0–12)		
Economic performance score: (scale of 0–48)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones

3.6.4.3 Social performance

By the end of 2019, Suzhou Industrial Park had 576,000 registered residents, a floating population of 745,500 and 1,151,200 permanent residents, most of whom belong to the Han ethnic group. The park is within easy access because of the convenient expressways, national and provincial roads, railways, waterways, and links to other transport networks. Shanghai may be reached in 20 minutes and Nanjing in 60 minutes from the Park Station via the Shanghai-Nanjing Intercity Railway. There are also several general heliports. It is 60 km from Shanghai Hongqiao International Airport, 120 km from Shanghai Pudong International Airport, and 40 km from Sunan Shuofang International Airport. By the end of 2019, in the park there were a number of national arterial road networks, including the Shanghai-Nanjing Expressway, the Suzhou-Jiaxing-Hangzhou Expressway and National Road No. 312, and urban roads longer than 1,000 km. The urban rail transit in operation in the park includes Suzhou Rail Transit lines 1, 2 and 3, with Suzhou Rail Transit lines 5, 6, 7, 8 and S1 under construction.

Infrastructure in the park is constructed to a high standard. Before the resident enterprises move into the park, all infrastructure facilities are been provided with utility services at the "Nine Connections and One Levelling" standard, which means connection to access roads, power supply, water supply, gas, heat supply, drainage, sewage, post and telecommunication, and cable TV, and also landfilling and levelling. In the process of development and construction of the park, the entire stand is built up to the flood control standard for floods with a return period of 100 years.

Since its establishment, Suzhou Industrial Park has always attached great importance to its public service function and regional boosting function. Where education facilities are concerned, by implementing the development strategy for modern, balanced, specialized and international education in order to raise the overall level of education and to ensure its modernization. Educational facilities and standards in the park are at the highest level of those in the city and province as a whole. As of April 2020, there are 78 kindergartens, 14 primary schools, 3 junior middle schools, 18 nine-year schools, 3 general high schools, 1 combined junior and senior high school, 2 fifteen-year comprehensive schools, 2 special education schools, 2 schools for children of foreigners, in addition to 1 open university (college for senior citizens), 1 youth activity centre and 1 municipal secondary school in the park. At present, there are more than 10,000 in-service teachers and 160,000 full-time students in the basic education section in the park. A comprehensive education system comprising pre-school education, compulsory education, general high school education, vocational education, higher education and social education has been set in place, and the entire life-cycle education from infant education, through youth education to adult education and elderly education has been

developed, thus creating an agreeable situation in which general education and special education, domestic education and international education, in-school education and out-of-school education, online education and offline education are all in parallel development.

In terms of medical and health service facilities, as of March 2020, the medical and health institutions in Suzhou Industrial Park mainly include seven modern large and medium-sized hospitals: Suzhou Dushuhu hospital (under construction), General Hospital of Children's Hospital Affiliated to Suzhou University, Suzhou Jiulong Hospital of Medical School of Shanghai Jiaotong University, Xinghai Hospital of Suzhou Industrial Park, Xinghu Hospital of Suzhou Industrial Park, Xingpu Hospital of Suzhou Industrial Park and Xingtang Hospital of Suzhou Industrial Park (under construction), and eight regional health service centres and specialized medical and nursing institutions: Jinjihu Community Health Service Centre, Loufeng Community Health Service Centre, Kuatang Community Health Service Centre, Weiting Community Health Service Centre, Xietang Community Health Service Centre, Chefang Community Health Service Centre, Shengpu Community Health Service Centre and Jiuling Nursing Home.

Where cultural facilities are concerned, the park continues to improve its public culture service system and promote the development of culture and cultural initiatives. Throughout 2019, more than 2,700 public service activities were carried out, serving more than 500,000 people, improving the availability to the public of cultural events. By the end of 2019, the park had a per capita area of 0.5538 m2 of public culture facilities, 5,754 cultural enterprises, nearly 50,000 employees, and an operating income of 65.4 billion yuan.

Turning to public sports facilities, by the end of 2019, the total area of such facilities in the park was 1,506,200 m2, and the per capita area of public sports venues 1.84 m2. These facilities are continuously being upgraded to be able to host various high-profile international events. In 2019, 10 events at the municipal and higher levels were held in the Olympic Sports Centre, attracting more than 80,000 spectators.

The following table shows the application of the modified framework and content of International Guidelines for Industrial Parks to Suzhou Industrial Park – evaluation of social indicators.

Table 3-36 Evaluation score of social performance indicators of Suzhou Industrial Park

Indicator	Quantitative input scoring basis	Score
1. Socially suitable site and social infrastructure		
Project ESIA conducted and filed with appropriate authorities	(Yes=1; no=0)	1
Childcare facilities	(Yes=1; no=0) (depending on # and type of service)	1
Park or greenspace as % of total area (as per international standard)	(Yes=1; no=0)	1
Presence of on-site incident response centre and public announcement (PA) system	(Yes=1; no=0)	1

Disabled-inclusive building design (i.e., access ramp and elevator in each building	(Yes=1; no=0)	0
[Average commute time to industrial park workplace for employees /average commute time in major cities nationally]	(≥1=1; <1=0)	1
Construction materials are domestically sourced	(Yes=1; no=0)	1
Industrial park provision of utilities to adjacent communities	(Yes=1; no=0)	1
ILO/IFC standard worker accommodations on-site	(Yes=1; no=0)	1
Drinking fountains in place throughout industrial park buildings	(Yes=1; no=0)	1
On-site multi-purpose athletic fields, gym, recreation, leisure, entertainment, community and cultural facilities	(Yes=1; no=0)	1
Availability of vocational skill training institution in the industrial park	(Yes=1; no=0)	1
Proportion of public service expenditure in public budget expenditure	(≥national average proportion in the said year =1; ≤the national average proportion in the said year =0)	1
Socially appropriate site and social infrastructure score: (scale of 0–13)		
2. Quality social management system and services		
Social impact management and monitoring system (SMS) in place in the industrial park	(Yes=1; no=0)	1
Social audits of each firm on at least biennial basis	(Yes=1; no=0)	1
Existence of emergency preparedness and response system in industrial park	(Yes=1; no=0)	1
Industrial park community solidarity programme and Involvement in community projects	(Yes=1; no=0)	1
Annual public/published social performance report for industrial park	(Yes=1; no=0)	1
% firms with ISO 26000 certification	(≥51% =1; ≤49% =0)	0
% firms with ISO 9001 certification	(≥51% =1; ≤49% =0)	0
% firms with SA 8000 certification	(≥51% =1; ≤49% =0)	0
% firms with AA1000AP certification	(≥51% =1; ≤49% =0)	0
% firms with AA1000AS Sustainability or AA1000SES Stakeholder Engagement Standard certification	(≥51% =1; ≤49% =0)	0
% Employees satisfied with social systems and services	(≥50% =1; ≤49% =0)	1

Dedicated/enhanced industrial park social regulations, including S-IA requirements, and community dialogue mechanism	(Yes=1; no=0)	1
Industrial Park Operator ISO 26000 certifications	(Yes=1; no=0)	0
Industrial Park Operator ISO 9001 certifications	(Yes=1; no=0)	1
Industrial Park Operator SA 8000 certifications	(Yes=1; no=0)	0
Industrial Park Operator AA1000AP certifications	(Yes=1; no=0)	0
Industrial Park Operator AA1000AS Sustainability or AA1000SES Stakeholder Engagement Standard certifications	(Yes=1; no=0)	0
Existence of industrial park dedicated internal ombudsman	(Yes=1; no=0)	1
Quality social management system and social services score: (scale of 0–18)		
3. Occupational health and safety		
[Expenditure on health and safety (EHS) per capita in industrial park /EHS per capita nationally]	(≥1=0; <1=1)	0
% firms with OHSAS 18001 certification in industrial park	(≥51% =1; ≤49% =0)	0
Existence of internal park operation fire safety guidelines	(Yes=1; no=0)	1
Public or common night transportation or blue-light system in place in industrial park	(Yes=1; no=0)	1
[(# fire alarms/building) in industrial park /(# fire alarms/ building) in accordance with Chinese standards]	(≥1=1; <1=0)	1
[# sprinklers/building in industrial park / # sprinklers/building in accordance with Chinese standards]	(≥1=1; <1=0)	1
[# crimes reported per capita in industrial park / # crimes reported per capita nationally]	(≥1=1; <1=0)	1
Access by fire services to all parts of industrial park	(Yes=1; no=0)	1
[% employees with social health insurance coverage in industrial park / % employees with social health insurance coverage nationally]	(≥1=1; <1=0)	1
[# of nurses per capita in park / # of nurses per capita nationally]	(≥1=1; <1=0)	1
First-aid room or kit in each building	(Yes=1; no=0)	1
Dedicated, 24/7 health services inside the industrial park	(Yes=1; no=0)	1
Defibrillator in every building	(Yes=1; no=0)	0
[Mean emergency (police, fire, ambulance) response time in industrial park / mean emergency (police, fire, ambulance) response nationally]	(≥1=1; <1=0)	1

Provision of an independent safety production organization	(Yes=1; no=0)	1
Occupational health and safety score: (scale of 0–15)		
4. Good labour relations and welfare		
Presence of aggregated, publicly accessible labour complaints or incidents and complaint measurement mechanism data available	(Yes=1; no=0) (depending on sophistication and transparency of system)	1
Presence of on-site regulator, operator or third-party authorized labour inspectors or counsellors	(Yes=1; no=0)	1
Absence of instances of child labour and forced labour	(No=1; yes=0)	1
Rights to assemble, unionize, engage in collective bargaining, and strike	(Yes=1; no=0)	1
[% workforce unionized in industrial park / % workforce unionized nationally	(≥1=1 ‹1=0)	1
[Average salary in industrial park / average salary nationally]	(≥1=1 ‹1=0)	1
[% employees on term or open-ended contracts in industrial park / % employees on term or open-ended contracts nationally]	(≥1=1; ‹1=0)	1
[# annual complaints per capita about working conditions received in industrial park/ # annual complaints per capita about working conditions nationally]	(≥1=0; ‹1=1)	1
[# annual complaints per capita resolved in industrial park / # annual complaints per capita resolved nationally]	(≥1=1; ‹1=0)	0
% industrial park workers satisfaction with industrial park labour relations	(≥51% =1; ≤49% =0)	1
[Average commuting distance of employees in the industrial park/average commuting distance in major cities nationally]	(≥1=1; ‹1=0)	1
[% employee annual turnover in industrial park / % employee annual turnover nationally]	(≥1=0; ‹1=1)	0
Good labour relations and welfare score: (scale of 0–12)		
5. Social inclusiveness		
[% employees from legally-recognized disadvantaged groups or with disabilities in industrial park / % employees from legally-recognized disadvantaged groups or with disabilities nationally]	(≥1=1; ‹1=0)	0
[% female workforce in industrial park / % female workforce nationally]	(≥1=1; ‹1=0)	1

[% women in management of operator and resident firms / % women in management nationally]	(≥1=1; <1=0)	1
[Female wages as % of male wages in industrial park / female wages as % of male wages nationally]	(≥1=1; <1=0)	1
Industrial park operator-organized inclusiveness or sensitivity training or events	(Yes=1; no=0)	1
[% employees between ages of 16 and 30 in industrial park / % employees between ages of 16 and 30 nationally]	(≥1=1; <1=0)	1
[# new domestic MSMEs/year/ha in industrial park / # new domestic MSMEs/year/ha nationally]	(≥1=1; <1=0)	1
Establishment of a financing promotion platform for MSMEs	(Yes=1; no=0)	1
[Domestic MSME % total investment in industrial park /MSME % total investment nationally]	(≥1=1; <1=0)	0
[Domestic MSME % of US$ in sales in industrial park /MSME % of US$ GDP nationally]	(≥1=1; <1=0)	0
[Domestic MSME % of US$ in exports in industrial park /MSME % of US$ in exports nationally]	(≥1=1; <1=0)	0
Social inclusiveness score: (scale of 0–11)		
Social performance score: (scale of 0–69)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones.

3.6.4.4 Environmental performance

Suzhou Industrial Park has an excellent ecological setting. In the park, there are 238 rivers, with a total length of about 430 km, and these rivers cover a water area of about 16 km2, including Loujiang River, Wusong River, Xiegang River and Jiepu River; five lakes in the park are listed in the Jiangsu Province protected lakes list: Jinji Lake, Shahu Lake, Yangcheng Lake, Dushu Lake and Woditan Lake, with a combined surface area of some 55 km2.

The aim for Suzhou Industrial Park is to transform it into a park with greening as its arterial system, so to speak, and water as its soul. More than 45 per cent of the park's area is covered by greenery. The park's well-designed rainwater collection and drainage system has eliminated the risk of waterlogging. By the end of 2018, according to the results of recent biodiversity surveys, more than 130 species of birds have been recorded in Suzhou Industrial Park, including 5 species of class II national protected animals, including mandarin duck, Chinese egret, sparrow hawk, accipiter gularis and kestrel. There are 570 varieties of cultivated plants and 199 varieties of wild plants in the park, and 328 species of aquatic organisms inhabit the waters of the lakes.

In managing the park, great importance is attached to ecological protection and environmental oversight, and it is one the first parks in China to have been designated an eco-industry demonstration parks, a pilot park in environmentally friendly construction, a national low-carbon industrial pilot park, a national green demonstration park and an energy Internet demonstration park.

The following table shows the application of the modified framework and content of the International Guidelines for Industrial Parks to Suzhou Industrial Park – evaluation of environmental indicators.

Table 3-37 Evaluation score of environmental performance indicators of Suzhou Industrial Park

Indicator	Quantitative input scoring basis	Score
1. Environmentally suitable site		
Site EIA conducted and filed with appropriate authorities	(Yes=1; no=0)	1
Compliance of the site with the "three lines and one list"(ecological protection red line, environmental quality bottom line, resource utilization upline, and environmental access list) requirements	(Yes=1; no=0)	1
Adoption of specific internal zone planning	(Yes=1; no=0)	1
[% plots actually allocated to green industry or non-industrial production activities in industrial park / % of GDP represented by green industry or non-industrial production activities nationally]	(≥1=1; <1=0)	1
Industrial Park situated on redeveloped brownfield site, with the effective possibility of reusing, re-purposing and converting existing infrastructure or buildings	(Yes=1; no=0)	0
Environmentally appropriate site score: (scale of 0–5)		
2. Green infrastructure		
Water, electrical and gas meters and load management systems in place, as appropriate to the services offered	(Yes=1; no=0)	1
Air quality monitoring (remote controlling and recording) system and infrastructure in place in industrial park	(Yes=1; no=0)	1
Presence of an off-site landfill for industrial park solid waste management	(Yes=1; no=0)	1
Presence of hazardous waste collection, storage and treatment or disposal management system	(Yes=1; no=0)	1

Presence of central sewage treatment facilities (inside or outside the park)	(Yes=1; no=0)	1
Presence of sustainable rain and storm water collection / harvesting (i.e., culverts/drains, cisterns/tanks), management, treatment (e.g., filter, water hyacinth) and reuse systems	(Yes=1; no=0)	1
Presence provision of garbage sorting and recycling devices	(Yes=1; no=0)	1
% of buildings with Leadership in Energy and Environmental Design(LEED) certification	(≥51%=1; ≤49%=0)	0
% of buildings with German Sustainable Building Council (DGNB) certification	(≥51%=1; ≤49%=0)	0
% of buildings with Building Research Establishment Environmental Assessment Method (BREAM) certification	(≥51%=1; ≤49%=0)	0
% of buildings with World Green Building Council (WGBC) certification	(≥51%=1; ≤49%=0)	0
[% firms with one of the listed WGBC certifications in industrial park for on-site buildings / % firms having obtained such a certification nationally]	(≥1=1; <1=0)	1
Anti-seismic, anti-flood, or anti-avalanche resilient construction techniques used, as applicable to site conditions	(Yes=1; no=0)	1
Presence of solar street lighting	(Yes=1; no=0)	1
Presence of waste exchange clearinghouse in the industrial park, promoting industrial symbiosis and economic circularity	(Yes=1; no=0)	1
Low-voltage (ideally photovoltaic) power electrical systems	(Yes=1; no=0)	1
Walking and bicycle paths, and racks, inside park for workforce	(Yes=1; no=0)	1
Presence of bicycle-sharing system in industrial park	(Yes=1; no=0)	1
Electrical and hybrid vehicle power plug-in points in industrial park	(Yes=1; no=0)	1
Non-potable and “grey” water usage for industrial park irrigation	(Yes=1; no=0)	1
Operator or users association shared “efficient manufacturing” systems and technologies (i.e., cloud-based systems; value networks and joint purchasing; rapid prototyping, CAD, 3D-printing; smart technology, M2M, smart grid, and internet of things; etc.)	(Yes=1; no=0) (depending on degree of tech and systems adoption)	1
Green infrastructure score: (scale of 0–21)		

3. Green systems		
Presence of team of dedicated on-site environmental engineers and/or of staffed unit in the employ of the regulator or operator	(Yes=1; no=0)	1
Formal operator schedule for verification of pipes and drains inside park, in place and applied	(Yes=1; no=0)	1
% of the implementation of enterprises carrying out annual environmental audit in industrial parks	(≥51%=1; ≤49%=0)	1
Operator annual environmental report released to public	(Yes=1; no=0)	1
[% firms having obtained a "Green" (e.g., "National Eco-industrial Park", "Green Label", etc. 20), ISO14001, ISO 50001, International Sustainability and Carbon (ISCC)21 certification or Global Reporting Initiative (GRI)22 Guidelines G3.1 rating (for recycled materials and wastewater, clean energy, sustainable alternative transport systems, etc.) or registration in industrial park / % firms having obtained such a certification nationally]	(≥1=1; <1=0)	1
[Expenditure on environmental management/ha in industrial park / expenditure on environmental management/ha nationally]	(≥1=1; <1=0)	1
Natural disaster assessment and risk management plan and system in place, as appropriate	(Yes=1; no=0)	1
Management institution of the industrial park possesses UN Global Compact Registration	(Yes=1; no=0)	0
Management institution of the industrial park has passed the possesses ISO14001	(Yes=1; no=0)	1
Management institution of the industrial park possesses International Sustainability and Carbon certification (ISCC)	(Yes=1; no=0)	0
Management institution of the industrial park having been granted ISO50001 or Green certification	(Yes=1; no=0)	1
Management institution of the industrial park having been granted GRI rating	(Yes=1; no=0)	0
Availability of dedicated financial or tax incentives for green building within the industrial park	(Yes=1; no=0)	1
Dedicated or enhanced industrial park internal environmental regulations, including biodiversity rules, environmental management system (EMS) requirements	(Yes=1; no=0)	1
Dedicated internal operating regulations with respect to odour, smoke, light, dust, vibration and noise, as well as hours of activity	(Yes=1; no=0)	1

[% firms that are UN Global Compact registered participants or signatories In the industrial park / % firms having signed the UNGC or obtained such a registration nationally]	(≥1=1; <1=0)	1
Employee car-sharing or car-pooling system in place	(Yes=1; no=0)	1
Green systems score: (scale of 0–17)		
4. Efficient and clean production, emissions and waste management		
Presence of solid waste collection service	(Yes=1; no=0)	1
[% energy from renewable (e.g., solar, wind, biomass/biogas/ biofuel, geothermal, tidal, hydroelectric, waste-to-power) sources in industrial park / % energy acquired from renewable sources nationally]	(≥1=1; <1=0)	1
[Comprehensive energy consumption (tons of standard coal)/ industrial added value (10,000 yuan) of the industrial park/ national (comprehensive energy consumption (tons of standard coal)/industrial added value (10,000 yuan)]	(≥1=0; <1=1)	1
[Freshwater consumption (m3)/industrial added value (10,000 yuan) of the industrial park/national freshwater consumption (m3)/industrial added value (10,000 yuan)]	(≥1=0; <1=1)	1
[Reuse volume of recycled (reclaimed) water from recycled wastewater (ton)/industrial added value (10,000 yuan) of the industrial park/national reuse volume of recycled (reclaimed) water from recycled wastewater (ton)/industrial added value (10,000 yuan)]	(≥1=1; <1=0)	0
[Solid waste (including hazardous waste) generated/industrial added value (10,000 yuan) of the industrial park/national solid waste (including hazardous waste) generated/industrial added value (10,000 yuan)]	(≥1=0; <1=1)	1
[Comprehensive utilization of industrial solid waste (ton)/ industrial added value (10,000 yuan) of the industrial park/ national comprehensive utilization of industrial solid waste (ton)/ industrial added value (10,000 yuan)]	(≥1=1; <1=0)	1
[SO2, NOx and particulate emissions (tons) of the industrial park/industrial added value (10,000 yuan)/ (SO2, NOx and particulate emissions (tons)/GDP (10,000 yuan)]	(≥1=0; <1=1)	1
[Hazardous waste generated/industrial added value (10,000 yuan) of the industrial park/national hazardous waste generated/industrial added value (10,000 yuan)]	(≥1=0; <1=1)	1

[Added value of heavy industry (10,000 yuan/year)/hectare of the industrial park]/[national added value of heavy industry (10,000 yuan/year)/hectare]	NA	-
[% solid waste sent to landfills in industrial park / % of solid waste sent to landfills nationally]	(≥1=0; <1=1)	1
[# days failing National Air Quality Safety Standards in industrial park / # days failing National Air Quality Safety Standards nationally]	(≥1=0; <1=1)	1
[% firms that invest in industrial symbiosis in industrial park / % firms that invest in industrial symbiosis nationally]	(≥1=1; <1=0)	1
Efficient and clean production, emissions and waste management score: (scale of 0–13)		
Environmental performance score: (scale of 0–56)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones.

3.6.4.5 Analysis of comprehensive performance evaluation results

The comprehensive performance of Suzhou Industrial Park is evaluated from the economic, environmental and social standpoints. A comprehensive evaluation score of 144 points (out of 173 points) is obtained, including 47 points (out of 48 points) for economic performance, 47 points (out of 56 points) for environmental performance, and 49 points (out of 69 points) for social performance. By and large, the park achieves higher scores in the evaluation of economic, environmental and social performance, although, by comparison with its outstanding economic and environmental performance, its social performance falls relatively well short of the full score. It is clear from this verification analysis of Suzhou Industrial Park that, despite the need for some issues to be optimized, the modified indicator system in the International Guidelines for Industrial Parks is fully applicable to Suzhou Industrial Park.

3.6.5 Analysis of the verification results of the modified indicator system of the International Guidelines for Industrial Parks

A horizontal comparison is made in the trial calculation results of the modified indicator systems of the International Guidelines for Industrial Parks between the three industrial parks.

In terms of economic performance, both Suzhou Industrial Park and Tianjin Economic and Technological Development Area get an almost full score, reflecting the achievements by top industrial parks in China in economic hardware and software. The evaluation results can be confirmed by the evaluation results of major industrial parks in China, for example, the evaluation of the comprehensive development level of national economic and technological development zones. As a zone representative of the industrial parks in Central China, Hefei High-tech Zone gets a lower evaluation score than the other two parks. The main difference between them is to be seen in the establishment of customer relationship management systems and other software functions. While maintaining their impressive levels of economic performance, parks in Central and Western China should also pay attention to the supporting software services. In a subsequent promotional exercise, the International Guidelines for Industrial Parks could focus on providing guidance and related services in this respect for the industrial parks in Central and Western China.

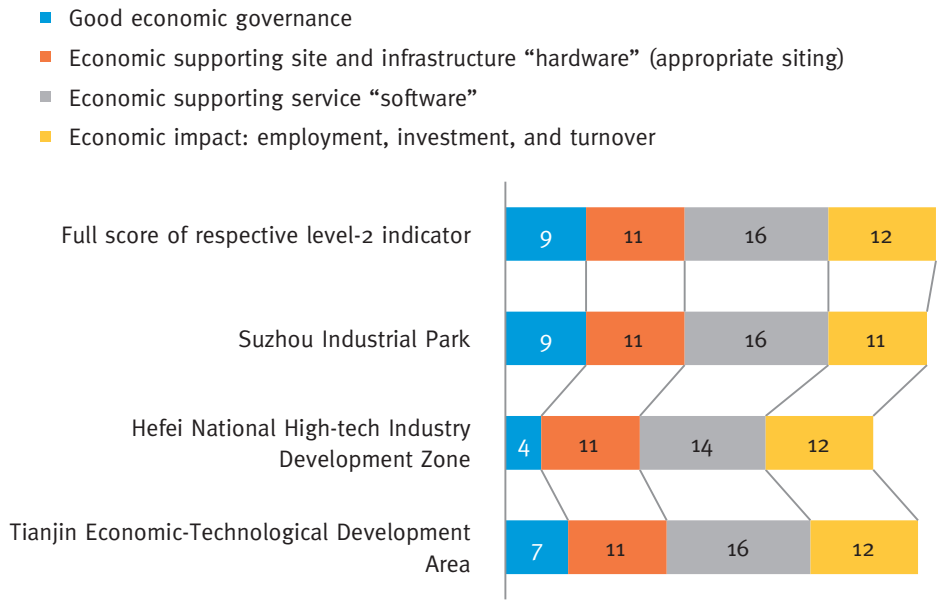


Figure 3-15 Analysis of the horizontal comparison between the evaluation results of economic indicators

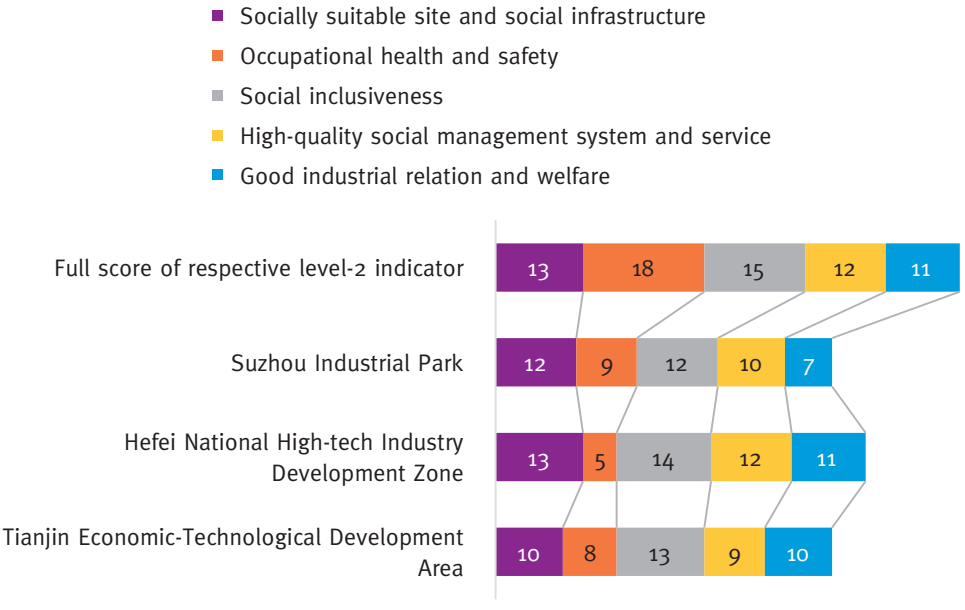


Figure 3-16 Analysis of the horizontal comparison between the evaluation results of social indicators

social performance is concerned, the total scores of the three industrial parks fall somewhat short of the full score of 69. They mainly do not score well against the level-2 indicator "high-quality social management system and service", in the evaluation of the dimensions of green building and environmental management system assessment. The three parks perform well in an environmentally suitable site, environmental protection infrastructure, and waste management, which shows that industrial parks in China have achieved substantive results in environmental governance. From the comparison, Hefei High-tech Zone can be seen to lag somewhat behind Suzhou Industrial Park and Tianjin Economic and Technological Development Area in overall environmental performance.

In terms of environmental performance, the three industrial parks are about 10 points short of the full score of the evaluation indicator system, mainly in the construction of green infrastructure and green system.

Both Suzhou Industrial Park and Tianjin Economic and Technological Development Area almost get a full score, reflecting the achievements by top industrial parks in China in economic hardware and software. The evaluation results may be confirmed by the evaluation results of major industrial parks in China, such as the evaluation of the comprehensive development of national economic and technological development zones. As noted above, Hefei High-tech Zone, which is representative of the industrial parks of Central China, gets a lower evaluation score than the other two parks, owing to its weaker performance in customer relationship management systems and other software services. Again, as noted above, parks in Central and Western China should look beyond their economic performance and pay attention to the supporting software services and the International Guidelines for Industrial Parks could focus, in subsequent application exercises, on providing guidance and related services in this respect for the industrial parks in Central and Western China.

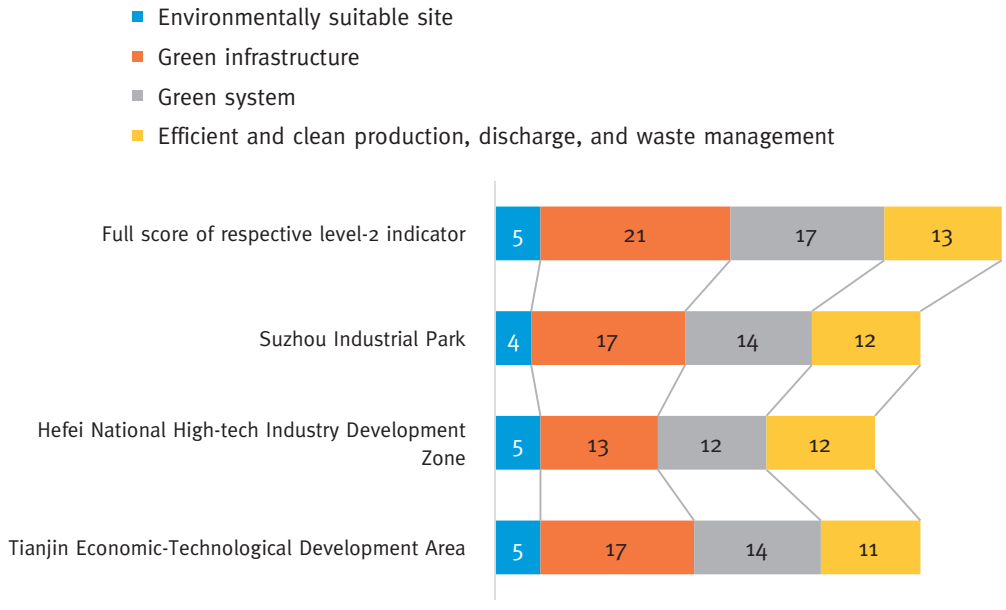


Figure 3-17 Analysis of the horizontal comparison between the evaluation results of environmental indicators

3.7 Adjustment after verification of the modified indicator system of the International Guidelines for Industrial Parks

3.7.1 Modified indicator system – economic performance evaluation

In line with the modified verification results and interviews with respective stakeholders of the parks being verified, a further modification has been made to the economic performance evaluation indicator system. The revised modified indicator system for economic performance evaluation is shown in the table below. The adjustment mainly relates to the "user maintenance and operation fees charged by the operator" indicator. For the most part, industrial parks in China are managed by a management committee within the government, and the fees to enterprises, which are mandatory, are charged through the financial and tax system. This indicator is of doubtful value in terms of its ability to discriminate and its connotations, so it is deleted after the evaluation.

In addition, it emerges from the verification that in the level-2 indicators of "economic impact: employment, investment, and turnover", various economic data of the industrial park have no effect in terms of discrimination during the national evaluation, so they are all changed to the ratio to the corresponding municipal economic data. The revised indicator evaluation focuses on the comparison between economic indicators of the industrial park and the municipal average level, covering other industrial parks in the city. The economic development level of industrial parks in a city is closely related to the municipal average economic development level, so the regional differences are further eliminated after the revision.

Table 3-38 Adjusted economic performance evaluation indicator system of the International Guidelines for Industrial Parks after adaptation verification

Indicator	Quantitative input scoring basis	Score
1. Good economic governance		
Robust economic system tracking economic analysis quantitatively showing a positive economic return (i.e., in terms of employment, taxes, net exports, forex, local supplies), after such factors as land, CAPEX and OPEX costs and subsidies are taken into account.	(Yes=1; no=0)	
Private participation in industrial park planning	(Yes=1; no=0)	
Private sector represented on Board of Regulators	(Yes=1; no=0)	
Land utilization rate≥60%	(Yes=1; no=0)	
Existence and functioning of a formal industrial park marketing department/unit	(Yes=1; no=0)	
% user enterprise satisfaction with the services provided by the industrial park operator	(≥51%=1; <49%=0)	

Operator customer relationship management (CRM) system in place	(Yes=1; no=0)	
Operator ISO 9001 certification	(Yes=1; no=0)	
Good economic governance score: (scale of 0–8)		
2. Economically enabling site and infrastructure hardware (appropriate site selection)		
Unencumbered land title	(Yes=1; no=0)	
Phased site development strategy and implementation	(Yes=1; no=0)	
Park liveability and perfection of urban service functions	(Yes=1; no=0)	
Proximity to appropriate highway	(Yes=1; no=0)	
Proximity to power transmission or distribution grid	(Yes=1; no=0)	
Proximity to gas transmission mains and gas 'city-gate'	(Yes=1; no=0)	
Proximity to microwave tower for broadband GSM mobile telephony and Wi-Fi connectivity	(Yes=1; no=0)	
Appropriately-sized (wide) internal roads	(Yes=1; no=0)	
Proximity operational public port, airport and high-speed of use and of interest to the industrial park's users	(Yes=1; no=0)	
[% hours power outage per period in industrial park / % hours power outage nationally]	(≥ 1=0;<1=1)	
[% hours of interruption of water supply, quality or quality in industrial park / % hours of interruption of water supply, quality or quality nationally]	(≥ 1=0; <1=1)	
Economically enabling site and hardware score: (scale of 0–11)		
3. Economically enabling services software		
Regular, scheduled maintenance of buildings, as well as dedicated rapid-response or emergency maintenance, repair, rectification and restoration service, including for utilities and superstructure assets	(Yes=1; no=0)	
Dedicated or localized industrial park business support, business association support, incubation, innovation or competitiveness programmes on effective offer	(Yes=1; no=0) (depending on # of programmes available)	
Industrial park user enterprises have access to specific financial support programmes	(Yes=1; no=0)	
Dedicated one-stop shop/single window in industrial park	(Yes=1; no=0)	
E-government services dedicated to the industrial park	(Yes=1; no=0)	

Online approval rate of (one-stop) government service hall	(≥51%=1; ‹49%=0)	
Formal industrial park B2B gatherings held on formal industrial park B2B platforms on regular basis	(Yes=1; no=0)	
Operator landscaping, gardening, and cleaning services	(Yes=1; no=0)	
Presence of mechanical cargo loading and off-loading services for users	(Yes=1; no=0)	
Operation of product exhibition centres, product display areas, conference centres, and/or auditoria	(Yes=1; no=0) (depending on # and variety)	
Presence of on-site banking, bureaux-de-change and ATM facilities	(Yes=1; no=0) (depending on # and variety)	
Presence of human resources agency and recruiting services	(Yes=1; no=0)	
Presence of manpower training services, in coordination with recognized specialized technical training institutions in various fields	(Yes=1; no=0)	
Presence of dedicated on-site R&D, patenting, and product commercialisation services, in conjunction with recognized universities and/or legal services providers	(Yes=1; no=0)	
Presence of dedicated on-site matching, twinning, and local supplier and buyer forward and backward linkages schemes	(Yes=1; no=0) (depending on # and sophistication of schemes)	
Presence of quality, product, process standards and/or trade certification services	(Yes=1; no=0)	
Economically enabling software and services score: (scale of 0–16)		
4. Economically impactful nature: Employment, investment, turnover		
[Per capita income in the industrial park / per capita income nationally]	(1=1; ‹1=0)	
[Full-time equivalent employment/hectare in industrial park] / full-time equivalent employment/hectare / in industrial parks nationally]	(1=1; ‹1=0)	
[Regional GDP/ha in industrial park/regional GDP/ha nationally]	(1=1; ‹1=0)	
[US$ sales revenues/ha in industrial park /US$ sales revenues/ ha nationally]	(1=1; ‹1=0)	
[% manufacturing inputs sourced domestically in industrial park/ % manufacturing inputs sourced domestically nationally]	(1=1; ‹1=0)	

[(output value of high-tech manufacturing / gross output) in industrial park/(output value of high-tech manufacturing / gross output) nationally]	(1=1; <1=0)	
[US$ Economic value addition (EVA, calculated as output-inputs) per capita in industrial park/US$ per capita nationally]	(1=1; <1=0)	
[Exports minus imports in industrial park / exports minus imports nationally]	(1=1; <1=0)	
[FDI % of total investment (or GFCF) in industrial park/FDI % of total investment (or GFCF) nationally]	(1=1; <1=0)	
[US$ exports/ha in industrial park / US$ exports/ha nationally]	(1=1; <1=0)	
[Enterprises/ha in industrial park / enterprises/ha nationally]	(1=1; <1=0)	
[IPR registrations/year/company in industrial park/ IPR registrations/year/company nationally]	(1=1; <1=0)	
Economically impactful nature score: (scale of 0–12)		
Economic performance score: (scale of 0–47)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones.

3.7.2 Modified indicator system – social performance evaluation

According to the adaptation verification results and interviews with respective stakeholders of the parks being verified, further modification has been made to the social performance evaluation indicator system. The adjustments mainly involve integrating the internationally accepted indicators for park management institutions and enterprises, and narrowing the scope of data collected for some indicators from the national level to the municipal level. The revised localization indicator system for social performance evaluation is shown in the table below. Adjustments and made principally to the "user maintenance and operation fees charged by the operator" indicator.

Table 3-39 Adjusted social performance evaluation indicator system of the International Guidelines for Industrial Parks after localization verification

Indicator	Quantitative input scoring basis	Score
1. Socially suitable site and social infrastructure		
Project ESIA conducted and filed with appropriate authorities	(Yes=1; no=0)	
Childcare facilities	(Yes=1; no=0) (depending on # and type of service)	
Park or greenspace as % of total area (as per international standard)	(Yes=1; no=0)	
Presence of on-site incident response centre and public announcement (PA) system	(Yes=1; no=0)	
Disabled-inclusive building design (i.e., access ramp and elevator in each building	(Yes=1; no=0)	
[Average commute time to industrial park workplace for employees /average commute time in major cities nationally]	(≥1=1; <1=0)	
Construction materials are domestically sourced	(Yes=1; no=0)	
Industrial park provision of utilities to adjacent communities	(Yes=1; no=0)	
ILO/IFC standard worker accommodations on-site	(Yes=1; no=0)	
Drinking fountains in place throughout industrial park buildings	(Yes=1; no=0)	
On-site multi-purpose athletic fields, gym, recreation, leisure, entertainment, community and cultural facilities	(Yes=1; no=0)	
Availability of vocational skill training institution in the industrial park	(Yes=1; no=0)	
Proportion of public service expenditure in public budget expenditure	(≥national average proportion in the said year =1; ≤the national average proportion in the said year =0)	
Socially appropriate site and social infrastructure score: (scale of 0–13)		
2. Quality social management system and services		
Social impact management and monitoring system (SMS) in place in the industrial park	(Yes=1; no=0)	
Social audits of each firm on at least biennial basis	(Yes=1; no=0)	

Existence of emergency preparedness and response system in industrial park	(Yes=1; no=0)	
Industrial Park Community Solidarity Programme and Involvement in community projects	(Yes=1; no=0)	
Annual public/published social performance report for industrial park	(Yes=1; no=0)	
% firms with ISO 26000/ ISO 9001/ SA 8000/ AA1000AP/ AA1000AS Sustainability or AA1000SES Stakeholder Engagement Standard certification	(≥51% =1; ≤49% =0)	
% Employees satisfied with social systems and services	(≥50% =1; ≤49% =0)	
Dedicated/enhanced industrial park social regulations, including S-IA requirements, and community dialogue mechanism	(Yes=1; no=0)	
Industrial Park Operator ISO 26000/ ISO 9001/ SA 8000/ AA1000AP/ AA1000AS Sustainability or AA1000SES Stakeholder Engagement Standard certifications	(Yes=1; no=0)	
Existence of industrial park dedicated internal ombudsman	(Yes=1; no=0)	
Quality social management system and social services score: (scale of 0–10)		
3. Occupational health and safety		
[Expenditure on health and safety (EHS) per capita in industrial park /EHS per capita nationally]	(≥1=0; <1=1)	
% firms with OHSAS 18001 certification in industrial park	(≥51% =1; ≤49% =0)	
Existence of internal park operation fire safety guidelines	(Yes=1; no=0)	
Public or common night transportation or blue-light system in place in industrial park	(Yes=1; no=0)	
[(# fire alarms/building) in industrial park /(# fire alarms/ building) in accordance with Chinese standards]	(≥1=1; <1=0)	
[# sprinklers/building in industrial park / # sprinklers/building in accordance with Chinese standards]	(≥1=1; <1=0)	
[# crimes reported per capita in industrial park / # crimes reported per capita nationally]	(≥1=1; <1=0)	
Access by fire services to all parts of industrial park	(Yes=1; no=0)	
[% employees with social health insurance coverage in industrial park / % employees with social health insurance coverage nationally]	(≥1=1; <1=0)	
[# of nurses per capita in park / # of nurses per capita nationally]	(≥1=1; <1=0)	

First-aid room or kit in each building	(Yes=1; no=0)	
Dedicated, 24/7 health services inside the industrial park	(Yes=1; no=0)	
Defibrillator in every building	(Yes=1; no=0)	
[Mean emergency (police, fire, ambulance) response time in industrial park / mean emergency (police, fire, ambulance) response nationally]	(≥1=1; <1=0)	
Provision of an independent safety production organization	(Yes=1; no=0)	
Occupational health and safety score: (scale of 0–15)		
4. Good labour relations and welfare		
Presence of aggregated, publicly accessible labour complaints or incidents and complaint measurement mechanism data available	(Yes=1; no=0) (depending on sophistication and transparency of system)	
Presence of on-site regulator, operator or third-party authorized labour inspectors or counsellors	(Yes=1; no=0)	
Absence of instances of child labour and forced labour	(No=1; yes=0)	
Rights to assemble, unionize, engage in collective bargaining, and strike	(Yes=1; no=0)	
[% workforce unionized in industrial park / % workforce unionized nationally	(≥1=1; <1=0)	
[Average salary in industrial park / average salary nationally]	(≥1=1; <1=0)	
[% employees on term or open-ended contracts in industrial park / % employees on term or open-ended contracts nationally]	(≥1=1; <1=0)	
[# annual complaints per capita about working conditions received in industrial park/ # annual complaints per capita about working conditions nationally]	(≥1=0; <1=1)	
[# annual complaints per capita resolved in industrial park / # annual complaints per capita resolved nationally]	(≥1=1; <1=0)	
% industrial park workers satisfaction with industrial park labour relations	(≥51% =1; ≤49% =0)	
[Average commuting distance of employees in the industrial park/average commuting distance in major cities nationally]	(≥1=1; <1=0)	
[% employee annual turnover in industrial park / % employee annual turnover nationally]	(≥1=0; <1=1)	
Good labour relations and welfare score: (scale of 0–12)		

5. Social inclusiveness		
[% employees from legally-recognized disadvantaged groups or with disabilities in industrial park / % employees from legally-recognized disadvantaged groups or with disabilities nationally]	(≥1=1; <1=0)	
[% female workforce in industrial park / % female workforce nationally]	(≥1=1; <1=0)	
[% women in management of operator and resident firms / % women in management nationally]	(≥1=1; <1=0)	
[Female wages as % of male wages in industrial park / female wages as % of male wages nationally]	(≥1=1; <1=0)	
Industrial park operator-organized inclusiveness or sensitivity training or events	(Yes=1; no=0)	
[% employees between ages of 16 and 30 in industrial park / % employees between ages of 16 and 30 nationally]	(≥1=1; <1=0)	
[# new domestic MSMEs/year/ha in industrial park / # new domestic MSMEs/year/ha nationally]	(≥1=1; <1=0)	
Establishment of a financing promotion platform for MSMEs	(Yes=1; no=0)	
[Domestic MSME % total investment in industrial park /MSME % total investment nationally]	(≥1=1; <1=0)	
[Domestic MSME % of US$ in sales in industrial park /MSME % of US$ GDP nationally]	(≥1=1; <1=0)	
[Domestic MSME % of US$ in exports in industrial park /MSME % of US$ in exports nationally]	(≥1=1; <1=0)	
Social inclusiveness score: (scale of 0–11)		
Social performance score: (scale of 0–61)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones.

3.7.3 Modified indicator system – environmental performance evaluation

According to the adaptation verification results and survey feedback from respective management institutions of the parks being verified, further modification has been made to the environmental performance evaluation indicator system. The adjustments mainly involve narrowing the scope of data collected from national level to municipal level, and deleting indicators not applicable for the parks being verified, such as International Sustainability and Carbon Certification (ISCC) 21 or Global Reporting Initiative (GRI) 22 Guideline G3.1 rating, in order to improve the data availability and indicator evaluation feasibility. The revised indicator system for environmental performance evaluation is shown in the table below.

Table 3-40 Adjusted environmental performance evaluation indicator system of the International Guidelines for Industrial Parks after localization verification

Indicator	Quantitative input scoring basis	Score
1. Environmentally suitable site		
Site EIA conducted and filed with appropriate authorities	(Yes=1; no=0)	
Compliance of the site with the "three lines and one list"(ecological protection red line, environmental quality bottom line, resource utilization upline, and environmental access list) requirements	(Yes=1; no=0)	
Adoption of specific internal zone planning	(Yes=1; no=0)	
[% plots actually allocated to green industry or non-industrial production activities in industrial park / % of GDP represented by green industry or non-industrial production activities municipally]	(≥1=1; <1=0)	
Industrial Park situated on redeveloped brownfield site, with the effective possibility of reusing, re-purposing and converting existing infrastructure or buildings	(Yes=1; no=0)	
Environmentally appropriate site score: (scale of 0–5)		
2. Green infrastructure		
Water, electrical and gas meters and load management systems in place, as appropriate to the services offered	(Yes=1; no=0)	
Air quality monitoring (remote controlling and recording) system and infrastructure in place in Industrial Park	(Yes=1; no=0)	
Presence of an off-site landfill for industrial park solid waste management	(Yes=1; no=0)	
Presence of hazardous waste collection, storage and treatment or disposal management system	(Yes=1; no=0)	
Presence of central sewage treatment facilities (inside or outside the park)	(Yes=1; no=0)	
Presence of sustainable rain and storm water collection / harvesting (i.e., culverts/drains, cisterns/tanks), management, treatment (e.g., filter, water hyacinth) and reuse systems	(Yes=1; no=0)	
Presence provision of garbage sorting and recycling devices	(Yes=1; no=0)	
% of buildings with Leadership in Energy and Environmental Design(LEED) certification	(≥51%=1; ≤49%=0)	

% of buildings with German Sustainable Building Council (DGNB) certification	(≥51%=1; ≤49%=0)	
% of buildings with Building Research Establishment Environmental Assessment Method (BREAM) certification	(≥51%=1; ≤49%=0)	
% of buildings with World Green Building Council (WGBC) certification	(≥51%=1; ≤49%=0)	
[% firms with one of the listed WGBC certifications in industrial park for on-site buildings / % firms having obtained such a certification nationally]	(≥1=1; <1=0)	
Anti-seismic, anti-flood, or anti-avalanche resilient construction techniques used, as applicable to site conditions	(Yes=1; no=0)	
Presence of solar street lighting	(Yes=1; no=0)	
Presence of waste exchange clearinghouse in the industrial park, promoting industrial symbiosis and economic circularity	(Yes=1; no=0)	
Low-voltage (ideally photovoltaic) power electrical systems	(Yes=1; no=0)	
Walking and bicycle paths, and racks, inside park for workforce	(Yes=1; no=0)	
Presence of bicycle-sharing system in Industrial Park	(Yes=1; no=0)	
Electrical and hybrid vehicle power plug-in points in industrial park	(Yes=1; no=0)	
Non-potable and "grey" water usage for industrial park irrigation	(Yes=1; no=0)	
Operator or users association shared "efficient manufacturing" systems and technologies (i.e., cloud-based systems; value networks and joint purchasing; rapid prototyping, CAD, 3D-printing; smart technology, M2M, smart grid, and internet of things; etc.)	(Yes=1; no=0) (depending on degree of tech and systems adoption)	
Green infrastructure score: (scale of 0–21)		
3. Green systems		
Presence of team of dedicated on-site environmental engineers and/or of staffed unit in the employ of the regulator or operator	(Yes=1; no=0)	
Formal operator schedule for verification of pipes and drains inside park, in place and applied	(Yes=1; no=0)	
% of the implementation of enterprises carrying out annual environmental audit in industrial parks	(≥51%=1; ≤49%=0)	
Operator annual environmental report released to public	(Yes=1; no=0)	

[% firms having obtained a "green plant", "green supply chain" and "ISO14001" certification in industrial park / % firms having obtained such a certification municipally]	(≥1=1; ‹1=0)	
[Expenditure on environmental management/ha in industrial park / expenditure on environmental management/ha municipally]	(≥1=1; ‹1=0)	
Natural disaster assessment and risk management plan and system in place, as appropriate	(Yes=1; no=0)	
Management institution of the industrial park possesses UN Global Compact Registration	(Yes=1; no=0)	
Management institution of the industrial park has passed the possesses ISO14001	(Yes=1; no=0)	
Management institution of the industrial park possesses International Sustainability and Carbon certification (ISCC)	(Yes=1; no=0)	
Management institution of the industrial park having been granted ISO50001 or Green certification	(Yes=1; no=0)	
Management institution of the industrial park having been granted GRI rating	(Yes=1; no=0)	
Availability of dedicated financial or tax incentives for green building within the industrial park	(Yes=1; no=0)	
Dedicated or enhanced industrial park internal environmental regulations, including biodiversity rules, environmental management system (EMS) requirements	(Yes=1; no=0)	
Dedicated internal operating regulations with respect to odour, smoke, light, dust, vibration and noise, as well as hours of activity	(Yes=1; no=0)	
[% firms that are UN Global Compact registered participants or signatories In the industrial park / % firms having signed the UNGC or obtained such a registration nationally]	(≥1=1; ‹1=0)	
Green systems score: (scale of 0–17)		
4. Efficient and clean production, emissions and waste management		
Presence of solid waste collection service	(Yes=1; no=0)	
[% energy from renewable (e.g., solar, wind, biomass/biogas/ biofuel, geothermal, tidal, hydroelectric, waste-to-power) sources in industrial park / % energy acquired from renewable sources nationally]	(≥1=1; ‹1=0)	

[Comprehensive energy consumption (tons of standard coal)/ industrial added value (10,000 yuan) of the industrial park / municipal comprehensive energy consumption (tons of standard coal)/industrial added value (10,000 yuan)]	(≥1=0; <1=1)	
[Freshwater consumption (m3)/industrial added value (10,000 yuan) of the industrial park/ municipal freshwater consumption (m3)/industrial added value (10,000 yuan)]	(≥1=0; <1=1)	
[Reuse volume of recycled (reclaimed) water from recycled wastewater (ton)/industrial added value (10,000 yuan) of the industrial park/ municipal reuse volume of recycled (reclaimed) water from recycled wastewater (ton)/industrial added value (10,000 yuan)]	(≥1=1; <1=0)	
[Solid waste (including hazardous waste) generated/industrial added value (10,000 yuan)of the industrial park/ municipal solid waste (including hazardous waste) generated/industrial added value (10,000 yuan)]	(≥1=0; <1=1)	
[Comprehensive utilization of industrial solid waste (ton)/ industrial added value (10,000 yuan) of the industrial park/ municipal comprehensive utilization of industrial solid waste (ton)/industrial added value (10,000 yuan)]	(≥1=1; <1=0)	
[SO2, NOx and particulate emissions (tons) of the industrial park/industrial added value (10,000 yuan)/ SO2, NOx and particulate emissions (tons)/GDP (10,000 yuan)]	(≥1=0; <1=1)	
[Hazardous waste generated/industrial added value (10,000 yuan) of the industrial park/ municipal hazardous waste generated/industrial added value (10,000 yuan)]	(≥1=0; <1=1)	
[Added value of heavy industry (10,000 yuan/year)/hectare of the industrial park]/ municipal added value of heavy industry (10,000 yuan/year)/hectare]	NA	
[% solid waste sent to landfills in industrial park / % of solid waste sent to landfills Municipally]	(≥1=0; <1=1)	
[# days failing National Air Quality Safety Standards in industrial park / # days failing National Air Quality Safety Standards Municipally]	(≥1=0; <1=1)	
[% firms that invest in industrial symbiosis in industrial park / % firms that invest in industrial symbiosis Municipally]	(≥1=1; <1=0)	
Efficient and clean production, emissions and waste management score: (scale of 0–13)		
Environmental performance score: (scale of 0–56)		

NB: Quantitative inputs shaded in blue are "nice to have" inputs, as opposed to "important" ones.

4· Recommendations on the Modified Indicator System in the International Guidelines for Industrial Parks

4.1 Recommendations on the study on the adaptation of indicator system in the Guidelines

4.1.1 Adjusting the unattainable indicators in order to improve their data accessibility

In the process of verifying the modified indicator system, the data required for some evaluation indicators are found to lie beyond the data coverage of conventional statistics for industrial parks in China. Either data on these indicators are unavailable, or qualitative judgment on these indicators can only be made through field interviews. It is therefore suggested that similar or related statistical data substitutes be sought within the coverage of conventional statistics for industrial parks in China; failing that, other indicators for which data are available or in respect of which qualitative judgment is possible may be selected for the purpose of evaluation in this dimension.

4.1.2 Integrating similar types of internationally accepted indicators, while considering domestic indicators

In the process of verifying the modified indicator system, some international indicators would found to have received low scores since the parks are subject to relatively fewer types of international assessment. For industrial parks in China, international evaluation is not a mandatory requirement for the park management committee, operators, enterprises, or enterprise development, and for a park with a relatively large number of enterprises, it is difficult for more than half of the enterprises to have received international assessement. In addition, for the parks less dependent on the export-oriented economy, the main markets and suppliers are in China, so it is less necessary for them to be subject to international assessment. It is therefore suggested that similar types of internationally accepted indicators be integrated, while adding the applicable domestic systems to the modified indicator system in the Guidelines.

4.1.3 Adjusting the scoring basis of some evaluation indicators

With the case study and verification, it was found that the scoring basis of some indicators requires adjustment and optimization. For example, in social performance evaluation, with regard to the indicators related to expenditure on health and safety (EHS), the high per capita EHS does not necessarily mean that employees in the park have a low occupational health and safety coefficient and have many problems with occupational health and safety. Instead, it may be because the park has relatively high EHS for its employees. It is suggested that a comprehensive evaluation be made of the evaluation indicators whose scoring basis is to be adjusted and optimized, and reasonable adjustments be made to the scoring basis according to the evaluation purpose.

4.1.4 Clarifying the definition of some proportion indicators

As an industrial cluster, the industrial park, by nature, will become an area where economic output, employment, talents and technologies cluster. It is therefore almost inevitable that the relevant indicators will be above the national average level. In this case, the relevant indicators will be less useful in discriminatory terms, but in fact, the proportion indicators reflecting the relative value rather than the absolute value are of great significance in indicating a large number of industrial parks with huge differences in China. It is therefore suggested that, when promoting the Guidelines in the future, the national average of such evaluation indicators be defined as the average level of industrial parks nationwide, which will greatly improve the discriminatory effect of such indicators and the effectiveness of the instructions. Statistics are in very short supply, however, for all industrial parks in China. If during the promotion of the International Guidelines for Industrial Parks,

some data reflecting the overall and average level of all industrial parks can be obtained by cooperation, survey or information means, the pioneering effect and the value of the promotion work will be further highlighted.

4.1.5 Performing verification and study of modified indicator system in the Guidelines by level and by class

By identifying the key impact factors of industrial parks in China by the dimensions of time, element, and type, adaptation verification modules are constructed for the purpose of verification and study by level and by class. The first dimension is time, including the development stage; the second is the element, including water, atmosphere, soil, management, innovation, policy, etc.; the third is type, which consists of the general type, industry type, and venous industry type. According to different key modules, the representative and typical industrial parks are identified, and they are provided with modified verification at these aspects: economic performance, social performance, and environmental performance. A modified indicator system of the International Guidelines for Industrial Parks suitable for different types of industrial parks in China is proposed, so as to achieve replicability and easy promotion in more industrial parks.

4.2 Recommendations on promoting the modified indicator system in the Guidelines in China

4.2.1 Improving the concordance between the indicator system in the Guidelines and the basic situation and development stage of China

Some indicators provided in the indicator system in the Guidelines, such as social performance in the evaluation of ethnic and religious beliefs, fail to take full consideration of the basic situation in China, so they are not easily applicable in China. It is suggested that, when establishing and modifying the indicator system, the basic situation in China should be taken into account, and evaluation indicators that do not meet the basic situation and development stage of China should be removed, so as to improve the concordance between the indicator system in the Guidelines and the basic situation and development stage of China.

4.2.2 Improving the applicability of the indicator system in the Guidelines to various industrial parks in China

There are a large number of industrial parks of many types and at different development levels in China, which has a vast territory, so it is difficult to have a set of evaluation indicator systems suitable for all industrial parks throughout the country. In this study, although the modified indicator system in the Guidelines has been optimized in line with the case verification results and the feedback recommendations from the case parks, its applicability is still limited. It is suggested that the different grades, diverse industries, and different development levels of industrial parks in China be taken into account in order to improve the applicability of the modified indicator system in the Guidelines. Modified versions of the evaluation indicator system can be formulated to adapt to parks in different regions, of different grades and types, and at different development levels, so as to promote the Guidelines in China.

4.2.3 Considering the risk management and technological innovation in the indicator system in the Guidelines

The current indicator system in the Guidelines takes insufficient consideration of risk management and technological innovation of the parks. The main

risks faced in the development of industrial parks include strategic risk, financing risk, investment risk and others. Risk management is performed by identifying, predicting and measuring risks, and selecting effective methods, so as to minimize the impacts of such risks on the development of the parks and achieve economic guarantees for safe production in the parks. In the indicator system in the Guidelines, the evaluation of risk management of industrial parks can be added, focusing on the achievements of industrial parks and enterprises in risk management concept, risk warning mechanism, risk control process and risk management outcomes. Technological innovation is an important means whereby industrial parks can maintain their competitiveness and industrial parks in China are attaching increasing importance to technological innovation. Most of the existing evaluation approaches for various industrial parks issued at the national and local levels in China have a special evaluation of technological innovation. Evaluation of the introduction of and support for innovative talents, the support mechanism for innovative enterprises, the promotion and reward of innovation output, and the construction and allocation of innovation carriers can be added to the indicator system in the Guidelines.

4.2.4 Ensuring the timeliness of the indicator system in the Guidelines

With the rapid development of industrial parks in China, the evaluation approaches and applicable policies for industrial parks at the national and local levels are constantly being adjusted and optimized. It is suggested that the indicator system in the Guidelines be dynamically optimized in order to improve the adaptability of the indicator system in the Guidelines to the rapid development of industrial parks in China and to ensure their constant adjustment to evaluation approaches in China. According to the latest development of industrial parks in China, some evaluation indicators in the Guidelines have been repeatedly adjusted and optimized to adapt to the development stage of the park being evaluated. In addition, with knowledge about the latest performance evaluation work conducted by industrial parks in China and resident enterprises, the latest evaluation approaches and applicable policies issued at the national and local levels, some evaluation indicators and specific evaluation aspects in the Guidelines have been repeatedly adjusted and optimized, so as to ensure the timeliness of the indicator system in the Guidelines.

4.2.5 Conducting direct horizontal comparison using the indicator system in the Guidelines

In order to ensure data accessibility, the Guidelines suggest that the performance evaluation of industrial parks should be carried out by comparing the performance of industrial parks with that of the countries where the parks are located, rather than between industrial parks or with industrial parks in other countries. Some indicators may be of little use in practice, distinguishing between Chinese industrial parks, since almost all the economical parameters of industrial parks are higher than the corresponding regional or national benchmarks and Chinese industrial parks have similar development timelines. It is suggested, therefore, that an extensive direct horizontal comparison be made between all the parks subject to the same set of performance evaluation indicator system or between parks in the same region, of the same grade or type or at a similar development level. In this way, it will be possible, when promoting use of the Guidelines in the future and in the conduct of research based on the indicator system, to identify the basic characteristics and differences between the comprehensive performance of the parks. A horizontal comparison of this kind will give full consideration to the evaluation scores in the dimensions of comprehensive performance, economic performance, social performance and environmental performance and the more detailed evaluation scores, so as to gain a clear understanding of the reasons behind the developmental differences between the parks, and to encourage the relevant government authorities

and park management committees to enforce policies designed to ensure that enterprises determine their necessary development direction.

4.2.6 Promoting the study outcomes and carrying out trial use of the localized indicator systems of the Guidelines

Where promotion of the outcomes of the study on adaptation of the Guidelines is concerned, first, exchanges and cooperation will be conducted to improve and upgrade the application of the Guidelines in China, including with practices, guidelines and lessons from other countries that have higher standards than those applied in China. Subject to measures to ensure safety and epidemic prevention, online and offline seminars on experience in the adaptation of the Guidelines shall be held; a knowledge-sharing network and expert think tank shall be established to discuss the applicability of the Guidelines and the feasibility of their adaptation and gradual optimization. Second, achievements in the adaptation of the Guidelines shall be promoted by multiple means and through multiple channels. A modified work process for the Guidelines shall be publicized on the Internet, on television and in the print media; industrial park management, technology and industry training courses, work exchange meetings, technology exhibitions, international seminars and other events shall be held; cooperation with competent government authorities and industrial parks in China shall be improved in order to promote the integration of applicable concepts and modified indicator systems in the Guidelines into the dominant development and management modes of industrial parks in China. Third, UCSSIC, with close engagement of the UNIDO Headquarters units responsible for industrial parks, will promote the UNIDO International Guidelines for Industrial Parks in other countries and may encourage and support similar comparative research and studies for localization of the UNIDO International Guidelines for Industrial Parks along local prevailing conditions, circumstances and needs in other countries.

Pilot and demonstration projects for the adaptation of the Guideline will be carried out in the Beijing-Tianjin-Hebei Region, Yangtze River Economic Belt, Yellow River Basin, Chengdu-Chongqing Economic Zone, Guangdong-Hong Kong-Macao Greater Bay Area and other key areas with dense industrial parks, rapid economic development, major environmental problems and high environmental risks.. First, in conjunction with a literature review, field research and other methods of inquiry, together with the relevant work of the parks, between three and five pilot industrial parks will be selected, on which economic, social, environmental and other data for the past 5-10 years will be collected, the basis for their adapted development will be evaluated, the management approaches for a modified pilot demonstration of the Guidelines will be determined, and the adapted operation and management scheme will be proposed. Second, international experts in industrial parks from UNIDO, the Republic of Korea, Japan and other countries and organizations will be invited to provide capacity-building training for managers and resident enterprises in the selected parks and to provide necessary guidance during implementation.

4.3 Recommendations on promoting industrial parks in China to achieve more inclusive and sustainable development

4.3.1 Promoting the international development of park management institutions and resident enterprises

By promoting the management institutions and resident enterprises of industrial parks in China in line with international standards, the international competitiveness of industrial parks in China is being duly enhanced. First, by providing references and benchmarks for international cooperation and activities of Chinese industrial parks. and by evaluating the development of the park in accordance with international standards, information is gathered about problems associated with the development of the park and the gap between current standards and applicable international standards. Second, by taking advantage of international platforms, including UNIDO, to promote the development of industrial parks, information about latest concepts and leading experience in promoting the economic development, social development and environmental protection of industrial parks at the international level are obtained and applied to the development of industrial parks in China, by integrating them with the development modes of industrial parks in China. Third, by promoting best practices and successful modes for the development of industrial parks in China to move to a global level, international cooperation in the field of industrial park development is promoted.

4.3.2 Promoting the social performance evaluation of parks and resident enterprises

Industrial parks in China play an important role in promoting urbanization and driving regional development. There are shortcomings, however, in the management and evaluation of the social performance of industrial parks. Attention should be paid to the systematic evaluation of social performance and corporate social responsibility of industrial parks, so as to promote and highlight the driving role of industrial parks in social development.

Appendix I: screening and summary of modified indicator system in the International Guidelines for Industrial Parks

Economic performance indicators

Indicator adjustment type	Application	Indicators
To be directly applied, without adjustment	Indicators with data available and of complementary and forward-looking value for the existing evaluation indicator systems in China, or with similar indicators included in the existing evaluation indicator systems in China	**1. High-quality social management system and service:** ■ Robust economic system tracking economic analysis quantitatively showing a positive economic return (i.e., in terms of employment, taxes, net exports, forex, local supplies), after such factors as land, CAPEX and OPEX costs and subsidies are taken into account; ■ Private participation in industrial park planning; ■ Private sector represented on Board of Regulators; ■ Existence and functioning of a formal industrial park marketing department/unit; ■ User Maintenance and Operation fees or charges collected by the Operator; ■ % user enterprise satisfaction with the services provided by the industrial park Operator; ■ Operator customer relationship management (CRM) system in place; ■ Operator ISO 9001 certification. **2. Economic supporting site and infrastructure hardware (appropriate location)** ■ Unencumbered land title; ■ Phased site development strategy and implementation; ■ Proximity to appropriate highway; ■ Proximity to power transmission or distribution grid; ■ Proximity to gas transmission mains and gas 'city-gate'; ■ Proximity to microwave tower for broadband GSM mobile telephony and Wi-Fi connectivity; ■ Appropriately-sized (wide) internal roads;

		■ [% hours power outage per period in industrial park / % hours power outage nationally]; ■ [% hours of interruption of water supply, quality or quality in industrial park/ % hours of interruption of water supply, quality or quality nationally] **3. Economic supporting service (software)** ■ Regular, scheduled maintenance of buildings, as well as dedicated rapid-response or emergency maintenance, repair, rectification and restoration service, including for utilities and superstructure assets; ■ Dedicated or localized industrial park business support, business association support, incubation, innovation or competitiveness programmes on effective offer; ■ Industrial park user enterprises have access to specific financial support programmes; ■ Dedicated one-stop shop/single window in industrial park; ■ E-government services dedicated to the industrial park; ■ Formal industrial park B2B gatherings held on formal industrial park B2B platforms on regular basis; ■ Operator landscaping, gardening, and cleaning services; ■ Presence of mechanical cargo loading and off-loading services for users; ■ Operation of product exhibition centres, product display areas, conference centres, and/or auditoria; ■ Presence of on-site banking, bureaux-de-change and ATM facilities; ■ Presence of human resources agency and recruiting services; ■ Presence of manpower training services, in coordination with recognized specialized technical training institutions in various fields; ■ Presence of dedicated on-site R&D, patenting, and product commercialisation services, in conjunction with recognized universities and/or legal services providers; ■ Presence of dedicated on-site matching, twinning, and local supplier and buyer forward and backward linkages schemes; ■ Presence of quality, product, process standards and/or trade certification services.

		4. Economic impact: employment, investment, and turnover ■ [Per capita income in the industrial park / per capita income nationally]; ■ [Full-time equivalent employment/hectare in industrial park] / full-time equivalent employment/hectare / in industrial parks nationally]; ■ [US$ sales revenues/ha in industrial park / US$ sales revenues/ha nationally]; ■ [% manufacturing inputs sourced domestically in industrial park / % manufacturing inputs sourced domestically nationally]; ■ [US$ economic value addition (EVA, calculated as output-inputs) per capita in industrial park / US$ per capita nationally]; ■ [Exports minus imports in industrial park / exports minus imports nationally]; ■ [FDI % of total investment (or GFCF) in industrial park / FDI % of total investment (or GFCF) nationally]; ■ [US$ exports/ha in industrial park / US$ exports/ha nationally]; ■ [Enterprises/ha in industrial park / enterprises/ha nationally]; ■ [IPR registrations/year/company in industrial park/ IPR registrations/year/company nationally]
To be applied after the adjustment	Unattainable indicators but of complementary and forward-looking value for the existing evaluation indicator systems in China	**1. High-quality social management system and service:** ■ Existence of 60% occupancy rate within 6 years (ha of land used by companies for productive use) **2. Economic supporting site and infrastructure "hardware" (appropriate location)** ■ Proximity to urban centre (with country significant population); ■ Proximity operational public port, airport of use and of interest to the industrial park's users **3. Economic supporting service (software)** ■ [#services offered through One-stop shop in industrial park / # services offered through One-stop shop in nearest urban community] **4. Economic impact: employment, investment and turnover** ■ [(Investment/ha) in industrial park /(Investment/ha) nationally] ■ [US$ sales of processed or semi-processed goods as % of total industrial park sales /US$ sales of processed or semi-processed goods as % of GDP in US$]

To be deleted	Indicators without discrimination for industrial parks in China or not in line with the current development stage of industrial parks in China	**1. High-quality social management system and service:** ■ Private participation in industrial park ownership; ■ If industrial park is on public land, Operator sourced on the basis of an open competitive tender **4. Economic impact: employment, investment, and turnover** ■ [US$ exports of processed or semi-processed goods as % of total industrial park US$ exports /US$ exports of processed or semi-processed goods as % of total national exports in US$]
To be added	Indicators included in the existing evaluation indicator system in China but not mentioned in the International Guidelines for Industrial Parks	None

Social performance indicators

Indicator adjustment type	Application	Indicators
To be directly applied, without adjustment	Indicators with data available and of complementary and forward-looking value for the existing evaluation indicator systems in China, or with similar indicators included in the existing evaluation indicator systems in China	**1. Socially suitable site and social infrastructure:** ■ Project ESIA conducted and filed with appropriate authorities; ■ Childcare facilities; ■ Park or greenspace as % of total area (as per international standard); ■ Presence of on-site incident response centre and public announcement (PA) system; ■ Disabled-inclusive building design (i.e., access ramp and elevator in each building); ■ Construction materials are domestically sourced; ■ Industrial park provision of utilities to adjacent communities; ■ ILO/IFC standard worker accommodations on-site; ■ Drinking fountains in place throughout industrial park buildings; ■ On-site multi-purpose athletic fields, gym, recreation, leisure, entertainment, community and cultural facilities **2. High-quality social management system and service** ■ Social impact management and monitoring system (SMS) in place in industrial park; ■ Social audits of each firm on at least biennial basis; ■ Existence of emergency preparedness and response system in industrial park; ■ Industrial park community solidarity programme and Involvement in community projects; ■ Annual public/published social performance report for industrial park; ■ % firms with ISO 26000 certification; ■ % firms with ISO 9001 certification;

		■ % firms with SA 8000 certification; ■ % firms with AA1000AP certification; ■ % firms with AA1000AS Sustainability or AA1000SES Stakeholder Engagement Standard certification; ■ % Employees satisfied with social systems and services; ■ Dedicated/enhanced industrial park social regulations, including S-IA requirements, and community dialogue mechanism; ■ Industrial Park Operator ISO 26000 certifications; ■ Industrial Park Operator ISO 9001 certifications; ■ Industrial Park Operator SA 8000 certifications; ■ Industrial Park Operator AA1000AP certifications; ■ Industrial Park Operator AA1000AS Sustainability or AA1000SES Stakeholder Engagement Standard certifications; ■ Existence of industrial park dedicated internal ombudsman **3. Occupational health and safety** ■ [Expenditure on health and safety (EHS) per capita in industrial park / EHS per capita nationally]; ■ Existence of internal park operation fire safety guidelines; ■ Public or common night transportation or blue-light system in place in industrial park; ■ [# crimes reported per capita in industrial park / # crimes reported per capita nationally]; ■ Access by fire services to all parts of industrial park; ■ [# of nurses per capita in park / # of nurses per capita nationally]; ■ First-aid room or kit in each building; ■ Dedicated, 24/7 health services inside the industrial park; ■ Defibrillator in every building;

		■ [Mean emergency (police, fire, ambulance) response time in industrial park / mean emergency (police, fire, ambulance) response nationally] **4. Good industrial relation and welfare:** ■ Presence of aggregated, publicly accessible labour complaints or incidents and complaint measurement mechanism data available; ■ Presence of on-site regulator, operator or third-party authorized labour inspectors or counsellors; ■ Absence of instances of child labour and forced labour; ■ Rights to assemble, unionize, engage in collective bargaining, and strike; ■ [% workforce unionized in industrial park / % workforce unionized nationally; ■ [Average salary in industrial park / average salary nationally]; ■ [% employees on term or open-ended contracts in industrial park / % employees on term or open-ended contracts nationally]; ■ [# annual complaints per capita about working conditions received in industrial park/ # annual complaints per capita about working conditions nationally]; ■ [# annual complaints per capita resolved in industrial park / # annual complaints per capita resolved nationally]; ■ % industrial park workers satisfaction with industrial park labour relations; ■ [% employee annual turnover in industrial park / % employee annual turnover nationally] **5. Social inclusiveness:** ■ [% female workforce in industrial park / % female workforce nationally]; ■ [% women in management of operator and resident firms / % women in management nationally]; ■ [Female wages as % of male wages in industrial park / female wages as % of male wages nationally]; ■ Industrial park operator-organized inclusiveness or sensitivity training or events;

		■ [% employees between ages of 16 and 30 in industrial park / % employees between ages of 16 and 30 nationally]; ■ [# new domestic MSMEs/year/ha in industrial park / # new domestic MSMEs/year/ha nationally]; ■ [Domestic MSME % total investment in industrial park /MSME % total investment nationally]; ■ [Domestic MSME % of US$ in sales in industrial park /MSME % of US$ GDP nationally]; ■ [Domestic MSME % of US$ in exports in industrial park /MSME % of US$ in exports nationally]
To be applied after the adjustment	Unattainable indicators but of complementary and forward-looking value for the existing evaluation indicator systems in China	**1. Socially suitable site and social infrastructure:** ■ [Average commute time to industrial park workplace for employees / Average commute time to workplace nationally] **3. Occupational health and safety:** ■ [% firms with OHSAS 18001 certification in industrial park / % firms with OHSAS 18001 certification nationally]; ■ [(# fire alarms/building) in industrial park /(# fire alarms/building) nationally]; ■ [# sprinklers/building in industrial park / # sprinklers/building nationally]; ■ [% employees with private health insurance coverage in industrial park / % employees with private health insurance coverage nationally] **4. Good industrial relation and welfare:** ■ [% industrial park employees commuting <15km / % national employees commuting <15km] **5. Social inclusiveness:** ■ [% employees from legally-recognized minority or disadvantaged groups, or with disabilities in industrial park / % employees from legally-recognized minority or disadvantaged groups, or with disabilities nationally]

To be deleted	Indicators without discrimination for industrial parks in China or not in line with the current development stage of industrial parks in China	**1. Socially suitable site and social infrastructure** ■ Proximity to public transport (i.e., bus, subway or light rail); ■ Proximity to residentially zoned areas; ■ Power lines in industrial park are buried, for workforce safety; ■ Presence of outdoor street-lighting throughout the industrial park; ■ Faith and prayer facilities for major denominations and religious groups represented in the workforce; ■ Climate-appropriate (ideally centralized and resource-efficient/ sustainable) HVAC equipment and systems in buildings; ■ Proximity to mini-mart or supermarket retail service; ■ Complaints box or Hotline available in industrial park; ■ Separate women's and men's restrooms in each building; ■ Site is not on traditional, indigenous or tribal land; ■ Operable windows in industrial park buildings, ensuring natural ventilation; ■ On-site common cafeteria/ canteen/ restaurant/ catering **2. High-quality social management system and service:** ■ Presence of public or subsidized transportation system for workforce between key points in or near industrial park **3. Occupational health and safety:** ■ Perimeter fence and access control posts; ■ On-site hospital, clinic or dispensary within industrial park; ■ CCTV cameras and security patrols in place

To be added	Indicators included in the existing evaluation indicator system in China but not mentioned in the International Guidelines for Industrial Parks	**1. Socially suitable site and social infrastructure:** ■ Availability of vocational skill training institution in the industrial park; ■ Proportion of public service expenditure in public budget expenditure **3. Occupational health and safety:** ■ Provision of an independent safety production organization **5. Social inclusiveness:** ■ Establishment of a financing promotion platform for MSMEs

Environmental performance indicators

Indicator adjustment type	Application	Indicators
To be directly applied, without adjustment	Indicators with data available and of complementary and forward-looking value for the existing evaluation indicator systems in China, or with similar indicators included in the existing evaluation indicator systems in China	**1. Environmentally suitable site:** ■ Site EIA conducted and filed with appropriate authorities; ■ Industrial Park situated on redeveloped brownfield site, with the effective possibility of reusing, re-purposing and converting existing infrastructure or buildings. **2. Green infrastructure:** ■ Water, electrical and gas meters and load management systems in place, as appropriate to the services offered; ■ Air quality monitoring (remote controlling and recording) system and infrastructure in place in industrial park; ■ Presence of an off-site landfill for industrial park solid waste management; ■ Presence of sustainable rain and storm water collection / harvesting (i.e., culverts/drains, cisterns/ tanks), management, treatment (e.g., filter, water hyacinth) and reuse systems; ■ % of buildings with German Sustainable Building Council (DGNB) certification; ■ % of buildings with Building Research Establishment Environmental Assessment Method (BREAM) certification; ■ % of buildings with World Green Building Council (WGBC) certification; ■ [% firms with one of the listed WGBC certifications in industrial park for on-site buildings / % firms having obtained such a certification nationally]; ■ Anti-seismic, anti-flood, or anti-avalanche resilient construction techniques used, as applicable to site conditions; ■ Presence of solar street lighting;

		■ Presence of waste exchange clearinghouse in the industrial park, promoting industrial symbiosis and economic circularity; ■ Low-voltage (ideally photovoltaic) power electrical systems; ■ Walking and bicycle paths, and racks, inside park for workforce; ■ Presence of bicycle-sharing system in industrial park; ■ Electrical and hybrid vehicle power plug-in points in industrial park; ■ Non-potable and "grey" water usage for industrial park irrigation; ■ Operator or users association shared "efficient manufacturing" systems and technologies (i.e., cloud-based systems; value networks and joint purchasing; rapid prototyping, CAD, 3D-printing; smart technology, M2M, smart grid, and internet of things; etc.) **3. Green system:** ■ Presence of team of dedicated on-site environmental engineers and/or of staffed unit in the employ of the regulator or operator; ■ Formal operator schedule for verification of pipes and drains inside park, in place and applied; ■ Operator annual environmental report released to public; ■ [Expenditure on environmental management/ha in industrial park / expenditure on environmental management/ha nationally]; ■ Natural disaster assessment and risk management plan and system in place, as appropriate; ■ Availability of dedicated financial or tax incentives for green building within the industrial park; ■ Dedicated or enhanced industrial park internal environmental regulations, including biodiversity rules, environmental management system (EMS) requirements; ■ Dedicated internal operating regulations with respect to odour, smoke, light, dust, vibration and noise, as well as hours of activity;

		[% firms that are UN Global Compact registered participants or signatories In the industrial park / % firms having signed the UNGC or obtained such a registration nationally]; Employee car-sharing or car-pooling system in place **4. Efficient and clean production, discharge, and waste management:** ■ Presence of solid waste collection service; ■ [% energy from renewable (e.g., solar, wind, biomass/biogas/biofuel, geothermal, tidal, hydroelectric, waste-to-power) sources in industrial park / % energy acquired from renewable sources nationally]; ■ [% solid waste sent to landfills in industrial park / % of solid waste sent to landfills nationally]; ■ [# days failing National Air Quality Safety Standards in industrial park / # days failing National Air Quality Safety Standards nationally]; ■ [% firms that invest in industrial symbiosis in industrial park / % firms that invest in industrial symbiosis nationally]
To be applied after the adjustment	Unattainable indicators but of complementary and forward-looking value for the existing evaluation indicator systems in China	**1. Environmentally suitable site:** ■ Site compatibility with Land Use Master Plan as regards non-agricultural use and environmentally-sensitive areas, such as forests, wetlands, mangroves, floodplains, wildlife refuges; ■ Internal Zoning Planning adopted; ■ [% plots actually allocated to non-polluting or light manufacturing activities in industrial park / % of GDP represented by non-polluting or light manufacturing activity nationally] **2. Green infrastructure:** ■ Presence of toxic and hazardous waste collection, storage and treatment or disposal management system; ■ Separate recycling reception bins, bells and/or containers for: paper and card; recyclable plastic containers; recyclable metal; glass; wood; and brick or stone materials and debris; ■ % of buildings with Leadership in Energy and Environmental Design (LEED) certification

		3. Green system: ■ Annual environmental audits performed on each firm; ■ [% firms having obtained a "Green" (e.g., "Green Label", etc. 20), ISO14001, ISO 50001, International Sustainability and Carbon (ISCC)21 certification or Global Reporting Initiative (GRI)22 Guidelines G3.1 rating (for recycled materials and wastewater, clean energy, sustainable alternative transport systems, etc.) or registration in industrial park / % firms having obtained such a certification nationally]; ■ Operator possesses UN Global Compact registration; ■ Operator possesses ISO14001; ■ Operator possesses International Sustainability and Carbon Certification (ISCC); ■ Operator possesses ISO50001 or Green certification; ■ Operator possesses GRI rating **4. Efficient and clean production, discharge, and waste management:** ■ [Power use in KWh /US$ of sales in industrial park / power use in KWh / US$ of sales nationally]; ■ [(Water use in m3/US$ sales) in industrial park / (Water use in m3/US$ sales) nationally]; ■ [(m3 of wastewater recycled/US$ in sales) in industrial park / (m3 of wastewater recycled/US$ in sales) nationally]; ■ [(Solid waste generated/US$ sales) in industrial park / (Solid waste generated/US$ sales) nationally]; ■ [(Tons of solid waste recycled/US$ in sales) in industrial park / (tons of solid waste recycled/US$ in sales) nationally]; ■ [(m3 of SOx, NOx, N2O, CO, CH, CFC, HC emissions)/US$ sales in industrial park /(m3 of SOx, NOx, N2O, CO, CH, CFC, HC emissions)/US$ GDP; ■ [(Hazardous waste produced/US$ in sales) in industrial park /(Hazardous waste produced/US$ in sales) nationally]; ■ [(US$ million/year heavy industry sales)/ha in industrial park] /[(US$ million/year heavy industry sales)/ha nationally];

To be deleted	Indicators without discrimination for industrial parks in China or not in line with the current development stage of industrial parks in China	**2. Green infrastructure:** ■ Presence of Public Wastewater Sewerage System, STP and/or of Wastewater Treatment Plant (WWTP); ■ Presence of CETP; ■ Presence of Organic Composting reception point for organic, vegetable and soil waste transformation into fertilizer and/or of Bio-digesters
To be added	Indicators included in the existing evaluation indicator system in China but not mentioned in the *International Guidelines for Industrial Parks*	None

Appendix II: Horizontal comparison between the Guidelines for Industrial Parks and evaluation indicator systems at the park level

Comparison aspect	International Guidelines for Industrial Parks	Green park	Low-carbon industrial park	Transformation to the circular economy	Eco-industrial demonstration park	Evaluation of the comprehensive development level of the national economic and technological development zone	Evaluation of national high-tech industrial development zone	Evaluation of social responsibility of Chinese industrial enterprise
Evaluation purpose	To define the success of the industrial parks, evaluate whether the development of the industrial park is in line with the ISID core objectives of "improving economic competitiveness", "creating common prosperity" and "being environmentally friendly"	To promote green manufacturing and the green development of the whole industry chain and product life cycle	To explore the low-carbon industrial development mode, reduce carbon emissions per unit of industrial added value, improve industrial competitiveness, and accelerate the transformation and upgrading of traditional industries and the development of new low-carbon industries	To improve the productivity of main resources, land productivity, solid waste resource utilization rate, water recycling utilization rate, and domestic waste resource utilization rate. To demonstrate and promote some parks as examples for transformation to circular economy and management suitable for China's national conditions	To promote the construction of ecological civilization in the industrial field, promote the implementation of eco-industrial production organization mode and development mode in industrial parks, promote green, low-carbon, and circular development of industrial parks, and standardize the construction of national eco-industrial demonstration parks	To motivate the local and national economic and technological development zones to accelerate transformation and upgrading and to realize innovation-driven development	To rank the main indicators for national high-tech industrial development zones	To reflect and measure the effects and efficiency of impacts by Chinese industrial enterprise management on stakeholders and the environment

Applicable object	Industrial parks with operators, excluding urban “industrial zones” in the conventional sense; some indicators are not applicable to new industrial park sites that are not fully operational.	National and provincial industrial parks	National new industrialization demonstration bases, industrial-based economic and technological development zones, and high-tech development zones on the China Development Zone Audit Announcement List	All kinds of parks, including economic and technological development zones, high-tech industrial development zones, bonded zones, export processing zones, and various special parks	Industrial parks above provincial level	National economic and technological development zones and provincial economic development zones applying for new establishment or upgrading to national economic and technological development zones	National high-tech industrial development zones	Industrial enterprises represented by coal, machinery, steel, petrochemicals, light industry, textiles, building materials, non-ferrous metals, electricity, mining, and other industries
Evaluation aspect	Evaluation of industrial parks at economic, social, and environmental aspects	Covering six dimensions: green energy utilization, green resource utilization, green infrastructure, green industry, green environment, and green operation management	Covering six dimensions: composite indicator, low-carbon industry, low-carbon energy, low-carbon management, low-carbon infrastructure, and comprehensive utilization of resources	Covering six dimensions: resource productivity, resource consumption, comprehensive utilization of resources, waste emission, other indicators, and characteristic indicators	Covering five dimensions: economic development, industrial symbiosis, resource conservation, environmental protection, and information disclosure	Covering seven dimensions: economic development, opening-up, scientific and technological innovation, industrial development, regional boosting, environmental protection, and administrative efficiency	Independent innovation, entrepreneurial environment, endogenous growth and effective utilization of resources	Starting from the actual needs of changing the traditional production and management mode of enterprises, based on the triple bottom line model, stakeholder theory, sustainable development theory, etc.
Indicator system structure	A three-level indicator system, including three first-level indicators and 13 second-level indicators	Six first-level indicators and 31 second-level indicators	Six first-level indicators and 21 second-level indicators	Six first-level indicators and over 20 second-level indicators	Five first-level indicators and 32 second-level indicators	First-level indicators of five major categories, and 53 second-level indicators	Four first-level indicators, which are broken down into 44 second-level indicators, including 39 quantitative indicators and five qualitative indicators	Five first-level indicators, 22 second-level indicators, and 98 third-level indicators

Evaluation calculation method	A sub-indicator can be given a quantitative score of 1 or 0 based on the evaluation criteria, without a weight set for indicators at all levels. The total score of performance evaluation can be obtained by adding together the scores of corresponding sub-indicators.	Longitudinal comparison, leading value target progressive method	Self-set targets, longitudinal comparison	Self-set targets, longitudinal comparison	With the one-vote veto system, if any of the 23 indicators under evaluation, including 17 compulsory indicators and 6 optional ones, is not up to the standard, it will not pass the evaluation.	According to the differences in the development stage, nature, and management system of national economic and technological development zones, different indicator weights are set in the indicator system.	The comprehensive evaluation score is the sum of the weighted scores of the first-level indicators. The score of the first-level indicators is the sum of the weighted scores of the subordinated second-level indicators. The score of the second-level indicators is obtained with the composite weighted calculation of the actual value and ranking of the indicators. The qualitative indicators will be evaluated in the form of a targeted public questionnaire. Torch High Technology Industry Development Centre, Ministry of Science and Technology will make minor adjustments to the statistical indicators and evaluation indicators every two years, and composite revision and adjustment every 6–8 years.	Following “indicator scoring – dynamic weighting for indicators – calculation of final score of indicators – calculation of final score of enterprise” Among all indicators, the total score of key indicators weighs 40%, and the total score of basic indicators weighs 60%. The indicators are classified according to the key indicators A2 and basic indicators A3. The final score of an enterprise is obtained by multiplying the sum of final scores of indicators of the same category by the allocated weight and then adding them up.

Evaluation and comparison scope	Achievements of the industrial park are compared with those of national achievements beyond the park (i.e., not comparison with the achievements of other parks, other countries or the same park over a period of time, etc.) in order to evaluate whether the achievements of the industrial park outperform specified national standard.	Construction and implementation of the green manufacturing system	Energy conservation and emission reduction, comprehensive utilization of resources, clean production, low-carbon technology innovation ability, transformation and upgrading of traditional industries or development level of low-carbon emerging industries	Analysis and evaluation of the economic, environmental and social benefits of transformation of the park through comprehensive evaluation on the economic development, social development, adjustment to infrastructure and industrial structure, industrial correlation, energy and resource conservation, and energy recycling, pollution control, and management, environmental quality improvement and other aspects of the park	Horizontal comparison between achievements of economic development, industrial symbiosis, resource conservation, environmental protection, and information disclosure and the national achievement beyond the park	Comprehensively evaluation of the development level of national economic and technological development zones, and evaluation on the leading role of transformation and upgrading, innovation-driven development	Targeted at "policy evaluation" and emphasizing the achievement of the state-oriented goals by the high-tech zone. The evaluation is made on the support, input, and output, etc.	On yearly basis. The indicators are composed of bottom-line indicators, key indicators, and basic indicators by the attribute; quantitative continuous indicators, quantitative dispersion indicators, and qualitative indicators by the technical requirements for indicator standardization.
Data availability	The proposed indicators will be retained only when the data available in the industrial park are also available beyond the industrial park (i.e., nationwide), and the data availability is relatively high.	The park will carry out creation work and self-evaluation according to applicable standards of green manufacturing system, and the highly accessible data are submitted by the park itself.	The industrial park will independently apply and submit the application materials to the competent provincial industrial and information authority for summary as required. The highly accessible data are submitted by the park itself.	The National Development and Reform Commission, together with relevant departments, will organize the establishment of an expert group on park transformation to the circular economy to provide technical service guides for the park transformation to the circular economy.	The relevant data required for calculating the evaluation indicators shall be obtained from the statutory statistical channels or statistical documents as far as possible; if they are not available, the park management institution shall establish the corresponding data collection and statistics mechanism.	The provincial commercial department organizes the collection and preliminary examination of relevant information that parks submit through the online system.	The Torch High Technology Industry Development Centre of the Ministry of Science and Technology organizes the evaluation, and the data involved are available from the annual statistical survey of national high-tech zones approved by the National Bureau of Statistics and organized by the Torch High Technology Industry Development Centre.	Independently provided by participating enterprises

Evaluation constraint	No mandatory constraint	On the green manufacturing public service platform, the green manufacturing level indicators and advanced experience of those listed as green manufacturing demonstration parks are regularly published. The self-declaration information of the parks will be provided with spot checks from time to time. Those failing to meet the green manufacturing demonstration requirements shall be removed from the list of demonstration parks. Those without problems found in three consecutive spot checks shall be exempted from spot checks within five years.	The approved pilot park will be listed as a “National Low-carbon Industrial Park Pilot Unit” to officially commence the pilot work, and the pilot work plan will be initiated and implemented. After satisfactory acceptance, the park will be granted the title of “National Low-carbon Industrial Park”. If it fails the regular review, the title of “National Low-carbon Industrial Park” and preferential policies will be withdrawn.	The National Development and Reform Commission and the Ministry of Finance give priority to the parks that have achieved remarkable results in the transformation to the circular economy as “national circular economy demonstration parks”.	The industrial parks approved and named as demonstration parks shall conduct self-evaluation on the performance of eco-industrial construction every year, draw up an annual evaluation report and submit it to the office. From the date when named as a demonstration park, the park shall be subject to a review every three years. The leading group may revoke the title of the demonstration park as the case may be.	According to the evaluation results of the year, a list of national economic and technological development zones to be interviewed, notified, and suggested to withdraw, and the respective disposal recommendations are put forward.	According to the evaluation, the development zones with outstanding achievements will be praised, and those with poor management and slow development will be ordered to rectify within a time limit; if the rectification fails, it will be reported to the State Council to cancel its qualification as a national high-tech industrial development zone.	No mandatory constraint

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