



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION



# INTERNATIONAL GUIDELINES FOR INDUSTRIAL PARKS



**INTERNATIONAL GUIDELINES  
FOR INDUSTRIAL PARKS**

CROSS-DISCIPLINARY TEAM ON INDUSTRIAL PARKS

November 2019

## Foreword



The United Nations Industrial Development Organization (UNIDO) is a specialized agency of the United Nations with the mandate to promote inclusive and sustainable industrial development (ISID). This mandate is central to the achievement of the 2030 Agenda for Sustainable Development Goal 9: “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”, with interlinkages to support the achievement of the other sustainable development goals. Meeting this goal requires, among others, adequate infrastructure development that can support investment in priority sectors of Member States and overcome the constraints associated with doing business in an economy.

Inclusive and sustainable industrial parks are a feasible, innovative and integrated intervention, which can be used to support countries, especially developing countries and middle-income economies, in accelerating their inclusive and sustainable industrialization and structural transformation. Industrial parks help overcome business infrastructure constraints and barriers to firm entry into the markets. Industrial parks have the capacity to generate high productivity, stimulate innovation, promote investment and foster social inclusion and environmental protection.

Over the past four decades, UNIDO has been promoting the establishment of industrial parks - we have been assisting our Member States in the planning and establishment of industrial parks to support sustainable growth through industrial development.

The development of inclusive and sustainable industrial parks are instrumental in the implementation of the Programme for Country Partnership (PCP), UNIDO’s innovative multi-stakeholder partnership model to accelerate ISID in Member States. UNIDO provides the technical support in infrastructure development, and complements this with appropriate policy analysis and advice to support the operationalizing of the

industrial parks. Through the PCP, UNIDO supports our member countries to mobilize diverse partners, financial resources and knowledge in order to create the synergies required to promote and implement industrial development, and to maximize development opportunities following the establishment of industrial parks.

As part of our holistic approach, UNIDO consolidates best practices and develops the necessary guidance tools to support our Member States and partners on issues related to industrial park development. We developed an “International Guidelines for Industrial Parks”, a comprehensive reference framework to guide the development of competitive, inclusive and sustainable parks. The guidelines were prepared by combining in-house technical expertise with international best practices. We hope that these guidelines will serve as a useful guide and reference tool by the different stakeholders, including industrial park regulators, developers, operators, tenants, partners (such as multilateral development agencies) and financial institutions. The guidelines are relevant to both existing and new industrial parks in various international contexts, with a focus on the needs and challenges developing countries and middle-income economies face.

Cognizant of our specialized knowledge and capabilities, UNIDO is committed to strengthening the development of inclusive and sustainable industrial parks in developing countries and middle-income economies. In this context, UNIDO will regularly review and update the guidelines to take account of new developments and evolving trends in the global development and industrial landscape, as well as inputs from our Member States and partners. UNIDO also stands ready to offer its services in assisting local implementers to make best use of the guidelines. The scope of such services may range from developing specific derivative documents and tools to supplement the guidelines to facilitate the implementation of these guidelines, to organizing international and regional forums, conferences and technical workshops, creating knowledge-exchange platforms and providing training.

LI Yong

Director General  
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## List of Acronyms

ADB	Asian Development Bank
AfDB	The African Development Bank
AI	Artificial Intelligence
AIP	Agro-industrial Parks
B2B	Business to Business
BREEAM	Building Research Establishment Environmental Assessment Method
CAPEX	Capital Expenditure
COMFAR	Computer Model for Feasibility Analysis and Reporting
COSHH	Control of Substances Hazardous to Health
CRM	Customer Relationship Management
CSP	Cambridge Science Park
DCR	Development Control Regulations
DFI	Development Financial Institution
DGNB	German Sustainable Building Council
EA	Environmental Assessment
EBRD	European Bank for Reconstruction and Development
EIB	The European Investment Bank
EIP	Eco-Industrial Park
ELIDZ	East London Industrial Development Zone
EPE	European Principles for the Environment
EPR	Enterprise Resource Planning
EPZ	Export Processing Zone
ERR	Economic Rate of Return
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Impact Mitigation Plan
EU	European Union
EVA	Economic Value Added
FDI	Foreign Direct Investment
FIAS	Foreign Investment Advisory Service
FAO	Food and Agricultural Organization
FTA	Free Trade Agreement
FTZ	Free Trade Zone
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GIZ	German Development Agency
HTP	High-Tech Park
HVAC	Heating, Ventilation, and Air Conditioning
IADB	Inter-American Development Bank
IBRD	International Bank for Reconstruction and Development
ICSID	International Centre for Settlement of Investment Disputes
ICT	Information Communications Technology
IDZs	South Africa's Industrial Development Zones
IEAT	Industrial Estate Authority of Thailand
IFC	International Finance Corporation
IIA	International Investment Agreements
ILO	International Labour Organization
IPA	Investment Promotion Agencies
IPDC	Ethiopian Industrial Parks Development Corporation

IRR	Internal Rate of Return
IPR	Intellectual Property Rights
ISID	Inclusive and Sustainable Industrial Development
IT	Information Technology
IZ	Industrial Zone
IZA	Industrial Zones Authority
KICOX	Korea Industrial Complex Corp.
Km	Kilometer
KPI	Key Performance Indicator
LDC	Least Developed Country
LEED	Leadership in Energy and Environmental Design
M2M	Machine-to-Machine
MFN	Most Favoured Nation
MIGA	Multilateral Investment Guarantee Agency
MoU	Memorandum of Understanding
MSDS	Material Safety Data Sheet
MSME	Micro, Small and Medium-sized Enterprise
NGO	Non-Governmental Organization
NIP	New Industrial Policy
NPV	Net Present Value
NTB	Non-Tariff Barrier
OpEx	Operational Expenditure
OSHA	Occupational Safety and Health Administration
PA	Public Announcement
PCP	Programme for Country Partnership
PPP	Public-Private Partnership
PV	Photovoltaic
QA	Quality Assurance
QC	Quality Control
R&D	Research and Development
RoI	Return on Investment
RTH	Regional Transformation Hub
SDG	Sustainable Development Goal
SEZ	Special Economic Zone
SIP	Suzhou Industrial Park
SIPAC	Suzhou Industrial Park Administrative Committee
SME	Small and Medium-sized Enterprise
SMS	Social Impact Management and Monitoring System
SRI	Solar Reflective Index
STP	Sewerage Treatment Plant
ToR	Terms of Reference
UNCITRAL	United Nations Commission on International Trade Law
UNCTAD	United Nations Conference on Trade and Development
UNIDO	United Nations Industrial Development Organization
VAT	Value Added Tax
WGBC	World Green Building Council
WTO	World Trade Organization
WWTP	Waste Water Treatment Plant

# Executive Summary

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The 2030 Agenda for Sustainable Development recognizes the importance of inclusive and sustainable industrialisation and the infrastructure that supports in eradicating poverty. However, premature de-industrialisation has also become increasingly noticeable in developing countries with manufacturing having a decreasing share of the gross domestic product (GDP). By delivering public goods and the accompanying policy interventions in support of investment, industrial parks have acted as a catalyst to facilitate industrial development. It should be noted that industrial parks also contribute to Sustainable Development Goals through promoting socially and environmentally responsible industrialisation within the parks themselves, as well as by demonstrating what is possible to the rest of the country.

In this broad context, a number of trends have been shaping the future of industrial parks. Firstly, the increase in the number of industrial parks since the early 1990s has created competition to attract investment and pressure to offer ever better services. Secondly, increasing urbanisation and the growth of residential and mixed-use areas in or adjacent to industrial parks has created pressure to better integrate them into their broader urban context. Thirdly, better management of environmental externalities in recent years, particularly in the context of increased awareness of climate change, has become an increasingly significant factor in business operations and decision-making for ‘green growth’ and resource-efficient ‘circular economy’ business models. Fourthly, the digital transformation, particularly in technologies related to Industry 4.0, presents opportunities and challenges for enterprises that actively embrace the trend and make an effort to stay abreast of the productivity gains.

Furthermore, regardless of the industrial parks’ ownership model, the private sector invariably plays a vital role, both as the parks’ residents, and very often also as design consultants, construction contractors and as the managers of public projects. The participation of private firms provides critical expertise and, thereby reduces government risk. It is critical that industrial parks adapt to these trends successfully to achieve their objectives.

These guidelines seek to promote the development of competitive, inclusive and sustainable industrial parks through a comprehensive reference framework; their specific objectives are to: Support industrial park decision-making; Improve industrial park efficiency; Enhance industrial park competitiveness; Promote industrial park sustainability; and Ensure industrial park inclusiveness.

The guidelines were prepared by UNIDO’s Cross-Disciplinary Team on Industrial Parks by combining UNIDO’s technical experience with international best practices. The literature was extensively reviewed, along with earlier UNIDO studies, tools and technical cooperation projects, supplemented by information from field visits, discussions with park managers and regulators, case studies of industrial park practices in Ethiopia, Peru and China, as well as feedback from a review by a group of experts drawn from UN agencies, DFIs, Banks, Academia, consulting firms, etc.

Finally, these guidelines have been designed to be practical. Their recommendations are relevant to both new and existing industrial parks in various international contexts, with a core focus on developing and transition economies. They can be used in all the development stages and for various types of industrial parks. Furthermore, they address the industrial park’s planning and design, construction, operations, marketing & investment promotion, waste management, and energy management. They are intended to be used and applied to industrial parks by a variety of stakeholders, including: Park Regulators, Park Developers, Park Operators, Park Tenants, and Stakeholders and partners such as multilateral development agencies and financial institutions.

## INDUSTRIAL PARK PLANNING

Industrial park development involves careful planning and oversight. The principle steps in planning an industrial park include: Business case formulation, including pre-feasibility studies; Pre-identification of a shortlist of suitable park sites; Detailed feasibility analysis of the selected site; and Financial structuring and agreement with financial backers.








To begin with, industrial parks must therefore be built based on a business case that demonstrates the need for serviced industrial land and the benefits the industrial park project will provide. The business case should be prepared before making any decision to initiate the project. A carefully developed business case must examine both the project’s opportunities as well as its risks, and convincingly describe the project’s rationale. In many developing countries, insufficient attention is given to proper business case development and the industrial park’s positioning, creating a ‘gap’ between what firms really need and what parks actually offer. It is critical that park programmes be market-driven, and respond to actual investment demand and investor needs. Demand forecasting is a complex and uncertain undertaking that requires the following: Assessment of investment and trade patterns; Assessment of sources of comparative advantage; Incorporating direct input from existing and potential investors; and Benchmarking.

A pre-feasibility analysis establishes a stronger basis upon which to assess the overall potential of any

industrial park project, thus guiding decision-makers as to whether the project is technically, financially, economically, socially and environmentally sound. It also helps to position proposed projects in the context of national, regional and international competition, and the relevant market trends. As a rule, pre-feasibility studies provide guidance in the following areas: Location/site; Market/industries; Investor demand; Sources of financing; Policy and the legal environment; Safeguards assessment; and Economic impacts.

Amongst other factors, industrial park promoters should take the following considerations into account when choosing the most appropriate site for their proposed project: Locations where there is meaningful investor interest; Compliance with local and national master-plans; Site development and construction costs based on topography and access; Proximity to social superstructure and assets; Avoidance of environmentally and culturally sensitive areas; Maximisation of user access to sustainable and affordable infrastructure; Seeking, wherever possible, to redevelop a previously-developed property; and Engaging the local community and the stakeholders in a well-coordinated manner.

The strategies listed below provide guidance concerning some of the activities that should be carried out and the procedures that should be applied during site selection:

-  Developing site selection and ranking criteria in such a way that sites are progressively evaluated from broader to more specific geographical considerations;
-  Gathering appropriate GIS data;
-  Legal feasibility of the various shortlisted sites;
-  Basic investor interest by ranking the various shortlisted sites based on qualitative and/or survey data;
-  Preliminary financial analysis of the various sites;
-  Preliminary socio-environmental assessment and ranking of the considered sites; and
-  Government interest and support for the project.



Any final decision to establish and finance an industrial park should only be made after conducting a reliable and site-specific full feasibility analysis with clearly supportive conclusions. Comprehensive and detailed market identification and demand projections, properly scaled and phased master plans, technical designs, project costs and benefits analysis, social and environmental assessments, institutional mapping and governance system design, off-site and on-site infrastructure requirement assessments and development plans, financial modelling and structuring plans, as well as economic impact modelling, are crucial to any final positive determination on whether to proceed with an industrial parks project.

The key elements of feasibility studies include the: Business Plan, including proposed services

and amenities, and pricing strategy; Technical Assessment and Plans; Environmental and Social Impact Assessment (ESIA) and plans; Analysis of the latent and phased investor market potential, and the resulting land take-up/absorption projections; Financial Modelling and projection of funding needed; Economic Impacts Study; Definition of the project service delivery model, and corporate and legal structures.

Potential industrial park sponsors and developers should consider using UNIDO's "Computer Model for Feasibility Analysis and Reporting" (COMFAR) tool in their feasibility analysis work. Overall, this body of feasibility work is intended to result in an evidence-based final go/no-go decision regarding whether to proceed with the project.

## INDUSTRIAL PARK LAND ACQUISITION, DESIGN AND DEVELOPMENT

Some of the typical activities of the industrial park developer include: Land acquisition, transfer and/or assembly; Master planning; Negotiation and conclusion of government and other institutional partnerships; Securing statutory approvals and permits, notably including ESIA approvals; Arranging finance and marketing; External utilities connections; and Development of internal utilities distribution networks and specialised industrial facilities.

The master plan should cover most of the following elements to ensure successful design and outcomes: Lay down the long-term vision and broad planning framework, with international site competitiveness in mind; Address the specific needs of target industries; Focus on integrated environmental management, utilities and inclusive social infrastructure; Flexibility in designing the built environment; Synergies of co-location, circularity and industrial symbiosis; Mixed land use; Enhancing physical connectivity to adjacent communities and regions; Use of renewable energy sources and energy conservation; and Phasing of the project.

Segregated internal zones such as the following are typical in an industrial park context: Industrial zones

for targeted sectors; Amenities zones, including, information centres, training centres, R&D facilities, clinics, administrative buildings, shopping centres, fire stations, etc.; Special infrastructure areas, such as certification laboratories, quarantine services, market intelligence unit, etc.; Logistics zones; Utilities zones, including for sewage treatment plants, solid waste collection centres, electrical substations, CETPs, etc.; Residential areas; and Green zones. Zoning within the park can also be designed in such a way as to encourage industrial symbiosis.

Furthermore, a growing number of industrial parks are building in sustainability strategies right from the feasibility study stage. As industrial parks notably offer opportunities for the sustainable use of low-carbon energy and for shared infrastructure, energy planning and management are becoming increasingly prominent components of industrial park planning and development. Some energy sustainability considerations include energy-efficient location choice, low-carbon infrastructure, as well as smart building design and orientation for integration of renewables. A strong foundation for sustainability must drive the design and development of an industrial park, and the construction therein, and

be built into its conceptualization based on the following principles: Sustainable site development, including restoring green cover, etc.; Sustainable transport; Water conservation; Energy efficiency, including reducing "heat islands", use of renewable technologies, sub-metering, etc.; Sustainable Material and Resource Management; Health and well-being, including park design catering to the differently abled and senior citizens, etc. Green Education; and Waste Management. Many Development Finance Institutions (DFIs) have policies, guidelines and tools to effectively integrate environmental and social considerations into their operation, which can help industrial park developers in preparing these assessments and plans.

An Environmental and Social Mitigation Plan (ESMP), prepared either as an integrated element of the ESIA or as a separate document should set out the measures required to maximize the project's benefits as well as to minimise and/or remedy any adverse impacts, by: Setting out an environmental and social management action plan; Defining responsibilities for specific tasks, and timeframes and budgets for its

implementation; Promoting active engagement with the affected persons and communities; Identifying monitoring mechanisms; and Promoting capacity building for its effective implementation.

When the industrial park's technical and engineering plans are ready, it is a sound practice for them to undergo an independent third-party review in order to ensure that the design meets all pre-determined requirements and standards and provides a sound basis for achieving the project's objectives.

Finally, once the park is built, the sales and leasing prices for serviced land and facilities depend on location, and the extent of the available infrastructure facilities therein. The recommended strategies for setting these prices are as follows: Prices should reflect the prevailing prices on the local market; Prices should enable developer/operator cost recovery plus margin, in order to enable the financing of future industrial park expansion and/or upgrade needs, and to incentivise the developer to make such investments; and Transparency.

## INDUSTRIAL PARK OPERATION AND MANAGEMENT

Industrial park operation involves site and facilities management and maintenance, ongoing investment promotion, performance monitoring and evaluation, and ongoing improvements and reinvestment. Industrial park management however mainly focuses

on coordinating actors, attracting investment and initiating the sale of land to residents, and the collecting of joint maintenance and operations fees and charges from users.



Modern operators should furthermore ground their delivery of utilities and waste management services in an understanding of eco-efficiency, by-product synergies and integrated waste management, in order to deliver properly coordinated, clean and green services. Moreover, and especially if the State contributes to the industrial park programme in some manner (for instance through land, equity, subsidies or tax incentives), industrial parks and their operators may also be expected to provide a number of “public goods”, for instance in the form of services aimed at incubating or developing entrepreneurship, organizing regulatory compliance through one-stop shops, strengthening supply chains through linkage programmes improving entrepreneur and/or residents’ workforce skills, and/or providing employee care.

Moreover, the responsible management of labour relations has a direct influence on the industrial parks’ sustainability as it affects the size, morale and productivity of the workforce. Due emphasis should therefore be given to: Decent working conditions; Freedom of labour union activity; and Labour dispute settlement. Modern industrial parks can and should however be leveraged as platforms to go beyond such basic protections, and to promote superior worker welfare standards, standards and practices to attract talent, to enhance workforce skills, and to contribute to quality jobs and a knowledge-based economy.

## INDUSTRIAL PARK REGULATION

The objective of industrial parks development should be part and parcel of a country’s overall industrial policy. Industrial parks represent an effective industrial policy tool because many of their possible supportive policy components –investment policy, trade policy, finance, support for enterprises including incentives, physical infrastructure and superstructure, consultancy and training, workforce development, and R&D and innovation policy– are the same. In this sense, industrial parks can be utilized as industrial policy microcosms, either through the geographically-concentrated application of national industrial policy or through a dedicated subset of policies. Indeed, establishing industrial support

Finally, it is important for the park’s management to adopt and continuously monitor the implementation of a waste management plan in park operations. Park management should also encourage waste prevention, reuse, recovery and recycling, through programmes promoting clean production, resource efficiency, recycling, materials exchanges, as well as synergies with local authorities. Such strategies should be based on the conventional waste management hierarchy that should encourage: Reduction of hazardous substances at the source by upgrading production systems and technology, as well as altering inputs and products; Reuse or in-process recycling; Recycling, through the separation and sorting of wastes and by-products; Recovery, through materials exchange or marketplace programmes; Treatment, through technologies reducing the volume and toxicity of waste; Industrial Symbiosis through the synergistic and cooperative exchange of industrial by-products, energy, water, by-products, and process wastes among closely situated firms; Circular economy practices, extending product lifespan through green and efficient waste, water and energy management and repurposing; and Disposal, in sites located fairly close to the source of the waste, separated from residential areas, off floodplains, on a geologically-stable base.

systems in parks is easier than it is at the country-wide level, due to the clustering of the enterprises they catalyse. Some of the more successful industrial park programmes have also developed mechanisms for addressing investment climate constraints.

Some of the areas that industrial park legislation may cover include the following: Effective industrial park location criteria, including ensuring transportation and communication facilities and connections to markets; Quality physical infrastructure and brownfield superstructure in industrial parks, including through sound planning and development control framework; Rights with respect to the establishment, use and

operation of infrastructure facilities within industrial parks; Investor eligibility and plot allocation; Investment incentives; Environmental obligations of industrial park developers, operators and users; and Organization of industrial park governance bodies. As there is constant global competition for increasingly scarce foreign direct investment (FDI), investment incentives have long been another public policy tool used in the pursuit of national and regional economic development goals through industrial parks. Investment incentives can be classified into three broad categories: Financial incentives (direct subsidies, grants and loans); Fiscal incentives (tax holidays and reduced tax rates); and other incentives (including subsidized land, infrastructure and services, as well as various regulatory concessions). The most common incentives in industrial parks are subsidized serviced land and infrastructure. However, fiscal incentives are also often frequently offered. Direct financial incentives are rarer.

Regardless of their specific elements and levels, any industrial park investment incentives should take the following key considerations into account: Incentives have public opportunity costs, and they should thus be applied “smartly”; Incentives should be easy to use and transparent; Impact of incentives should be measurable; Incentives should be relevant to the specific conditions, endowments and comparative advantages of the host economy (e.g., location, infrastructure, sectors); and Incentives must take the

## INDUSTRIAL PARK INVESTMENT MARKETING AND FACILITATION

Studies have confirmed the effectiveness of investment promotion as a non-distortive industrial policy tool that can have a significant impact on FDI. Results suggest that the sectors targeted by specific investment promotion campaigns receive, on average, more than twice as much in FDI inflows as non-targeted sectors and that investment promotion shows a highly positive cost-benefit. Conversely, the lack of effective marketing and investment promotion activities can lead to the failure to attract quality investment to an industrial park, even though strong infrastructure, legal arrangements and services may have been put in place for the park’s investors.

international rules-based investment framework into consideration.

Competitive investment policy should above all include the adoption of overarching framework laws for the transparent and non-discriminatory treatment of investors (e.g., freedom to invest, national treatment), for the employment of foreign management personnel, for capital and current account transfers, for limited expropriation that is fairly compensated, as well as for efficient and transparent commercial dispute settlement through national and international arbitration. Industrial parks can be utilized as a policy instrument to further enhance the business climate.

Finally, Special Economic Zones (SEZs), Free Trade Zones (FTZs) and Export Processing Zones (EPZs) are forms of industrial parks generally established as “Distinct Customs Territories” within their host countries, applying special customs regulations and duty rules in order to facilitate trade and exports through reduced company operating costs and cash flow, and streamlined customs procedures. It is crucial to bear in mind, when setting up any such regimes, that the rules and implementation of these zones are to be aligned with international fair taxation rules, prohibitions against tax-induced export subsidies and the rules on the non-discriminatory treatment of foreign investment.

Thus, it is essential to establish a clear and effective marketing strategy that emphasizes the package of tailored investor support services that the industrial park programme offers.

However, prior to developing the marketing messages and mechanisms, it is important to first understand the targeted audience. Identifying those sectors that can bring the country a long-term competitive advantage should therefore inform the subsequent actions pursuant to the industrial parks promotion strategy. Indeed, such investor targeting has implications well beyond those of investment



marketing, thus informing additional, complementary sector-specific interventions that should take place in order to eliminate the constraints on these industrial sectors. Furthermore, a concerted effort should be made to attract anchor investors regarded as leaders in their respective sectors into industrial parks. This not only sends a strong signal to other potential investors to look more closely at the industrial park's market and cost conditions, but can also directly help to "crowd in" the existing international suppliers for the lead investor, creating a virtuous cycle whereby word-of-mouth marketing by existing investors complements and amplifies the formal investment promotion efforts.

A common impediment to effective investment promotion is related to coordination failures among investment promotion stakeholders, especially when there are any jurisdictional overlaps between the various government actors.

Therefore, investment marketing and facilitation for industrial parks should: Be synchronised with the efforts undertaken by national Investment Promotion Agencies (IPA); Avoid sending mixed signals and creating confusion amongst potential investors about

## INDUSTRIAL PARK RISK MANAGEMENT

Although the development of industrial parks presents many economic and non-economic opportunities, it also presents a number of risks with respect to their planning, development or operation, business interruption, environment or social impacts. Such risks can be better managed when they are analysed using a systematic approach in order to identify, prioritize and mitigate them. It is critical to have clear risk identification, prevention and mitigation plans at both the company and park level.

Some of the core issues in developing a risk identification and prioritisation plan are to respond to the following questions: How to define the risk level? How to measure the risk? What is the industrial park's risk tolerance threshold? In some situations, it may be possible to use procedures set forth in manuals dealing with risk engineering analysis or

applicable investment regulations, especially where there may be overlapping jurisdictions, preferably through a standing committee of relevant line ministry and agency representatives; and Provide for an integrated one-stop shop system with clear links to line Ministries.

Another key risk in investment promotion campaigns relates to their proper timing. For instance, premature campaigns based only on mock-up versions of the industrial park master plan lack transparent and verifiable information regarding a park's readiness to receive investors. Promotion campaigns therefore are usually ineffective unless the construction work on an industrial park is in its final stretch.

Finally, in the first years after the investment decision, an enterprise's entry and establishment are critical to its survival and development, as is its proper nurturing throughout its entire investment lifecycle and operations. Thus, it is also of prime importance that the enterprise be supported during as well as after the establishment phase, through proper investment facilitation and aftercare, in order to achieve successful industrial park investment promotion programmes.

the classification and prioritisation of risks from major accidents in industry. These methods and procedures typically address risks such as: strategic, financial, market and contractual risk, risk of accidents with on-site and/or off-site consequences, risks associated with fixed installations, as well as with handling, storing, processing and transporting hazardous materials. A sound risk management plan also includes risk prevention and mitigation measures, actions in case of incidents, responsible partners and required communication actions. Risk avoidance, reduction, sharing and retention are the four widely-adopted risk control strategies. Selecting the appropriate risk control strategy depends on the nature, type and costs of the risk, as well as the available resources for taking relevant actions. One or more of these strategies may be used simultaneously.

## INDUSTRIAL PARK PERFORMANCE EVALUATION

In order to define the industrial park's success, it is necessary to establish a reference framework, i.e. a set of goals against which to measure performance, along with Key Performance Indicators (KPIs). KPIs can be defined for an entire industrial park, an individual facility or the various processes at the park or an individual facility. In line with the core Inclusive

and Sustainable Industrial Development (ISID) principles, these guidelines propose three indicator categories comprising a total of 13 key industrial park performance indicators: economic performance indicators, social performance indicators and environmental performance indicators. These indicators are as follows:



### Economic performance indicators relating to the ISID pillar "Advancing Economic Competitiveness":

- Good economic governance;
- Economically enabling site & infrastructure 'hardware';
- Economically enabling services 'software'; and
- Economically impactful nature (not applicable to new sites that are not yet fully operational).



### Social performance indicators relating to the ISID pillar "Creating Shared Prosperity":

- Socially appropriate site & social infrastructure;
- Social inclusiveness;
- Quality social management system & social services (not applicable to new sites that are not yet fully operational);
- Occupational health & safety (not applicable to new sites that are not yet fully operational); and
- Good labour relations & welfare (not applicable to new sites that are not yet fully operational).



### Environmental performance indicators relating to the ISID pillar "Safeguarding the Environment":

- Environmentally appropriate site;
- Green infrastructure;
- Green systems (not applicable to new sites that are not yet fully operational); and
- Efficient & clean production, emissions & waste management (not applicable to new sites that are not yet fully operational).

Each of these key indicators is in turn composed of a number of input-level quantitative sub-indicators, allowing key indicator "scores" to be tabulated. While some of these indicators (particularly those relating to site and infrastructure characteristics) are appropriate to new industrial parks, others (notably those relating to impact and services use) are not particularly informative until a park is fully operational. The methodology proposed in these guidelines and

its indicators should thus be viewed as "modular," and flexible, to be "varied" depending on the state of operational readiness and implementation of the industrial park being assessed. Indeed, one can quite easily tailor and adapt the proposed performance measurement framework simply by omitting some of the proposed indicators, if less relevant to the industrial park's current lifecycle stage.

These guidelines only seek to provide a general reference framework to assist decision-makers in planning and implementing new industrial parks, or in upgrading operational ones. A range of specific derivative documents and tools can and still should be developed to supplement this document and facilitate its implementation. Furthermore, as both active engagement with stakeholders and the building of solid partnerships are important to promote knowledge sharing and learning on industrial parks, UNIDO stands ready to offer its services to assist local implementers to make the best use of the guidelines. The scope of such engagement may for instance range from organizing international and regional forums, conferences and technical workshops, to creating industrial park knowledge sharing and networking platforms. It may also include stakeholder engagement through UNIDO's Programme for Country Partnership (PCP) and training on the use of UNIDO's COMFAR feasibility studies tool.

# 1

## Introduction

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## 1.1 INCLUSIVE AND SUSTAINABLE INDUSTRIALISATION AND INFRASTRUCTURE

The 2030 Agenda for Sustainable Development recognizes the importance of inclusive and sustainable industrialisation and its supporting infrastructure in order to eradicate poverty, as no country or region in the world has ever achieved a decent standard of living for its citizens without a robust industrial sector. Indeed, industrialisation generates economies of scale in national output, increases household income with more stable and higher-skilled manufacturing jobs, and expands consumption, setting economies on a virtuous growth cycle. Moreover, growth of the manufacturing sector is essential for employment creation, as it absorbs surplus labour from agriculture and other traditional sectors, particularly in view of the urbanisation trend that is taking place in developing countries.

Over the last few decades, the manufacturing sector has undergone a profound transformation –in terms of structure, technology, sectoral interlinkages and boundaries. As a result, the manufacturing value added has increased steadily in both industrialized

and developing countries since 1990<sup>1</sup>. However, premature de-industrialisation has also been increasingly noticeable in developing countries where manufacturing sector shows a decreasing share of gross domestic product (GDP).

It is clear that governments must apply well-designed strategies and policies to industrialise and transform their economies, particularly if they are still developing. These strategies comprise a wide variety of approaches and instruments, depending on the level of industrial development and the overall economic context in which they are designed to produce results.

Infrastructure policy is an important element of any effective industrialisation strategy. Indeed, limited access to consistent and reliable power, water, telecommunications, waste treatment, and other public utilities and services, are major impediments to investments in the manufacturing sector.

## 1.2 THE CONCEPT OF INDUSTRIAL PARKS

The principal rationale for establishing an industrial park is to enable “industry to settle and develop at a specific location that is planned and improved to that effect”<sup>2</sup>. Industrial parks are, for this reason, an important tool within a country’s broader industrial and infrastructure policies.

The common definition of an industrial park is “a tract of land developed and sub-divided into plots according to a comprehensive plan with the provision of roads, transportation and public utilities, sometimes also with common facilities, for use by a group of manufacturers”<sup>3</sup>. The term “industrial parks” is often also used however to cover a broad

range of concepts, such as free-trade zones, export-processing zones, special economic zones, high-tech zones, free ports, enterprise zones, etc<sup>4</sup>. The large number of terms and concepts associated with industrial parks is, among other reasons, the result of differences in the objectives, functions or forms of these parks, differences in the economic policy terminology of various countries, as well as the desire of certain industrial parks or programmes to differentiate themselves from the competition. Thus, any comprehensive definition of industrial parks must be sufficiently broad to reflect the variety within them<sup>5</sup>. Table 1 summarizes the most common types of industrial parks.

<sup>1</sup> UNIDO, *Demand for Manufacturing: Driving Inclusive and Sustainable Industrial Development*, Industrial Development Report 2018 (2017)

<sup>2</sup> UNIDO, *Industrial Estates in Europe and Middle East* (1966)

<sup>3</sup> UNIDO, *Guidelines for the Establishment of Industrial Estates in Developing Countries* (1997)

<sup>4</sup> D.Z. Zeng, *Special Economic Zones: Lessons from the Global Experience*, PEDL Synthesis Paper Series

<sup>5</sup> ASSOCHAM, *Special Economic Zones Performance and Lessons* (2016)

Type	Definitions	Examples
<b>Eco-Industrial Parks (EIPs)</b>	Also called, sustainable, low-carbon, green, or circular zones, EIPs are industrial parks designed to improve the social, economic and environmental performance of their resident firms, including through the promotion of industrial symbiosis and green technologies delivering resource efficiency and resulting in competitive advantage, promoting climate-resilient industries and green value chains, as well as inclusive and sustainable business practices and socially responsible relations with surrounding communities.	Myeonggy, Noksan, Sungseo, and Kusan in the Republic of Korea; Masdar Green City in the UAE; Tianjin Eco-City in China.
<b>Special Economic Zones (SEZs)</b>	Delineated areas of a country, subject to unique economic regulations that differ from other areas in the same country and also generally provide for extra-territorial treatment with respect to customs tariffs.	Shenzhen and Xiamen in China; Panama Pacifico in Panama.
<b>Border Economic Zones</b>	Economic zones located along an international border to facilitate cross-border trade and investment.	Thai-Malaysian Special Border Economic Zone; Mexican Maquilladoras; Corozal in Belize.
<b>Export Processing Zones (EPZs)</b>	Duty-free zones focused on manufacturing for export, generally providing export subsidies in the form of tax holidays and having no or minimum export quotas.	Athi River EPZ in Kenya; Kaohsiung EPZ in Taiwan; United Republic of Tanzania EPZs; Bangladesh EPZs.
<b>Free Trade Zones (FTZs) / Free Zones (FZs)</b>	Delineated areas with suspended import taxes and where regulatory compliance obligations are reduced, in order to attract new business and foreign investments.	Shannon in Ireland; Katowice in Poland; Jebel Ali in Dubai; Tanger Med in Morocco.
<b>Bonded Areas / Bonded Zones</b>	Areas where dutiable goods may be stored, manipulated, or undergo light processing (such as assembly) without payment of duty, subject to customs bonds.	Waigaoqiao Bonded Logistics Zone in China; Dammam Port Bonded Zone in Saudi Arabia.
<b>High-Tech Parks (HTPs)</b>	Special areas designated to facilitate and promote the creation and growth of innovation-based companies through incubation and other policy interventions.	Mie Hi-Tech Park in Japan; Gangwon Technopark in the Republic of Korea; Discovery Park in the UK.
<b>Agro-Industrial Parks (AIPs)</b>	Specially-designated areas designed to attract and promote industries in downstream agricultural processing.	Integrated agro-industrial parks in Ethiopia; Indian Food Parks.

Sources: Zeng (2010), ADB (2016), ASSOCHAM (2016); Locus Economica (2019); and UNIDO

Table 1: Common Types of Industrial Parks<sup>6</sup>

Though the various types of industrial parks above differ slightly from one another, they all share certain common features. Industrial parks are distinguished from other types of business and industrial locations,

and from the simple clustering or agglomeration of industries in a specific location, by the characteristics depicted in Figure 1<sup>7</sup>.

<sup>6</sup> The list in the above table is non-exhaustive and only includes some of the most common types of industrial parks.

<sup>7</sup> KIIEP, *Special Economic Zone as a Tool of Industrial Development: The Case of Korea* (2016)





Figure 1: Basic characteristics of Industrial Parks

### 1.3 PUBLIC POLICY ARGUMENTS FOR ESTABLISHING INDUSTRIAL PARKS

The public policy motivations for promoting industrial parks often derive from the industrial policies or strategies of national, state and local governments, seeking to induce industrial transformation, diversification and upgrading towards more competitive, sustainable and inclusive economies, through structural changes correcting for market failures<sup>8</sup>.

Industrial policy in general has the potential to enhance the competitiveness of the economy, enable the restructuring of existing sectors and allow enterprises to become more efficient, diversify the economy into new industrial sectors, integrate

- Facilitating production and employment;
- Attracting investment, integration into global value chains and facilitating exports;
- Promoting structural change, diversification of production into areas of comparative and competitive advantage, and productivity;
- Stimulating R&D and innovation, technological capabilities, the development of competitive human resources and the upgrading of enterprises;
- Development of physical infrastructure;
- Promoting sound environmental management in industry;
- Gender and social inclusiveness in employment and economic benefits of wealth creation; and
- Improving the effectiveness of public service delivery.

enterprises into global value chains, as well as to lead to gains in technology, know-how and production methods. As such, industrial policy is cross-disciplinary and seeks to ensure coordinated action in many different policy areas with linked objectives, including through investment, trade, fiscal, financial, R&D and innovation, education, labour, infrastructure, transportation, energy and environmental policy measures. To ensure successful implementation, the industrial policy targets and policy performance criteria should be clearly defined. Some of the typical objectives of an industrial policy include the following:

Investment policy is at the core of industrial policy because its objectives can only be realized with higher levels of investments in infrastructure, human capital, science and technology, all of which are

required in order to enhance a country's competitive position. These investments include public, private and public-private ones. Investment policies have a variety of objectives, which can for instance include:

- Generating savings and capital;
- Infrastructure development;
- Stimulation of R&D, digital growth, know-how, and technology transfer; and
- Elimination of regional development disparities.

A strong long-term government investment policy commitment is needed to ensure policy stability and success, as are proper dialogue and cooperation mechanisms between the central, regional and local governments, involving the private sector and civil society.

Within the broader overall context of industrial and investment policy and their general goals, more specific policy motivations for industrial parks may include the following:

- a Developing the manufacturing sector.** A competitive manufacturing sector plays a key role in both economic growth and socio-economic transformation. Industrial parks can provide a favourable business environment to develop the manufacturing sector and to add economic value in economies that are heavily dependent on the production of unprocessed/semi-processed agricultural products or extractive resources. Industrial parks can also be used to create backward and forward linkages where an economy's raw materials and supplies flow to the park for processing. Agro-processing parks, for instance, have backward linkages to farmers and their raw materials, as well as forward linkages to food wholesalers, retailers and exporters<sup>9</sup>.
- b Attracting investment and technology.** Industrial parks are an important tool for attracting investment and technology, given that some of the key factors that influence investment decisions are the availability of land, infrastructure, quality services and proximity to strategic markets. The technology transfer opportunities that foreign investment in particular can bring to an economy are crucial to improving production capacity through the associated transition from labour-intensive to technology-intensive production that often accompanies it<sup>10</sup>.
- c Regional and national development.** Contributing to regional and national development is often a primary driver of the decision to establish industrial parks that foster new investment, industries, jobs, linkages and growth<sup>11</sup>.
- d Improving the business environment**<sup>12</sup>. Industrial parks can improve companies' productivity by reducing production costs, reducing waste and pollution, and generally increasing economic opportunities.
- e Fostering innovation.** Industrial parks create environments that foster collaboration and innovation by providing a location where the government, the private sector and universities and research institutes can collaborate, as well as conduct and commercialise research and reinforce entrepreneurship. Industrial parks can also support entrepreneurs by incubating new businesses. The shared services offered by industrial parks can moreover reduce small business market entry barriers and facilitate access to seed capital.

<sup>9</sup> GKTODAY, *Forward and Backward Linkages in Food Processing Industry* (2015), retrievable at: <https://www.gktoday.in/gk/what-are-forward-and-backward-linkages/>

<sup>10</sup> C. Xueyi et al, *Management Models of Industrial Parks in China* (2011)

<sup>11</sup> UNIDO, *Planning and Managing Industrial Parks*

<sup>12</sup> Ibid.

- f Economic experimentation and demonstration.** Industrial parks can serve as a test of economic reforms, new policies and approaches in a geographically-concentrated pilot area. Their demonstration effects can then, if successful, be replicated nationwide, along with the best practices drawn from these pilots and their demonstration effects then being applied to other industrial locations and businesses.
- g Community development.** Industrial parks, as local economic hubs and growth centres with certain positive externalities, can (when properly designed) serve as platforms for delivering on broader local community goals, such as local employment creation, as well as transportation services, education and training, health care, mail and communication services, and others.
- h Promoting environmental safeguards.** Industrial parks can offer the opportunity to decrease production costs through common infrastructure and systems, while also leading to increased materials, water and energy efficiency, including through waste recycling, water management and resource recovery. Eco-industrial parks can further reduce pollution and waste by applying pollution prevention, renewable energy, industrial symbiosis, and other environmental management methods and technologies<sup>13</sup>.

#### 1.4 EMERGING TRENDS AFFECTING INDUSTRIAL PARKS

Inclusive and sustainable industrial parks can, when appropriately implemented, be an effective policy instrument to promote industrialisation and the structural transformation it brings. While they primarily serve to overcome high production and transaction costs stemming from lack of infrastructure, along with the focused complementary interventions their industrial agglomeration facilitates, industrial parks can also help reduce information asymmetries, facilitate access to finance, and help to strengthen regulatory institutions<sup>14</sup>. By delivering these public goods and the accompanying policy interventions to support investment, industrial parks have been a catalyst in facilitating industrial development, including in East Asia's "tiger economies" and in China during the 1980s, as well as in Europe, the Americas and parts of South Asia since as far back as the 1960s<sup>15</sup>.

A number of important emerging trends are shaping the future of industrial parks. There has been a sharp increase in the number of industrial parks across the globe since the early 1990s, creating competition among countries and their parks in attracting investment, and a resulting pressure to offer ever better services. Furthermore, increasing urbanisation

and the growth of residential and mixed-use areas in or adjacent to industrial parks, has created pressure to better integrate them into their broader urban planning context. Moreover, better management of environmental externalities, in recent years, particularly in the context of increased awareness of climate change, has become an increasingly significant factor in business operations and decision-making for 'green growth' and resource-efficient 'circular economy' business models. Fourth and finally, the digital revolution presents opportunities for productivity gains at the firm and industrial park operational levels alike.

Indeed, over the last few decades, manufacturers around the world have undergone a profound transformation – in terms of structure, technology and sectoral interlinkages. Changes in consumer demand, the nature of products and the economics of production have all contributed to a fundamental shift in the way companies do business<sup>16</sup>, and to reshaping the competitive landscape for manufacturing. Such change can be expected to continue apace. Going forward, industrial parks should therefore take into account such emerging trends as follows:

#### ONGOING COMPETITION FOR FOREIGN DIRECT INVESTMENT

Since the early 1990s, there has been a sharp increase in the number of industrial parks across the world, especially in industrialising and emerging economies. According to the database of the International Labour Organization (ILO), the number of industrial parks worldwide increased from 29 in 1975 to 3,500 in 2006. Three out of every four countries have at least one industrial park<sup>17</sup>. Maintaining competitiveness amidst domestic and global competition will continue to be a critical issue for industrial parks, their developers and their operators. The future industrial park will likely be one with ever higher quality infrastructure, along with superior services and superstructure, as these competing parks all strive to best satisfy the demands of enterprises.

#### INTENSIFYING 'GREEN SHIFT'

Concern about environmental externalities is becoming an increasingly significant factor in business operations and decision-making. There is now a major emphasis on how to combine green growth with spatial planning initiatives. Furthermore, in order to curb environmental impacts and ensure productivity in resource-scarce environments, governments and businesses alike are looking to scale up resource efficiency and to implement cleaner production practices. Environmental considerations have therefore become a vital issue in the process of establishing new industrial parks as well as an impetus for retrofitting and upgrading existing ones to improve their environmental performance. These trends, and the environmental safeguards for the industrial zones they create, appear likely to become more and more accentuated over the coming years<sup>18</sup>.

#### INDUSTRIAL TOWNS

Industrial parks were traditionally built outside of the city limits due to lower land costs, the desire to avoid zoning incompatibilities with residential and commercial areas, and the ability to manage certain environmental externalities more effectively from such locations. Over time, however, many industrial parks have become industrialised towns or urban districts, as employees have settled in or near them. Adjacent areas have been transformed into towns and sometimes even cities, and local authorities have responded to this process by increasing urban services such as low-cost housing, medical care and education, as well as by allowing residential, retail and mixed-used zoning. The growth of commercial businesses and residential areas in or adjacent to industrial parks has meant that such places have taken on increasingly urban economic and social characteristics, with both the challenges and the opportunities that this presents for industry. Moreover, with rapid urbanisation all around the world, cities are expanding in all directions, such that industrial parks and their own boundaries have begun to meet and indeed blur.

These forms of urban development entail that industrial park development policies increasingly need to consider the implications and impacts of urban agglomerations, their features, and their requirements for sustainable development, as well as begin to incorporate these factors into their design and management approaches. This will ensure better integration between the parks and nearby urban centres and towns, not least as regards utilities, and social infrastructure and services.

<sup>13</sup> ADB, *Eco-Industrial Park Handbook for Asian Developing Nations*, (2001) and UNIDO, IBRD and GIZ, *An International Framework for Eco-Industrial Parks* (2017)

<sup>14</sup> UNIDO, *Regional Conference on Industrial Parks, Baku, Azerbaijan* (2012)

<sup>15</sup> J. Vidova, "Industrial Parks: History, their Present and Influence on Employment", in *Review of Economic Perspectives*, Vol. X, Issue 1 (2010)

<sup>16</sup> Deloitte, *The Future of Manufacturing: Making Things in a Changing World* (2015)

<sup>17</sup> "Special Economic Zones: Not So Special" in *The Economist* (2015)

<sup>18</sup> UNIDO, World Bank and GIZ (2017)

## DEEPENING DIGITAL TRANSFORMATION

Another important development over the last few years has been the digital transformation of society and its permeation into every aspect of industrial production. Digitalisation presents opportunities for enterprises that actively embrace the trend and make an effort to stay abreast of the productivity gains that digital technologies, web-based apps, ERP, robotics and AI can bring. Technologies related to Industry 4.0<sup>19</sup> will only further increase in global importance and further the ongoing re-organization of global value chains, notably through re-shoring and cross-shoring of FDI to locations where the know-how of the locally-available workforce is greatest. Exploring the advantages of current information technologies promotes the steady and rapid development of the big data industry and facilitates the growth of intelligent manufacturing, as well as smart industrial parks. By utilising cyber-physical system, big data and AI technology, smart industrial park solutions integrate the internal and external resources in the park; identify the real needs of the enterprises in the park and optimize management and smart services, such as smart office service, smart personnel service, smart transport services, smart building, intelligent property management, smart energy, etc.

Being well positioned to obtain direct feedback from foreign investors regarding their skills requirements, industrial park operators seem likely to increasingly intervene through collaborative platforms involving institutional partners from academia (chiefly in science, technology, engineering and mathematics), to swiftly design and deliver demand-driven training programmes to tomorrow's industrial park occupant enterprises.

## EMERGING CIRCULAR ECONOMY

By and large, traditional manufacturing has involved 'linear' production processes, where raw materials are used to make a product, with resulting by-products and wastes disposed of into the environment. Under this production system, the planet's finite raw materials will eventually run out, while waste will simply accumulate, either resulting in disposal expenses for the enterprises producing them or in pollution. In recent years, the concept and practices relating to the increasing advent of a more 'circular economy' have emerged as an innovative business model, responding to the challenge of the need for 'leaner production'. In the emerging 'circular economy', as much as possible everything is reused, recycled or used as a source of energy and, only as a last resort, disposed of.

Global companies such as Nike, H&M, Philips and IKEA are implementing aspects of the circular economy into their global business practices. National economies, businesses and employees alike will benefit, as they fill the new resource, energy and manufacturing niches created by the circular economy. In this overall context, as explained in these guidelines, the establishing of more eco-industrial parks can, for instance, help to extend the use of resources beyond the walls of any one single plant, with a view to ensuring their efficient use by groups of closely-agglomerated companies<sup>20</sup>.

## 1.5 OBJECTIVES OF THESE GUIDELINES

In many developing countries, industrial parks are seen as important tools for inclusive and sustainable industrialization, and therefore as a key to national progress on the Sustainable Development Goals (SDGs), in particular Goals 6, 8, 9, 11, 12 and 13<sup>21</sup>.

<sup>19</sup> Note: Industry 4.0 is a current trend in manufacturing that involves a combination of cyber-physical systems, automation and the Internet of Things (IoT), which together create a smart factory.

<sup>20</sup> UNIDO, *Circular Economy* (2017). [https://www.unido.org/sites/default/files/2017-07/Circular\\_Economy\\_UNIDO\\_0.pdf](https://www.unido.org/sites/default/files/2017-07/Circular_Economy_UNIDO_0.pdf)

<sup>21</sup> Sustainable Development Goals Knowledge Platform. *Transforming our world: the 2030 Agenda for Sustainable Development*. <https://sustainabledevelopment.un.org/post2015/transformingourworld>



- **Goal 6:** Ensure availability and sustainable management of water and sanitation for all;
- **Goal 8:** Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;
- **Goal 9:** Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;
- **Goal 11:** Make cities and human settlements inclusive, safe, resilient and sustainable;
- **Goal 12:** Ensure sustainable consumption and production patterns; and
- **Goal 13:** Take urgent action to combat climate change and its impacts.

It should be noted that industrial parks can contribute to the SDGs not only through socially and environmentally responsible industrialization within the parks themselves, but also by demonstrating what is possible to the rest of the country<sup>22</sup>.

In line with the SDGs, these guidelines aim to promote the development of competitive, inclusive and sustainable industrial parks through a comprehensive reference framework. The specific objectives of the guidelines are to:

- a **Support industrial park decision-making**, by enabling policymakers to ask the appropriate questions about their economy, their institutions and their policy context, in order to identify priorities, develop an effective set of policies, and evaluate the performance of industrial parks, as well as to support stakeholders in making appropriate decisions about establishing new industrial parks and/or retrofitting existing ones;
- b **Improve industrial park efficiency**, by enabling park developers and operators to design cost-effective and efficient management and operation systems, and providing alternative models specifying required infrastructure, services and regulatory offerings;
- c **Enhance industrial park competitiveness**, by enabling improved economic gains from industrial parks, through end-to-end planning, demand-based serviced industrial land development, sustainable infrastructure, and innovative investment mobilization strategies;
- d **Promote industrial park sustainability**, including clean and green production systems, by integrating environmental performance requirement priorities at the early industrial park conceptualization and planning stages; and
- e **Ensure industrial park inclusiveness**, by supporting the development of inclusive economic activity that empowers the people and communities where parks are located, especially those who are economically disadvantaged, to actively participate in the conceptualization, development, operations and, above all, the ongoing resident activity of industrial parks.

<sup>22</sup> UNCTAD, *Enhancing the Contribution of Export Processing Zones to the Sustainable Development Goals* (2015)

## 1.6 STRUCTURE OF THE GUIDELINES

The guidelines consist of nine sections:

**SECTION 1:** Having provided an introduction to the general trends related to industrialization and infrastructure, addressed conceptual issues around industrial parks and their public policy rationale, and set out these guidelines' objectives, sets forth the guidelines' scope and structure, how these were developed and how they may be used.

**SECTION 2:** Highlights best practices related to industrial park planning, including as regards business case assessment, formulation and decision-making, location/site selection, and the conduct of feasibility studies.

**SECTION 3:** Sets out the best practice elements that all strategies for setting up industrial parks should contain, including as regards land acquisition, master planning, engineering design, environmental and social assessments, construction, as well as the selling or leasing of plots and factory/warehouse shells.

**SECTION 4:** Defines the roles and responsibilities of industrial park management entities in ensuring the efficient operation of an industrial park, for instance as regards waste and energy management and stakeholder coordination.

**SECTIONS 5 AND 6:** Introduce the basic facets of investment marketing, promotion strategies and policy framework in the context of industrial parks, including the critical issues of industrial park investor targeting approaches, investment incentives and supporting investment facilitation.

**SECTION 7:** Identifies and summarizes potential industrial park risks and proposes risk management strategies to mitigate them.

**SECTION 8:** Outlines key indicators for monitoring the performance of industrial parks.

**SECTION 9:** Provides some conclusions on the above aspects of industrial park establishment and operations, as well as some ideas on the way forward for this important economic, social and environmental policy tool.

## 1.7 SCOPE AND METHODS OF DEVELOPMENT

These guidelines were prepared by UNIDO's Cross-Disciplinary Team on Industrial Parks (CDTIP) by bringing together UNIDO's technical experience and international best practices in developing and implementing industrial park projects.

The literature on the subject was extensively reviewed, as were earlier UNIDO studies, tools and technical cooperation projects, and form the core drivers of the guidelines. In addition, information from field visits, meetings with park managers, regulators and government representatives, case study research on

industrial parks practices in Ethiopia, Peru and China, as well as feedback from an external review group were incorporated herein.

The guidelines have been designed in such a way as to be practical. The guidelines' recommendations are relevant to both new and existing industrial parks in various international contexts, with a core focus on developing and transition countries. It can be used for all development stages of industrial parks and different types of parks. They address core areas such as industrial park planning and design, construction, park operations, marketing & investment promotion, environmental impact and energy management.

The guidelines can, moreover, be used in conjunction with earlier UNIDO framework documents relating to industrial parks, including:

- UNIDO, IBRD and GIZ, A Practitioner's Handbook for Eco-Industrial Parks: Implementing the International Eco-Industrial Parks Framework (2018);
- UNIDO, Implementation Handbook For Eco-Industrial parks (2017);
- UNIDO, World Bank Group, and GIZ, An International Framework For Eco-Industrial Parks (2017);
- UNIDO, Industrial Estates: Principles and Practice (1997); and

- UNIDO, Guidelines for Establishment of Industrial Estates in Developing Countries (1978).

These guidelines are not a policy-making nor an urban planning report, but rather a technical study, and are not intended to cover topics such as legislation, urban planning, financial modelling and closure in-depth. It bears note that it is UNIDO's intent that these guidelines should also provide the basis for the future development of manuals, standard operating procedures, training materials and other guidance documents related to industrial parks.

## 1.8 USING THE GUIDELINES

Given that industrial parks can promote investment, create employment and foster economic growth that is also environmentally sustainable and socially responsible, the government decision-makers, the private sector, academia and other social stakeholders alike should all be empowered to participate in the

design of their overarching policy framework, as well as in its implementation. These guidelines are therefore intended to be used and applied by a variety of stakeholders with an interest in industrial parks, including:

- a PARK REGULATORS:** who create industrial parks' regulatory framework, oversee and assure the quality of their planning, implementation and operation, as well as the resident activity therein, so that they may more effectively prioritize policy decisions based on applying ISID principles in industrial parks, supporting and incentivizing these initiatives and, most importantly, monitoring and evaluating the results they achieve;
- b PARK DEVELOPERS:** so that they may take advantage of opportunities to enhance the planning and setting up of industrial parks, as well as reduce the associated risks and, in this manner, establish industrial parks that better respond to the demands of enterprises, ensure appropriate financing is available for their project, and deliver best practice infrastructure and services;
- c PARK OPERATORS:** who provide services and support to residents on a day-to-day basis, so that they may provide said services in an improved and more coordinated manner;
- d TENANTS:** so that they can make informed investment and funds allocation decisions, and reduce their production costs, while ensuring environmentally-sustainable and socially-responsible operations; and
- e STAKEHOLDERS AND PARTNERS,** such as multilateral development agencies, financial institutions, and other development partners - so that they can provide effective financial and non-financial support to existing and new industrial parks alike.



# 2

## Industrial Park Planning

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Industrial park development involves careful planning and oversight. The principle steps in planning an industrial park include:



Business case formulation, including through pre-feasibility studies about preliminary investor needs and the appropriate industrial park value proposal, as well as on the industrial park's proposed conceptual master plan and financial model.

Pre-identification of the shortlist of suitable park location/sites based on pre-feasibility studies, including logistics connectivity assessments, and basic environmental and social assessments of these sites.

Detailed feasibility analysis of the selected site, including refined market research and investor demand analytics, full environmental and social assessments, site master-planning and financial modelling.

Financial structuring and agreement with appropriate financial backers and institutions<sup>23</sup>.

## 2.1 BUSINESS CASE DEVELOPMENT AND DECISIONS

Industrial parks offer governments a potentially valuable tool to overcome some of the existing constraints that their economies face in attracting investment. For their developers and the business clients they serve, they can offer the possibility of attractive financial rewards. To serve any of these purposes, the parks must however be built on a business case that demonstrates why serviced industrial lands are needed and what the benefits of the industrial park project will be when it is finalized. The business case should be prepared early in the project cycle before any decision is made to initiate the project. A carefully developed business case must examine both the project's opportunities as well as its risks, and convincingly detail the project's rationale.

In many developing countries, insufficient attention is given to proper business case development and industrial park positioning, creating a "gap" between what firms need and what parks actually offer.

*It is critical that park programmes be market-driven, and that they respond to actual investment demand and investor needs. A "build it and they will come" approach only works in those exceptional cases where there is significant latent investor demand for industrial land in the host economy and the industrial park location matches these firms' expectations<sup>24</sup>.*

Demand forecasting is a complex and uncertain exercise that requires the activities listed below:

- a Assessment of investment and trade patterns at global, regional and national levels. This analysis provides a clear sense of the sectors that will constitute the bulk of investment, and of emerging trends (Industrial sector specification and investment selection methods are presented in Section 6)<sup>25</sup>;
- b Assessment of sources of comparative advantage in the country as a whole and in the region where the park is located, such as appropriate and abundant labour, preferential access to key markets, land resources, etc.;
- c Incorporating direct input from existing and potential investors, through surveys, focus group discussions and interviews, in order to understand their investment location decision-making process, the criteria that will drive it and their needs in terms of serviced industrial land;
- d Benchmarking, by comparing the proposed industrial park against alternative location options, both within and outside the marketplace, in order to properly compare investor options in this context, their costs, services and other characteristics; and
- e Government decision-making, aimed at providing the required political and social consensus, as well as the necessary political, programmatic and resources commitment and to support to the establishment of industrial parks, through a formal industrial parks policy<sup>26</sup>.

Strong industrial park business case definition, and successful industrial park planning, development and operations, require input from numerous stakeholders and integrating the work of diverse professionals, such as engineers, urban planners, economist, monitoring and evaluation team, etc. Identification and engagement with these various stakeholders early on will ensure that the broadest possible set of viewpoints guides the definition

of the characteristics, as well as the planning for industrial parks projects. A common understanding of the project's objectives, how various stakeholders' contributions interact and intersect with one another, and how they come together, are vital to both strong business case definition and to the eventual integrated planning process that must follow therefrom<sup>27</sup>.

## 2.2 PRE-FEASIBILITY STUDIES

A pre-feasibility analysis establishes a broad perspective upon which to base an assessment of the overall potential of any industrial park project, and to guide decision-makers as to whether the project is technically, financially, economically, socially and environmentally sound. It also allows the proposed projects to be positioned within the contexts of the national, regional and international competition, and relevant market trends.

Although an initial assessment (preceding any "deeper dive" full feasibility studies, if deemed appropriate), a pre-feasibility study will usually make use of more widely available statistical data sources nevertheless,

supplemented by field data collected for the specific purpose of the study itself, and more qualitative information gathered through interactions with public authorities and enterprises. Data on such variables as labour supply, income level of the consumer base, and the nature of existing enterprises present in the targeted market are significant indicators of the potential sustainability of potential industrial parks, as are the studied market's economic activity levels, key economic sectors, population, infrastructure facilities and legal framework. Pre-feasibility studies generally cover similar subjects as feasibility studies but do so in less detail. As a rule, pre-feasibility studies provide guidance in the following areas:

<sup>23</sup> Industrial parks funding arrangements range from traditional financing through direct or indirect public sector investment to capital market instruments such as issuing stock, bonds or trust product to a project financing model through public-private partnerships (PPP). These Guidelines will not go into the in-depth technical detail of explaining the financing models for industrial parks.

<sup>24</sup> World Bank, *Special Economic Zones in Africa: Comparing Performance and Learning from Global Experience* (2011)

<sup>25</sup> Ibid.

<sup>26</sup> Gujarat Industrial Development Board website: <http://www.gidb.org/industrial-parks-demand-supply-scenario>

<sup>27</sup> ADB, *Eco-Industrial Park Handbook for Asian Developing Countries* (2001)



**LOCATION/SITE SELECTION:** Comparing alternative sites that are potentially suitable for establishing an industrial park, in the contexts of their relative market suitability, connectivity or linkages for transport, power, water, etc. and cost feasibility;



**MARKET/INDUSTRY IDENTIFICATION AND FORECASTS:** Assessment of the sectoral niches likely to be attracted to the proposed industrial park, as well as their country of origin, expectations and needs;



**DEMAND PROJECTIONS:** Projecting anticipated sector specific demand for an industrial park based on historical investment patterns and current trends internationally, nationally and in the prospective location, and industry and comparator country benchmarks in terms of space utilization, providing for: (i) analysing the sector's competitiveness; (ii) estimates of the amount of project investment and industrial land demand required for an industrial park, (iii) a sense of the infrastructure and service requirements, and (iv) the resulting scale of the project's costs and revenues;



**FINANCIAL ANALYSIS:** Modelling the costs and revenue streams of the potential industrial park project, based on its expected demand and conceptual master plan, exploring a range of possible financing structures, mechanisms, and funding sources;



**POLICY ANALYSIS AND STAKEHOLDER MAPPING:** Considering the existing policy, legal and regulatory environment in which the project would be grounded, and providing a high-level overview of the institutions and stakeholders, identifying any opportunities for differentiation that these conditions may provide for the project and its potential investors, the constraints and challenges they pose, and informing any possible reforms that might be considered in the same context;



**SAFEGUARDS ASSESSMENT:** Evaluating the social and environmental considerations for the proposed industrial park with respect to relevant national requirements and international commitments, providing a proposed impact mitigation and management strategy, and influencing the demand and investment costs for the park as well as its competitiveness<sup>28</sup>; and



**ECONOMIC IMPACT PROJECTIONS:** Modelling the anticipated economic impacts of establishing the proposed industrial park in terms of investment, public finance expenditures, jobs, net exports, tax revenues and foregone revenues, and other factors, based on the results of the demand and financial analysis.

## Site Selection

Location and site selection are amongst the most critical steps in designing an industrial park as they have implications in terms of “industry fit”, demand levels, project costs and the overall potential for the project's success.

The choice of a location should be made in the context of a broader geographical area responding to identified general market parameters and requirements, within which several alternative

specific sites are considered, for instance in terms of the transportation time and cost considerations. Some of the other factors influencing the identification of a location include government master plans, available infrastructure services, geophysical conditions and the natural environment. Amongst others, industrial park promoters should take the following considerations into account when choosing the most appropriate location/site for their proposed project:

- a Locations where there is meaningful investor interest, (at least incipient) economic activity and clustering dynamics, proximity to supplies and services, the presence of an appropriately-skilled workforce, logistical connectivity and cost efficiencies;
- b Compliance with national and local master-plans, urban plans, land use plans, and agricultural/residential/commercial and industrial zoning classifications and requirements;
- c Cost of site development and construction, based on topography and access;
- d Transportation connectivity or linkages, utility linkages and proximity to social infrastructure and assets, including residential communities, commercial and retail areas, schools, police and fire stations, hospitals and clinics, and places of worship;
- e Avoidance of environmentally and culturally sensitive areas, protection of the natural ecosystem and promotion of the rational management of heritage;
- f Building in sustainability strategies right from the site selection stage, since energy sustainability considerations should, for instance, ideally include an energy-efficient location choice;
- g Maximization of user access to sustainable and affordable energy supplies, water services, telecommunications, transportation infrastructure and nodes, and other utilities;
- h Seeking, where possible, to redevelop previously-developed property rather than breaking fresh ground, in order to capitalize upon and leverage under-utilized assets for maximum project impact; and
- i Engaging stakeholders and the local community in a well-coordinated manner, to ensure their concerns are taken into account and properly managed<sup>29</sup>.

Some considerations are critical. Industrial parks, for instance, are all usually located close to transport facilities, especially where more than one transport modality exists<sup>30</sup>. Similarly, a viable nearby market for the products and services available in the industrial park is generally important for the successful creation and operation of park enterprises and the industrial park's long-term commercial viability, unless the activity is primarily export-oriented. The relative importance of certain other factors or parameters differs however based on the type of targeted industries. Heavy industries - such as chemical industries or raw material processors - thus require

locations that possess an abundant and cost-effective energy supply.

Labour-intensive industries, in contrast, are usually attracted to low-wage areas, whereas capital-intensive industries tend to be attracted to areas with a skilled and well-trained labour force. Moreover, the skill level distribution of the workforce itself usually depends on the quality of schools and the availability of vocational-technical training programmes<sup>31</sup>. The same is true of knowledge-intensive industries, as demonstrated in Box 1.

<sup>28</sup> UNIDO, World Bank and GIZ, *An International Framework for Eco-Industrial Parks* (2017)

<sup>29</sup> Australian Government, *Guidelines for Industrial Development* (2010)

<sup>30</sup> K. Kim, *Industrial Parks in Korea - Outline and Recent Policy* (2008)

<sup>31</sup> Ibid.

The guidelines on Good Practices for Science and Technological Parks prepared by the European Commission has identified the following parameters for site selection for science parks:

- Proximity to the knowledge base; the closer the site is located to knowledge-based organizations, the easier it is to forge strong linkages between residents and members of the knowledge base.
- Visibility; particularly in the early stages of a science park when it needs to overcome lack of awareness, visibility in a prominent location helps promote it more effectively.
- Accessibility; it is essential that a science park offer easy access by a variety of means of transport.
- Size; when planning a science park, it is helpful to have a large enough site to accommodate significant growth. Demand assessments will however help to determine the appropriate size.
- Availability for science park purposes; the site has to have planning conditions and ownership status that allow the park to be developed within a foreseeable time schedule and without undue physical constraints.
- Potential for green space, water features and landscaping; science parks are characterized for low-density development and generous landscaping, making them pleasant locations to work.
- Value and price; the site's value or its purchase price will be a key consideration in exploring the financial viability of the scheme<sup>32</sup>.

Box 1: Site Selection Criteria for EU Science and Technology Parks

Regardless of sector-specific considerations, the selection of an optimal industrial site is generally tied to the factors included in Table 2 below:

No.	Critical Success Factor	Evaluation Parameter
1	LAND STATUS	<ul style="list-style-type: none"> <li>▪ Availability;</li> <li>▪ Clean and clear title;</li> <li>▪ Land price;</li> <li>▪ Time required or other challenges in acquisition;</li> <li>▪ Cost of development.</li> </ul>
2	CONNECTIVITY	<ul style="list-style-type: none"> <li>▪ Distance of identified site from the nearest commercially relevant rail lines, highways, airport, dry ports, and/or sea or river ports;</li> <li>▪ Distance from major population and distribution centres, offering both markets and potential labour pools.</li> </ul>
3	RAW MATERIALS AND SERVICES	<ul style="list-style-type: none"> <li>▪ Availability of commercially-relevant raw materials in area, in country, or ease of access to them;</li> <li>▪ Proximity to service providers.</li> </ul>
4	PHYSICAL FEATURES	<ul style="list-style-type: none"> <li>▪ Plot size and shape;</li> <li>▪ Topography, including grading and drainage conditions;</li> <li>▪ Soil conditions;</li> <li>▪ On-site above-ground and/or underground water resources;</li> <li>▪ Accessibility.</li> </ul>
5	INFRASTRUCTURE	<ul style="list-style-type: none"> <li>▪ Industrial power, gas and renewable energy sources;</li> <li>▪ Communications network;</li> <li>▪ Water for industrial use;</li> </ul>

<sup>32</sup> EU Commission, *Setting Up, Managing and Evaluating EU Science and Technology Parks* (2013)

		<ul style="list-style-type: none"> <li>▪ Potable water (wells, boreholes, reservoirs, tanks, pipelines);</li> <li>▪ Industrial and household sewerage disposal, effluents and storm water collection, disposal and treatment points.</li> </ul>
6	ENVIRONMENTAL AND SOCIAL FACTORS	<ul style="list-style-type: none"> <li>▪ Site-specific environmental rules and guidelines;</li> <li>▪ Site-specific construction rules and guidelines;</li> <li>▪ Adjacency considerations regarding surrounding areas;</li> <li>▪ Workforce availability and characteristics;</li> <li>▪ Local government and civil society support and commitment.</li> </ul>
7	BUSINESS CONSIDERATIONS	<ul style="list-style-type: none"> <li>▪ Business presence in area;</li> <li>▪ Business interest, as registered by relevant major trade associations and chambers of commerce;</li> <li>▪ Presence of complementing facilities and services;</li> <li>▪ Presence of competing facilities;</li> <li>▪ Operational &amp; utility delivery costs;</li> <li>▪ Supporting business environment such as affordable labour force, presence of nearby central and local government services and single-window facilities.</li> </ul>

Source: UNIDO (2016)

Table 2: A Typical Parameter Matrix for Site Selection

In all cases, in order to ensure site selection is properly conducted and ensures the highest probability of industrial park success, the following strategies should be applied and activities carried out<sup>33</sup>:

- Developing site selection and ranking criteria in such a way as to allow sites to be progressively evaluated from broader to more specific considerations, from country to regional level factors, and from regional market considerations to the attributes of specific sites;
- Gathering appropriate GIS and site screening data for the identified areas, including concerning:
  - Ownership status and title;
  - Administrative boundaries;
  - Presence of developed/built-up urban areas;
  - Settlements and residential areas within the influence zone;
  - Land use zoning classifications;
  - Shape of land, potential industrial usage and usable area;
  - Development cost;
  - Existing factories nearby;
  - Public rights of way;
  - National highways, major roads and minor roads, railway lines, light rail and subways, airports and airfields, sea and river ports, quays and jetties, etc.;
  - General topography and grading (e.g., slope) of land under consideration;
  - Hydrology - rivers, lakes, streams and water bodies;
  - Meteorological characteristics (including average rainfall, wind directions and speeds);
  - Presence of agricultural land, wetlands, mangroves, protected lands, national parks and forest areas;
  - Educational facilities and institutions, police and fire stations, hospitals and clinics, commercial/retail areas, and places of worship;
  - Location of power sources (sub-stations, transmission lines, power distribution grids, gas pipelines, gas “city gates”, etc.); and
  - Location of water sources (intake wells, boreholes, reservoirs, water distribution networks).

<sup>33</sup> UNIDO, FAO, UNDP, Italian Development Cooperation and Ethiopian Ministries of Industry, Agriculture, and Finance and Economic Cooperation, *Feasibility Studies for Four Pilot Integrated Agro-Industrial Parks*, as summarized in UNIDO, *Integrated Agro-Industrial Parks in Ethiopia*, CPC Ethiopia (2016)

- c Political (both national and local) support;
- d Legal feasibility of development of the various shortlisted candidate sites;
- e Basic investor interest assessment and ranking of the various shortlisted sites, based on qualitative and/or survey data;
- f Preliminary financial analysis of the various sites, in order to evaluate the feasibility and the relative financial merits of each option;
- g Preliminary socio-environmental assessment and ranking of the considered sites;
- h Confirmation of local government interest and support for the project; and
- i Final selection and endorsement.

### 2.3 FEASIBILITY STUDIES

Any final decision to establish and finance an industrial park should only be made after conducting a reliable and site-specific full feasibility analysis with clearly supportive conclusions.

Comprehensive and detailed market identification and demand projections, properly scaled and phased master plans, technical designs, project costs and benefits analysis, social and environmental

assessments, institutional mapping and governance system analyses, off-site and on-site infrastructure requirement assessments and development plans, financial modelling and structuring plans, as well as economic impact modelling, are crucial to any final positive determination to proceed with an industrial park project<sup>34</sup>.

The key elements of feasibility studies include, but are not limited to, the following:

- a Business plan, including definition of the industrial park site and its location, its logistical positioning (as backed up by appropriate transport economics and logistical study annexes), its overall value proposition for users, its competitive market positioning and factors for differentiation (as backed up by a benchmark analysis), its proposed services and amenities, any investment incentives to be provided by law (as backed up by a regulatory study annex, discussing market failures and policy responses), as well as its basic land and services pricing strategy for industrial park users. It also involves preparing a conceptual masterplan and zoning plan, subdivision plan, utilities plan, amenities and specialized infrastructure plan<sup>35</sup>.
- b Technical assessment and plans, which describe the site’s physical context, the project’s geo-technical specifications, its resulting engineering and architectural plans, and the transportation management plans.
- c Analysis of the latent and phased investor market potential, including identification of the sectors likely to drive investment and occupancy within the park, the competitors and the degree of competition, critical investment and production trends in the target sectors, projected volumes and ramp-up timeframes for investment, the sales projections (including for exports) and the prospective markets, and the resulting land take-up/absorption projections impacting the project’s revenue modelling. It also involves identifying promotional vectors for the marketing campaign, potential market threats and the various ways to overcome them.

<sup>34</sup> Details on feasibility study preparation can be found in: UNIDO, *Manuals for the preparation of industrial feasibility studies* (1991)

<sup>35</sup> Note: Detailed planning is prepared during feasibility studies.

- d Financial modelling and projection of funding needed, including project capital and operational expenditures, revenue streams and Return on Investment (ROI), as primarily captured through Net Present Value (NPV), Internal Rate of Return (IRR) and discount rate. In addition, the financial model should contain an analysis of available sources of capital and of the project’s proposed financial structuring model, as well as the financial sustainability and financial stakeholder risk-sharing mechanism. While numerous factors have the potential to influence the project’s overall cost, this will ultimately depend on the size of the industrial park and the type of facilities provided, as informed by the prior demand forecasts and the master-planning and design work. Industrial park projects can be financed through direct or indirect public sector investment, including through direct allocation of national budget or indirect investment through public enterprises, commercial debt financing (backed by Sovereign Guarantees or not) or equity. Although the primary project offtake or revenue stream is derived from plot and facilities rental (or land sale) income collected from the users, various other industrial park “value added services” can also prove interesting as supplementary revenue streams.
- e Economic impacts study, including “overall value chain” competitiveness; projected investment levels and their breakdown (by sector, origin), induced employment and fiscal impacts; impacts on country policies on poverty reduction, food security and rural transformation; public expenditure requirements (including through subsidies and other forms of financial support); trade impacts; and overall Economic Rate of Return (ERR) and Economic Value Addition (EVA) modelling.
- f Definition of the service delivery model, and corporate and legal structure for the proposed industrial park, including details of the nature of the corporate vehicle that will be used to develop and operate the industrial park, the extent of participation from the public and private sectors in it, and their respective roles and responsibilities in terms of the design, the financing, the ownership, the development and the operation of the project. The basic constituent elements involved (i.e., Design, Build, Finance, Own and Operate) can be shared in many different ways between project sponsors, as demonstrated in Figure 2 below:

REGULATOR	DEVELOPER	OPERATOR	OWNER/ SPONSOR
<p><b>Public entity / Government body</b></p> <ul style="list-style-type: none"> <li>▪ Designates land as parks;</li> <li>▪ Facilitates government services and coordinates public agency inputs to/within industrial parks such as utilities;</li> <li>▪ Monitors and enforces compliance.</li> </ul>	<p><b>Private, public or public-private partnership (PPP) entity</b></p> <ul style="list-style-type: none"> <li>▪ Owns, finances, designs, plans, and manages development of industrial park basic infrastructure;</li> <li>▪ Develops land (grading, leveling, construction) and provision of basic infrastructure such as internal road networks, drainage and sewerage, etc.</li> </ul>	<p><b>Private, public or public-private partnership (PPP) entity</b></p> <ul style="list-style-type: none"> <li>▪ Manages day-to-day services to users;</li> <li>▪ May or may not be same as developer;</li> <li>▪ Facilitates marketing;</li> <li>▪ Facilities management, leasing and maintenance;</li> <li>▪ Utilities maintenance;</li> <li>▪ Provides value-added services;</li> <li>▪ Provides or contracts for solid waste removal and treatment, maintenance, security, etc.</li> </ul>	<p><b>Private, public or public-private partnership (PPP) entity</b></p> <ul style="list-style-type: none"> <li>▪ Owns site land;</li> <li>▪ Performs strategic planning;</li> <li>▪ Initiates park development;</li> <li>▪ Pays all or part of the cost of park development.</li> </ul>

Source: Adopted from FIAS “SEZ Practitioners Guide”

Figure 2: Key Industrial Park Stakeholders

Until the 1990s, government bodies in many developing countries often carried out all these roles simultaneously. The overlapping government mandates became problematic following the private sector’s growing participation in park development, creating a conflict of interest and an “un-level playing field” as the government was simultaneously responsible for regulating private parks, and for operating, financing and promoting its own competing parks, thus creating a conflict regarding equal treatment under the law. A practical approach to mitigating this conflict of interest, at least in part, is to institutionally separate the regulatory role as much as possible from the roles of owners, developers and operators<sup>36</sup>.

<sup>36</sup> World Bank, *Institutional Best Practices for Special Economic Zones: An Application to Tanzania* (2011)



**5g** Environmental and social assessments and plans regarding the proposed site, including a full description and analysis of the site's socio-environmental context, with all the associated risks and anticipated impacts, so as to plan and programme mitigation measures aimed at averting environmental degradation and protecting the interests of the population affected by the park's development. This dimension of the feasibility studies assesses the project's effects on the ecosystems, the people, the properties, the heritage sites and social services in the host and adjacent communities, and proposes associated management and, where appropriate, rehabilitation and/or compensation plans. The environmental assessment covers baseline data regarding site soil and hydrology characteristics, and projects' anticipated impacts on air quality, noise levels, water quality, etc. It should furthermore provide, as appropriate, for sufficient connectivity and/or buffer zones to maximize the off-site and on-site synergies for adjacent communities. On the social safeguards front, the assessment and plan must also ensure that the project considers the project's social impacts in terms of employment, community welfare and inclusion, safety, heritage and identity<sup>37</sup>, through a proper Socio-Environmental Management Strategy.

The overall purpose of this body of feasibility work is to result in an evidence-based final go/no-go decision regarding whether or not to proceed with the project.

## 2.4 FEASIBILITY ANALYSIS TOOLS

UNIDO's "Computer Model for Feasibility Analysis and Reporting" (COMFAR) tool may be worth consideration by potential industrial park sponsors and developers in support of their feasibility analysis work. COMFAR comprises manuals, teaching materials and software aimed at supporting the project's identification and preparation processes. It also offers specialized modules on such specialized topics as Clean Development Mechanisms (CDMs) and on Environmental Management. Currently, three COMFAR versions (COMFAR III Expert, COMFAR III Business Planner and COMFAR III Mini Expert)<sup>38</sup> are available to public and private stakeholders alike. COMFAR III Expert can be used to support both new as well as expansion projects, with a scalable planning horizon of up to 60 years.



<sup>37</sup> Australian government, *Guidelines for Industrial Development* (2010)

<sup>38</sup> UNIDO provides regular training courses on financial analysis of investment project scenarios with application of COMFAR software. More information on COMFAR can be accessed at: <https://www.unido.org/resources/publications/publications-type/comfar-software>





# 3

## Industrial Park Land Acquisition, Design and Development

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Some of the typical activities of an industrial park developer are outlined in Table 3 below:

- Land acquisition, transfer and/or parcel assembly;
- Master planning, including topography, contour surveys and geotechnical investigations, as well as the preparation of internal building and development control guidelines;
- Negotiation and conclusion of government and other institutional partnerships, as applicable, including any associated memoranda of understanding and/or agreements;
- Securing statutory approvals and permits, notably including ESIA approvals;
- Obtaining access to external water, gas, telecommunications, and power supply connections; and
- Development of internal utilities distribution networks and specialised industrial facilities.

Table 3: Phased, One-Off Implementation Activities of Industrial Park Developers

### 3.1 ACQUISITION OF LAND

The development of an industrial park requires the acquisition of a plot of land of the appropriate size, based primarily on phased occupancy demand projections, but also large enough to accommodate facilities and associated manoeuvring areas with an efficient building layout, right-of-way and greenspace. The size of the plot depends on the planned number of enterprises, the requirements for ready-made factory shells and the extent of the common infrastructure and services needed on the site, as well as surface buildout ratios and setbacks.

The process for obtaining land may differ by city, province, or region within countries, and the acquisition process can take different forms depending on the region's land ownership policy. Land ownership can be purely private, joint or state-owned. In some countries, the government provides land to industrial park developers free of charge or at a minimum cost as part of an incentive package, whereas in other countries the land is sold, made available on a concession basis or leased, under varying terms and conditions.

The relevant considerations in land acquisition include the following:

- a Preference for parcels held by one or a few owners or that do not require assembling parcels, in order to avoid delays during the acquisition process;
- b Consideration of possible future expansion, in terms of site size and zoning;
- c Environmental and social impact considerations;
- d National legislation and by international guidelines and practices regarding acquisition and/or expropriation;
- e Integration with local and regional planning; and
- f Consideration of ancillary industries.

## 3.2 SITE MASTER PLANNING

### 3.2.1 Planning Principles and Considerations

Industrial parks development should be based on well-defined master plans.

Master planning has a lasting impact on how an industrial park develops, operates and is integrated into surrounding areas and communities. It defines the connection between the topography, land use,

infrastructure, public right-of-way, buildings, social settings, and their surrounding environments<sup>39</sup>. Master plans should be prepared based on existing public plans, as well as new site-specific surveys, investigations and analysis. Proper comprehensive master plans start with a feasibility study.

The master plan should cover most of the following elements to ensure an overall successful design:

- a Lay down long-term vision and a broad planning framework, with international site competitiveness in mind;
- b Address the target industries' specific needs;
- c Focus on integrated infrastructure – with an emphasis on environmental management, utilities and inclusive social infrastructure;
- d Optimal utilization of available land;
- e Flexibility in designing the built environment;
- f Synergies of co-location, circularity and industrial symbiosis (the exchange of industrial by-products, heat and process waste and by-products among closely-situated firms);
- g Synergies of collocation of ancillary and symbiotic industries
- h Mixed land use;
- i Conservation of important natural features;
- j Enhancing physical connectivity to adjacent communities and regions;
- k Use of renewable energy sources and energy conservation;
- l Phasing of the project;
- m Integrate with regional and local planning; and
- n Compliance with planning norms and guidelines<sup>40</sup>.

### 3.2.2 Preparing Site and Plots Layout

The industrial park's layout plan is essentially the physical portion of the development plan. It indicates the location of the major facilities that are to be provided by the developer and sets the general pattern for the site.

The layout should be designed with a full understanding of the site development phasing programme in mind. The objective of phasing is to ensure investments in

infrastructure are in accordance with market needs. Indeed, different components of the industrial park will need be constructed at different times. The anticipated demand and use, project development phasing, and associated investment requirements must therefore be modelled and analyzed for each phase of development. The site's various phases must moreover be carefully designed so as to integrate with

<sup>39</sup> World Bank, *Regenerating Urban Land: A Practitioner's Guide to Leveraging Private Investment* (2016)

<sup>40</sup> LandT-RAMBOLL Consulting Engineers, *A Presentation on Site Master Planning – Examples from India*, International Conference on Eco Industrial Parks, Hyderabad (2009)

one another and provide continuity. During the first phase of any industrial park development, the focus should thus be on basic infrastructure, as well as limited ready-built, sustainable industrial structures or factory shells.

The layout should provide as much flexibility as possible. It must also be adapted to the site's topography, so as to take full advantage of drainage, vistas, cost of buildout and other considerations. Plots

should be regular in shape to provide for efficient use of the site. Plots should also be appropriate for a range of industrial and business uses.

There are no set rules regarding the size of the plots, as it should be determined based on demand analysis, as well as on the common infrastructure and services needed on site. An appropriate layout will achieve the following:

- a Create suitably-sized plots that are functional, accessible, accommodate future expansion and enhance the local character;
- b Provide for a diversity of plot sizes and uses;
- c Protect and enhance environmental and landscape features, and address the site's constraints;
- d Maximize passive solar design through plot orientation;
- e Adhere to mandatory requirements;
- f Parcellation suitable to target industries;
- g Development phasing based on market demand;
- h Non-processing areas to be incorporated; and
- i Flexibility of master plan<sup>41</sup>.

### 3.2.3 Zoning within the Park

Industrial parks should be configured and organized in accordance with the expected uses of the land within them; this form of spatial organization and planning is known as “zoning”. It is always an advantage for an industrial park to have different zones for different types of industrial and non-industrial activities. The relationship between industrial, residential (e.g., multi-format worker housing, hotel and guesthouse, etc.), commercial, administrative, social and recreational zones, and the expanse and intensity of each use, significantly impacts the project. Zoning

helps by encouraging on-site economies of scale in utilities infrastructure concentration and utilization, for instance as regards waste collection and treatment, wastewater recycling, internal transport networks and other amenities. It also smooths vehicular and pedestrian circulation by enabling clear movement patterns.

Segregated internal zones such as the following are typical in an industrial park context:

- a Industrial zones for targeted sectors - these include industrial plots, industrial factory shells, and multi-story industrial units for non-polluting or medium-polluting industries;
- b Amenities zones - these cover information centres, training centres, R&D facilities, clinics, administrative buildings, shopping centres, fire stations, weigh stations, fire stations, etc.;

<sup>40</sup> Note: square or rectangular layouts offer the greatest flexibility and accommodate the most users.

- c Special infrastructure zones - these cover certification laboratories, quarantine services, market intelligence unit, etc.;
- d Logistics zones - these cover loading and unloading yards, parking lots, packaging facilities, transportation hubs, cargo-handling centres, raw material collection and storage depots, goods storage warehouses, etc.;
- e Utilities zones - these cover solid waste collection centres, electrical sub-stations, CETPs, etc.;
- f Residential zones - these cover multi-format worker housing, guesthouses and hotels, etc.; and
- g Green zones - these cover green belts and buffer zones along the park's boundaries, lawns, parks and water features, internal walkways between zones, etc.

Industrial park zoning maps are prepared based on such key site parameters as boundary (perimeter) shape, physical site features, area availability, environmental considerations, micro climatic conditions, compatibility issues, surrounding areas, accessibility, transportation issues and visibility. Existing and adjacent land use are also critical considerations in deciding on nearby and future on-site land uses and zoning.

Zoning within the park can be designed furthermore in such a way as to encourage industrial symbiosis for the utilization of materials, industrial water and energy by-products. Energy efficiency optimisation can be attained by stimulating and facilitating ‘energy symbioses’ and cooperation amongst residents. Surplus energy (e.g., heat, electricity, steam, hot

water, biogas, etc.) from a plant can be transferred to other companies, either within the park or in nearby communities. Segregating polluting and non-polluting activity is another sound zoning practice. Internal park uses, for instance, can be clustered within the park according to three broad waste generation and toxicity brackets: (a) high toxicity (e.g., firms producing, or extensively storing or using, paints, dyes, solvents, pharmaceuticals, etc.); (b) medium toxicity; and (c) low or no toxicity (e.g., green areas, composting, organic gardening and farming, etc.). All units producing liquid waste can also be located together so that their waste can be collected and treated in a single plant<sup>42</sup>, enabling economies of scale and efficiencies both in terms of the investments in and operation of associated treatment systems.

### 3.2.4 Infrastructure Assessment and Planning

An industrial park provides concentrated critical infrastructure to support the development of the industrial sector in general and, sometimes, of targeted industries in particular. It is important to bear in mind that an industrial park's infrastructure requirements may vary based not only on the type of industries likely to invest at the site, but also based on the previously-existing infrastructure on-site or in the vicinity<sup>43</sup>.

In addition, social and commercial amenities may be required in order to make required conveniences available to the industrial park's working population and its visitors. It is particularly important to

ensure security in this context, and to create a safe environment for the people living in and around the industrial park. It is important to consider whether some of these social infrastructure facilities might need to be placed at a reasonable distance from the industrial plots in order to minimise the danger that the public might face from their activities.

Infrastructure planning should be established based on existing plans, as well as on new site-specific survey and assessments. Such planning should take into consideration the following fundamental principles:

<sup>42</sup> Auroville Consulting, *Planning and Design Guidelines: Green Industrial Park for ALEAP, Nandigama, Andhra Pradesh* (2014)

<sup>43</sup> Eco-Industrial Parks in India, reviewed at: <http://www.urbansanitation.org/e18092/e33075/e54572/e33078/e33079/>



- a All the infrastructure should be modular, functional, cost-effective and flexible to take gradual occupancy into account;
- b Waste minimisation /sustainable & green concepts;
- c Life cycle operation, and management costs, and value for money analysis from developer and unit occupant perspectives;
- d Phased development; and
- e The various infrastructure development options and alternatives.

Within this overall context, Figure 3 presents a number of the more specific objectives of infrastructure provision that industrial parks may have:

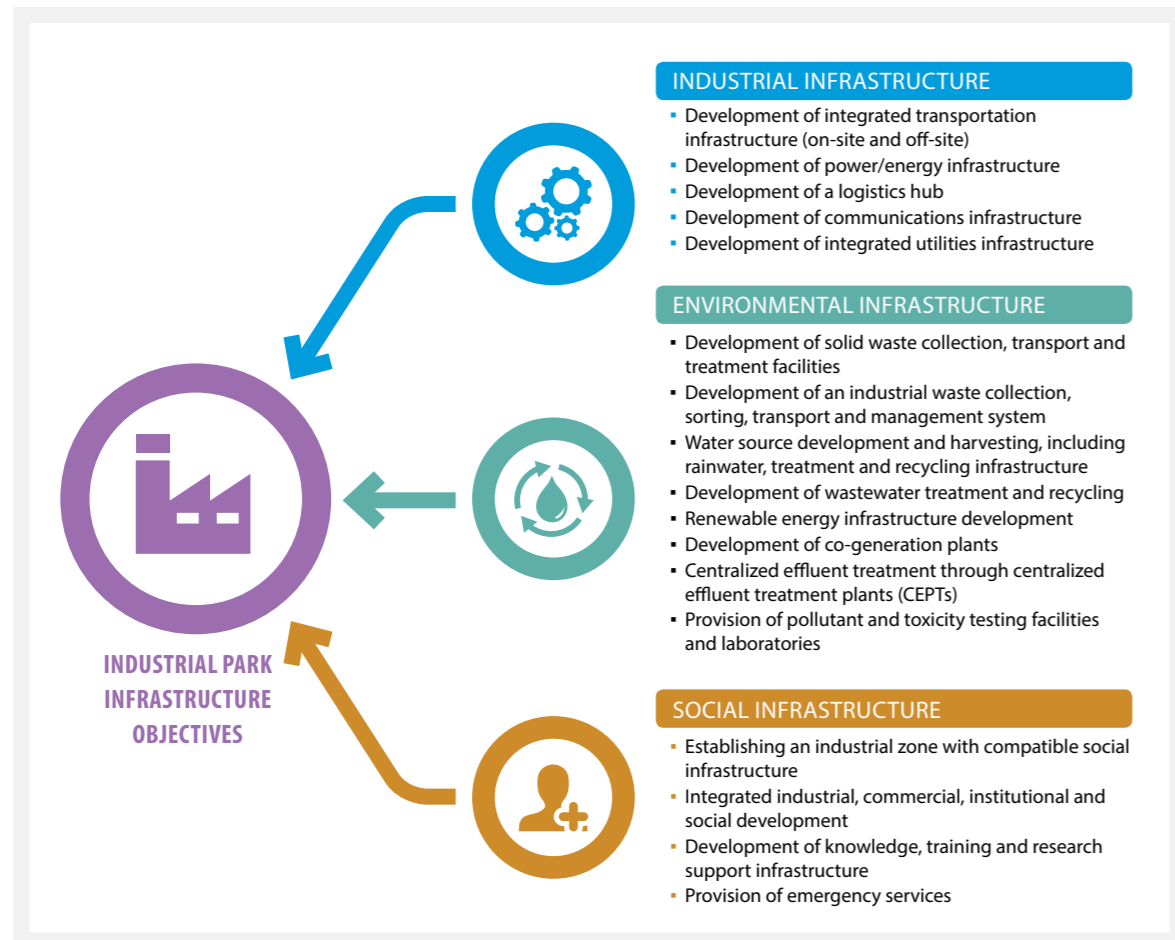


Figure 3: Illustration of Industrial Park Infrastructure Objectives

Some examples of required basic on-site industrial park infrastructure and facilities, as well as some more “value added” and specialized industrial park infrastructure and facilities, are listed in Table 4.

Possible Components	Description
<b>Internal roads</b>	<ul style="list-style-type: none"> <li>▪ Arterial and access/distribution roads network, with pedestrian walkways, in order to provide access to the entire park, as well as to the main highways nearby</li> <li>▪ Bicycle lanes and/or electric light-rail networks, as well as bicycle and/or electric golf-cart sharing systems, in order to reduce combustion engine-based vehicle dependency for short distance commuting</li> </ul>
<b>Surface drainage</b>	<ul style="list-style-type: none"> <li>▪ Drainage on all roadways</li> <li>▪ Gravity-based rainwater harvesting</li> <li>▪ Summer rainwater storage tanks</li> </ul>
<b>Water supply</b>	<ul style="list-style-type: none"> <li>▪ Sufficient drinking and non-potable water, with separate distribution networks</li> <li>▪ Wells, boreholes and reservoirs</li> <li>▪ Water pumping station</li> <li>▪ Water treatment plant</li> <li>▪ Smart water metering</li> </ul>
<b>Sewerage</b>	<ul style="list-style-type: none"> <li>▪ Sewage and effluent collection and storage systems (separate for industrial and household needs)</li> <li>▪ Systems for removal of contaminants from wastewater, storm run-off, and domestic sewage, through primary treatment of effluents</li> <li>▪ Physical, chemical and biological treatment processes</li> <li>▪ Treated and recycled water system</li> <li>▪ Smart sewage metering</li> </ul>
<b>Solid waste management</b>	<ul style="list-style-type: none"> <li>▪ Segregation of wastes into different categories and colour-coded bins and containers (i.e., for industrial non-hazardous waste, industrial hazardous waste, bio-degradable waste, non-biodegradable waste, e-waste, construction waste, hospital and bio-medical waste, etc.)</li> <li>▪ Energy creation through waste</li> </ul>
<b>Power supply</b>	<ul style="list-style-type: none"> <li>▪ 24x7 supply of electricity throughout the site</li> <li>▪ Distribution substations at strategic locations, with network of underground cables or overhead lines</li> <li>▪ On-site renewable energy (e.g., rooftop solar PV panels or solar farm to serve the park)</li> <li>▪ Smart energy metering</li> </ul>
<b>Street lighting</b>	<ul style="list-style-type: none"> <li>▪ Conventional or solar street lighting</li> <li>▪ Smart energy-efficient lighting</li> </ul>
<b>IT connectivity, telecommunication, and ICT-enabled resident services</b>	<ul style="list-style-type: none"> <li>▪ High-speed Wi-Fi and internet services</li> <li>▪ Robust data infrastructure system</li> <li>▪ Communication system within the park</li> </ul>
<b>Landscaping, public open spaces and green cover or vegetation</b>	<ul style="list-style-type: none"> <li>▪ Tree beds along the boundary and roads</li> <li>▪ Open spaces of various types - natural, plazas, parks, or recreation areas (international planning norms require at least 10 % green space)</li> <li>▪ Green buffers between zones</li> <li>▪ Bio-diversity and planned planting of native flora</li> </ul>

Possible Components	Description
<b>Specialized industrial support infrastructure</b>	<ul style="list-style-type: none"> <li>Standard factory shells and warehouses with smart, sustainable building design</li> <li>Public depot warehousing and cold storage facilities</li> <li>Quality assurance services and quality control laboratory (whether run by private or public entities)</li> <li>Truck parking and weighing station</li> <li>Fuel pumping station</li> <li>Administrative building</li> <li>Banks</li> <li>Post Office</li> <li>Customs office</li> <li>Exhibition centre and showroom</li> <li>R&amp;D, incubation, training, innovation centre and knowledge hub</li> <li>Market intelligence centre</li> <li>One-stop shop</li> <li>Logistics and parking centres</li> <li>Operation centre</li> </ul>
<b>Safety and security</b>	<ul style="list-style-type: none"> <li>24x7 public safety infrastructure, including lighting and CCTV surveillance systems</li> <li>Emergency response centre/s (including for accidents and first aid, fire and chemical hazards, security incidents, natural disasters and crises, etc.)</li> <li>Health care centre, medical facilities</li> <li>Live air quality monitoring through smart environment monitoring system</li> <li>License plate monitoring and speed control</li> </ul>
<b>Social and commercial centre</b>	<ul style="list-style-type: none"> <li>Buildings for shopping and culture (i.e., restaurants, supermarkets, barber shops, swimming pools and sport facilities, etc.)</li> <li>Environment-friendly apartment complexes, on-site or nearby</li> <li>On-site day care</li> <li>Auditorium and meeting rooms suitable for educational/training activities, business meetings, conferences, and community meetings</li> <li>Housing (IFC + ILO standards)</li> <li>Off-site infrastructure</li> </ul>

Sources: Ethiopia Small and Medium-sized Industries Cluster Development Plan (2016) and UNIDO

Table 4: Basic Infrastructure, Utilities, Facilities and Services of Industrial Parks

### 3.2.5 Resource and Energy-Efficient Park Design

As industrial parks notably offer opportunities for the sustainable utilization of low-carbon energy as well as for shared infrastructure, energy planning and management are becoming increasingly prominent components of industrial park planning and development.

Some energy sustainability considerations include low-carbon infrastructure, smart building design and

orientation for integration of renewables, etc. The architectural and engineering design elements of industrial parks should incorporate energy efficiency and clean energy considerations, including such “green” features as exterior openings, skylights, passive cooling/heating technologies, materials with a high solar reflective index (SRI), vegetation to cover exposed roof areas, energy-efficient lighting, on-site renewable energy, etc.

Opportunities for industrial symbiosis to improve resource efficiency, as illustrated by the case study in Box 2 (i.e., common industrial park water, energy and material resources management and treatment systems, energy and material recovery,

waste valorisation, use of renewable energy and sustainable materials, parts and components, and by-product reuse and recycling, etc.) should be a key consideration in industrial park zoning plans.

In Colombian industrial parks, the private developer-operators often only provide such basic services as security and common areas maintenance (e.g. exterior and street lighting, gardening and road maintenance). In some cases, the park manager also provides such services as water supply and wastewater treatment, energy supply, and is engaged in capacity-building and community outreach. Recently however, national policies (e.g. the Green Growth Policy, the National Circular Economy Strategy) have been adopted in order to spur collaboration among resident companies, leading to resource efficiency gains, industrial symbiosis, as well as benefits for resident companies. UNIDO has implemented one such EIP pilot project alongside the operator of the Malambo Industrial Park (PIMSA), identifying and implementing industrial symbiosis opportunities and their implementation. PIMSA is strongly committed to the vision of transitioning to an eco-industrial park and extending its business model towards renewable energy and resource efficiency in industry, as well as toward improved social and economic community outreach and involvement<sup>44</sup>.

Box 2: Colombian Eco-Industrial Parks

### 3.2.6 Integrated Waste Management Plans

Waste generated by industrial parks can include solid waste, organic waste from food production and processing, and industrial inorganic by-products (e.g. gypsum, ash, lime, etc.). Industrial park developers should ensure that good waste management practices are observed during the planning and design process, as well as during park construction activities, through the adoption and implementation of a clean waste management plan. Engineering design, construction practices and building materials selection can make a significant contribution to waste prevention and reduction. Looking ahead, the plan can also be drawn up with a view to helping enterprises minimise operating costs by enabling industrial symbiosis. The waste management plan should therefore outline waste management and disposal activities and methods, throughout the industrial park’s life span, taking into account national laws, regulations and requirements.

The waste management plan and infrastructure should correspond to the type of companies the park

is expected to accommodate. For example, if the park accommodates companies that generate hazardous waste, such as tanneries, then infrastructure and management systems must be designed to fulfil the resulting requirements, including via efficient wastewater effluent treatment systems and facilities.

Wastewater treatment can be provided either through centralized or decentralized systems. Centralized wastewater management consists of a sewer system that collects wastewater from many producers, transports it to a centralized wastewater treatment plant, and ensures the disposal or reuse of the treated effluent, usually far from the point of origin. Centralized systems treat wastewater from groups of two or more companies or buildings in the industrial park, while generally achieving the required underlying clustering of activities through smart internal zoning plans. Decentralized wastewater management, in contrast, involves wastewater collection, treatment, and disposal or reuse at or near the point of generation (i.e., generally at a company level)<sup>45</sup>.

<sup>44</sup> UNIDO, *Implementation Handbook for Eco Industrial Parks* (2017)

<sup>45</sup> S. Hophmayer-Tokich, *Wastewater Management Strategy: Centralized v. Decentralized Technologies for Small Communities*. The Center for Clean Technology and Environmental Policy, University of Twente (2006)

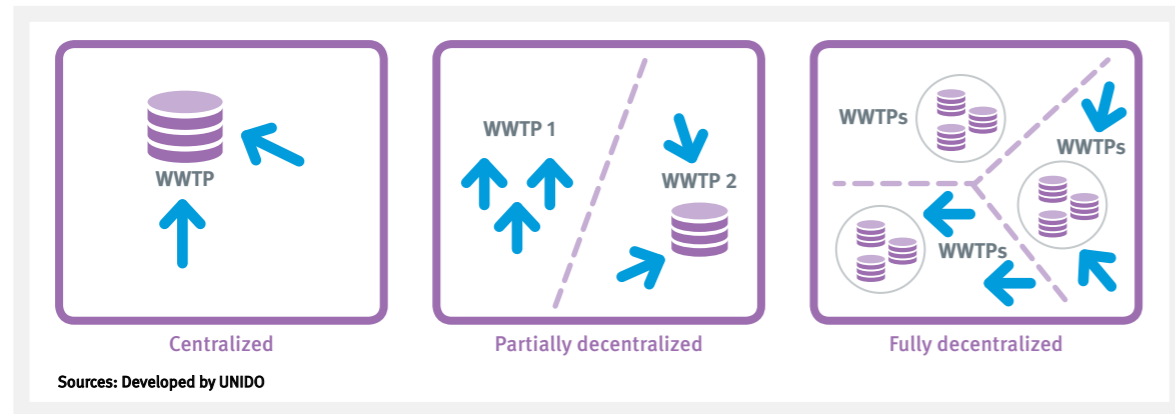


Figure 4: Wastewater Treatment Approach in Industrial Parks

Each strategy has its respective strengths and weaknesses, and the decision as to the most appropriate approach should be based on a cost-benefit analysis to decide on the type of treatment system most optimally suited to ensuring sustainable business operations in the industrial park. Some of the key parameters to be taken into account in this assessment process include:

- Wastewater characteristics;
- Land availability, topography, climate, soil and existing land use;
- Regulatory requirements as regards discharges;
- Density of human settlements;
- Availability of energy;
- Institutional and technical ability to implement centralized solutions;
- Enterprise demand; and
- Affordability and willingness to pay.

Table 5, below, illustrates the respective advantages and disadvantages of the centralized and decentralized wastewater treatment approaches:

APPROACH	ADVANTAGES	DISADVANTAGES
 CENTRALIZED	 <ul style="list-style-type: none"> <li>▪ High treatment efficiency</li> <li>▪ Possibility of staged development</li> <li>▪ High capacity</li> <li>▪ Enables economy of scale</li> </ul>	 <ul style="list-style-type: none"> <li>▪ Significant investment and operating costs</li> <li>▪ High energy consumption</li> <li>▪ Substantial pumping required</li> <li>▪ Less flexible</li> <li>▪ Greater land requirement</li> <li>▪ Requires operator with strong management capacity</li> </ul>
 DECENTRALIZED	 <ul style="list-style-type: none"> <li>▪ Low investment costs</li> <li>▪ Low operating and maintenance costs</li> <li>▪ Efficient use of energy and land</li> <li>▪ Treatment design based on wastewater characterization</li> </ul>	 <ul style="list-style-type: none"> <li>▪ Longer periods for starting operations, as it depends on each and every individual company's implementation</li> <li>▪ Difficulty in modifying infrastructure in case the host company expands or increases production</li> </ul>

Sources: Developed by UNIDO

Table 5: Comparison of Centralized and Decentralized Wastewater Treatment Systems

### 3.3 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENTS AND IMPACT MITIGATION PLANS

A strong sustainability foundation must drive the design and development of an industrial park, and construction therein, and be built into its conceptualization based on the following principles and their various applications:

- a **Sustainable site development:** controlling soil erosion and sedimentation, minimising disturbances or restoring green cover, etc.;
- b **Sustainable transportation:** interconnected internal pedestrian and public transportation networks, reducing combustion engine-driven vehicle dependency, and associated fuel consumption and vehicular emissions, etc.;
- c **Water conservation:** rainwater harvesting, landscaping to ensure minimum water consumption, irrigation systems, wastewater treatment and reuse, sub-metering to improve water performance and thereby save drinking water, etc.;
- d **Energy efficiency:** reducing “heat islands”, encouraging the use of renewable technologies and sub-metering to improve energy performance, etc.;
- e **Sustainable material and resource management:** use of locally-available building materials, use of eco-friendly materials, avoidance of toxic chemicals, etc.;
- f **Health and well-being:** health and well-being facilities, park design catering to differently-abled and senior citizens, etc.;
- g **Green education and public consultations:** involving local communities and NGOs, to increase park residents’ awareness levels and encourage the implementation of eco-friendly practices; and
- h **Waste management:** utilization of waste minimisation technologies, segregation and management of waste, etc.

Environmental and Social Impact Assessments (ESIAs) must underpin site master planning, and predict and evaluate a project’s environmental and social impacts on the ecosystem, bio-physical and human environment, as well as propose any required project impact mitigation plans. ESIAs should, in addition, lay the basis for ongoing assessment of socio-economic and environmental impacts throughout the project’s lifespan, including during: pre-construction activities (e.g., relocation of people displaced due to the project,

etc.); construction activities (e.g., land clearing and site preparation, infrastructure construction, etc.); and post-construction operational activities (e.g., maintenance, etc.).

Many Development Finance Institutions (DFIs) have policies, guidelines and tools to effectively integrate environmental and social considerations into their operations that can help industrial park developers in preparing these assessments and plans (see Box 3):

Multilateral development banks have safeguard policies that seek to avoid, minimise, or mitigate adverse environmental and social impacts, including protecting the rights of those likely to be affected or marginalised by the development process.



**The World Bank Group** has an environmental and social framework that sets out the Bank’s commitment to sustainable development. The framework requires borrowers to conduct ESIAs on projects proposed for World Bank support. The World Bank’s safeguard policies recognize the importance of borrowers’



early and continuing engagement and meaningful consultation with stakeholders, including communities, groups, or individuals affected by proposed projects. The World Bank Group also requires the provision of a grievance procedure to receive and facilitate resolution of the concerns of project-affected parties<sup>46</sup>.



**The African Development Bank (AfDB)** adopted its Environmental Policy in 1990 (revised in 2004), a set of Environmental and Social Assessment Procedures (ESAPs) in 2001, and an Involuntary Resettlement Policy in 2003, clearly setting out AfDB’s environmental and social safeguards. The 2003 ‘Involuntary Resettlement Policy’ pays particular attention to the cultural or religious significance of land, the vulnerability of the affected populations, and the availability of in-kind replacement for assets which may have important intangible implications. The AfDB requires a borrower to develop a Resettlement Plan (RP) as part of a development programme where physical displacement and loss of economic assets are unavoidable. The displaced persons and host communities should be meaningfully consulted early in the planning process, and encouraged to participate in the elaboration of the resettlement programme. Expropriated assets should be compensated at “full replacement” cost prior to commencement of project activities<sup>47</sup>.



**The Asian Development Bank (ADB)**’s current safeguards policy builds upon the three previous safeguard policies: the Involuntary Resettlement Policy (1995), the Policy on Indigenous Peoples (1998) and the Environment Policy (2002). In addition, environmental safeguard elements are included in ADB’s water, energy and forestry policies. ADB carries out screening and categorization at the earliest stage of project preparation, in order to ensure that they (i) reflect potential impacts; (ii) commit the appropriate level of resources for safeguard measures; and (iii) meet disclosure requirements<sup>48</sup>.



**The European Investment Bank (EIB)**’s environmental and social safeguard policies, and the principles, practices and standards they embody, are based on the EU’s 2006 Declaration on the European Principles for the Environment (EPE). Environmental considerations are taken into account at all stages of the project cycle. All projects financed by the EIB are subject to an Environmental Assessment (EA), normally carried out by its own staff, but, if by others, according to EIB requirements. Social issues now are also assessed and focus on labour standards, occupational and community health and safety, population movement and resettlement, minority rights (including those of indigenous people, women and vulnerable groups), public consultation and participation, and cultural heritage<sup>49</sup>.

No	Area	World Bank Group	EBRD	EIB	IADB	ADB	AfDB
1.	Environmental and social assessment	Yes	Yes	Yes	Yes	Yes	Yes
2.	Involuntary resettlement	Yes	Yes	Yes	Yes	Yes	Yes
3.	Pollution prevention	Yes	Yes	Yes	Yes	(in 1)	Yes
4.	Bio-diversity	Yes	Yes	Yes	Yes	(in 1)	Yes
5.	Community impacts	Yes	Yes	Yes	No	(in 1)	(in 1)
6.	Labour conditions	Yes	Yes	Yes	No	(in 1)	Yes
7.	Indigenous peoples	Yes	Yes	Yes	Yes	Yes	(in 1)
8.	Cultural heritage	Yes	Yes	Yes	Yes	(in 1)	(in 1)
9.	Environmental flows	No	No	No	No	No	(in 4)

Key Operational Safeguards of the Multilateral Development Banks

**Box 3: Multilateral Development Bank Safeguards Policies**

<sup>46</sup> World Bank, *Environmental and Social Framework (English)* (2017)

<sup>47</sup> AfDB, *Integrated Safeguards System Policy Statement and Operational Safeguard* (2013)

<sup>48</sup> ADB, *Safeguard Policy Statement* (2009)

<sup>49</sup> EIB, *The EIB Statement of Environmental and Social Standards* (2009); EIB, *Environmental and Social Handbook* (2013)

An Environmental and Social Mitigation Plan (ESMP), prepared either as an integrated element of the ESIA or as a separate document should set out the measures required to maximise the project’s benefits as well as to minimise and/or remedy any adverse impacts or

externalities. It ensures that the environmental and social impacts and risks identified in the ESIA process are effectively managed. The ESMP, amongst other things, addresses the following:

- a Setting out an environmental and social management measures action plan;
- b Defining responsibilities for specific actions, timeframes for implementation, and associated budgets;
- c Actively engaging with the affected people and communities;
- d Identifying monitoring mechanisms in relation to project social and environmental performance, and compliance with related statutory requirements; and
- e Outlining capacity building requirements for the effective implementation of the plan.

**3.4 SUSTAINABLE AND PEER-REVIEWED ENGINEERING PLANS**

A crucial factor in any infrastructure project is the quality of its engineering plans. Industrial park infrastructure encompasses complex physical support systems such as facilities for the transportation of materials and people to and from the site, for the production and supply of energy, for the transport, storage and treatment of water, and for telecommunications. Their planning and construction requires the preparation of scale drawings and layouts, the selection of appropriate technology and equipment, site preparation and construction planning, project delivery scheduling, and approvals by the relevant authorities.

In recent years, the issue of environmental sustainability has become a key consideration in industrial park engineering. For instance, engineering plans specify which materials and sources will be used during construction. A sustainable approach to industrial park infrastructure, including relating to energy, water, industrial effluents and waste, communications and social services, has implications in terms of building materials, orientation, glazing and other factors. The main principles of sustainable engineering include<sup>50</sup>:

- a Encouraging developers to consider sustainability from the earliest stages of the design process, and to go beyond minimum standards;
- b Incorporating built forms, technologies, materials, orientation and layout that contribute to energy efficiency (e.g. through natural ventilation, heating, cooling and lighting) and associated emissions;
- c Avoiding adverse micro-climatic effects (e.g. wind turbulence, noise reflection, etc.);
- d Taking into account, where feasible, the potential for the re-use of existing buildings and materials;
- e Making adequate provision for the storage and recycling of waste and for the management or recycling of water; and
- f Encouraging flexible building design for multiple uses.

<sup>50</sup> Brent Council, *Sustainable Design, Construction and Pollution Control* (2004)

When engineering plans are ready, requiring an independent third-party review is a sound practice in order to ensure that the design meets all the pre-determined requirements and standards, and provides a sound basis for achieving the project's

### 3.5 CONSTRUCTION

Industrial park construction involves the properly programmed and scheduled hiring of contractors, bulk earthworks, the construction of road and other transportation networks, and the installation of such services as power, water, gas, telecommunications and waste treatment, both within the park boundaries and for any required "last mile" connection spurs.

Construction activities have the potential to impact the environment and communities. Construction management strategies must therefore minimise the adverse impacts of the construction processes

- a Risk assessment of the possible impacts resulting from construction;
- b Developing a construction management plan outlining the necessary actions to mitigate and manage potential construction risks;
- c Procurement of sustainable building materials for use in construction (i.e., those that have the least environmental impact, while still offering the highest technical specifications);
- d Maximising opportunities for re-using and recycling construction waste both on-site and off-site;
- e Maximising the industrial park's energy saving potential by using energy-efficient materials and resource-efficient construction practices, including the construction of industrial buildings and installations capable of exchanging energy flows and of enhancing collective heating, ventilation and cooling; and
- f Monitoring the implementation of the construction management plan<sup>53</sup>.

### 3.6 STAKEHOLDER ENGAGEMENT DURING PARK DESIGN AND DEVELOPMENT

Industrial park development involves a wide range of stakeholders, including institutions at various levels of government, businesses, financial institutions, development partners, education and training institutions, research centres, and environmental and

objectives. The appropriate degree and level of review will depend on a number of risk factors, but even low-risk projects should, at a minimum, go through at least a basic peer-review process<sup>51</sup>.

on the natural environment and ecosystem (in terms of habitat, soil, water, air, etc.) and on people (in terms of noise, light, fumes, dust, and usage of local amenities), including by identifying and using the most efficient construction methods and materials available. The plan should follow the Development Control Regulations (DCR) for the jurisdiction, which outline a set of rules that are designed to ensure a park's proper and efficient development, as well as the general welfare of the public<sup>52</sup>. Strategies to reduce these impacts include:

Successful industrial park planning, design, development and indeed operation requires a close partnership between the various stakeholders, in order to deliver the best results for industry, its host community, and the natural environment within which they must coexist.

Strategies for effective stakeholder engagement during the design and development of industrial parks include:

- a Binding Memoranda of Understanding (MoU) between two or more stakeholders outlining each party's requirements, roles and responsibilities, so as to enable more effective coordination, by capitalizing on the parties' respective mandates, knowledge and expertise;
- b Establishing a functioning governance system in order to facilitate the inclusion and collaboration of multiple stakeholders at the national, regional and local levels, as well as their coordination;
- c Ensuring full and transparent stakeholder engagement, as well as constituency and trust building, through regular communications amongst stakeholders; and
- d Active engagement with the community to fully integrate affected citizens' and communities' knowledge, suggestions, concerns and vision, in order to shape park development decisions.

UNIDO, which has been assisting Member States in the planning and establishing of industrial parks around the world for the last forty years, has come to understand this need well. UNIDO has therefore devised an innovative and integrated economic

development approach, the Programme for Country Partnership (PCP), in order to synergistically bring together different public and private partners for these purposes.



<sup>51</sup> UNOPS, *Design Planning Manual for Buildings: Technical Framework for Minimum Requirements for Infrastructure Design* (2014)

<sup>52</sup> Note: Development Control Regulations provide a mechanism by which the entire park development process is controlled to achieve the target of promoting the overall benefit of the society as well as creating a conducive business location for enterprises.

<sup>53</sup> Sands, L. and Shepherd, S. *Guidelines for Industrial Development, Perth NRM Region* (2010)



# 4

## Industrial Park Operation and Management

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Industrial park operation involves site and facilities management and maintenance, including ongoing investment promotion, performance monitoring and evaluation, and continuous improvement and reinvestment. During the project's implementation phase however, the industrial park's management mainly focuses on coordinating actors, attracting investment, implementing DCR and initiating the sale or lease of land to residents. Some of the industrial park operator's main activities are outlined in Table 6 below:

- Marketing of the developed plots, ready-built factory shells and warehousing space, residential and commercial areas and facilities, etc.;
- Industrial park brand image building;
- Contractual agreements with residents;
- Day-to-day operation of the park, including ensuring the efficient operation of all the general and specialized infrastructure and facilities therein;
- Facilities management and maintenance within the park, including facilities upgrades;
- Collection of common maintenance and operations fees and charges from users;
- Compliance with legal standards and requirements, including in particular as regards, environmental matters; and
- Supervision of the application and enforcement of internal development control rules by the park's users.

**Table 6: Ongoing Activities of Industrial Park Developers-Operators**

#### 4.1 INDUSTRIAL PARK OPERATOR FUNCTIONS

At the most basic level, industrial parks are meant to provide an integrated real estate solution for gaps in the market for serviced industrial land. In this context, they must, however, provide more than land and utilities, and offer a basket of services to support resident businesses. The operators must transfer developed land, ensure effective utilities connections and network management, and manage, maintain and repair all of the industrial park's facilities, or contract with specialized service providers to do so. Industrial park operators must also supervise residents' own building construction on plots, if this is an option, plant installation and operations, provide environmental management services within the park, and ensure park security.

Modern operators' delivery of utilities and waste management services should be grounded in an

understanding of eco-efficiency, by-product synergies and integrated waste management, in order to deliver properly-coordinated, clean and green services at the park-wide level<sup>54</sup>. Moreover, and especially if the State contributes to the industrial park programme in some manner (for instance through land, equity, subsidies or tax incentives), industrial parks and their operators may also be expected to provide a number of "public goods", for instance in the form of services aimed at developing entrepreneurship, strengthening supply chains through linkage programmes, improving entrepreneur and/or resident workforce skills, ensuring employee care, etc.

As integrated real estate solutions, industrial parks' primary indicator of success is their occupancy level. It is thus essential for industrial parks to attract resident firms and investment, and to this end must also

develop marketing and branding strategies based on their distinctive characteristics or "value proposition". The successful management of industrial parks therefore entails both administration as well as public relations. The industrial park's operator maintains the industrial park and supervises its daily operation on the basis of the park operations framework manual. Park operators should possess technical experience and capacity (such as energy management, waste utilization, investment and marketing, etc.) in order to manage activities within the industrial park and

ensure continued investment. The scope of the responsibilities and functions of industrial park operators differ according to their agreements with the industrial parks' respective developers.

The main management functions required during the operation of an industrial park include infrastructure management and operation, along with the provision of administrative, business and social services, as illustrated in Table 7 below:


Management function	Components	Description
<b>Plot and shell facilities allocation</b>	Real estate management	Plot and facilities leasing or sales
<b>Infrastructure, superstructure and facilities management</b>	Landscaping, infrastructure and utility provision, operation and maintenance, along with collection of utility usage fees, including for telecommunication land lines, internal transport networks, drainage, waste management and water distribution	Guaranteeing regular operation and supply of utilities and other infrastructure management services
<b>Administrative services</b>	Registration and licensing, if these functions are delegated to it by the respective government agencies, overseeing regulatory compliance, ensuring park safety and security, and providing overall park financial management	Ensuring quick and easy entry of firms into the park, providing adequate protection for people, property and the environment, and ensuring safe production and movement within the park
<b>Business development and innovation management</b>	Providing information on park services, attracting new residents and, sometimes (generally through publicly funded programmes), attracting skilled workers, business incubation supporting innovation	Attracting business into the park, and providing a platform to encourage R&D and knowledge-sharing
<b>Social service management</b>	Directly or indirectly ensuring the provision of healthcare, training, retail, community and civil society relations, recreational accommodation for workers and firefighting services within the park, where the costs of such listed services being either rolled into the fees paid by residents (e.g., firefighting services, community relations), based on user fees (e.g., healthcare, accommodation for workers) or may be provided by commercial businesses (e.g., retail, catering, etc.)	Creating a favourable working and living environment, cooperating with the community and encouraging dialogue with interest groups
<b>Performance management and monitoring</b>	Compiling reports, surveying residents, performance assessment	Economic, social and environmental performance monitoring

Source: Developed by UNIDO


**Table 7: Possible Industrial Park Management Functions**

<sup>54</sup> UNEP, *Environmental Management for Industrial Estates: Information and Training Resources* (2001)

Some specific examples of industrial park business incubation programmes are outlined in Box 4, below:



- **UK:** Cambridge Science Park (CSP) was established by the University of Cambridge in 1970 in order to strengthen university-industry technology transfers and innovation. The strategic importance of Cambridge as a research centre attracted many companies in the 1980s, and several venture capital companies opened offices in the park, improving access to funding for start-ups. In the 1990s, the cluster of hi-tech companies in the Cambridge area grew to some 1,200 companies, employing around 35,000 people, and demand for space increased. In 2005, after incubators for start-ups were established elsewhere in Cambridge, the park opened an innovation centre to support the growth of new companies<sup>55</sup>.



- **China:** Wuhan East Lake New Technology Industrial Development Zone (a.k.a. Wuhan Optical Valley), which occupies 510 square kilometres, was established in 1988. There are around 100 higher education institutions, accommodating 800,000 on-campus students, within the overall zone. The East Lake New Technology Start-up Centre, headquartered in the zone, was the first business commercialization incubator to be established in China. The centre had incubated over 2,000 technological enterprises and start-ups as of 2013, creating more than 70,000 jobs. The rapid development of Wuhan Optical Valley was only possible because of the successful business incubation provided by East Lake New Technology Start-up Centre<sup>56</sup>.

Box 4: Business Incubation Centres in Industrial Science Parks and Technology Zones

## 4.2 TRANSFER OF DEVELOPED PLOTS

The transfer of developed industrial plots, factory shells or warehouses can be done either through sales or leases. The decision to sell or to lease depends on prevailing land law or DCR in the host jurisdiction, market preferences and the types of assets offered. Leasing provides the greatest market entry and exit flexibility, and the lowest financial barriers for park residents as it does not require a large down payment. From the standpoint of the industrial park developer, leasing has the disadvantage of facilitating short or

medium-term exit from the industrial park, but it also has the critical advantage of providing a constant revenue stream and cash flow.

The sales and leasing price of serviced land and facilities depends on the location of the industrial park, and the extent of the available infrastructural facilities within it. The following strategies are recommended when setting these prices:

- a Prices should reflect prices prevailing in the local market;
- b Prices should enable developer/operator cost recovery plus margin, in order to enable the financing of future industrial park expansion and/or upgrade needs, and incentivize the developer to make such investments; and
- c Transparency in pricing is essential to uptake.

A good practice example when applying these strategies may be found in the Ethiopian industrial

parks case study presented in Box 5:

In 2015, Ethiopia's Industrial Park Development Cooperation (IPDC) developed a directive for leasing industrial plots and factory shells. The directive outlines the following conditions for their transfer:

- Rental agreements providing for monthly rent payments;
- Competitive international selection amongst invited capable investors, in accordance with government bidding procedures;
- Ratification of leases by the IPDC Board of Directors<sup>57</sup>.

Box 5: Serviced Land and Factory Shell Leasing in Ethiopian Industrial Parks

## 4.3 LABOUR RELATIONS MANAGEMENT

Responsible labour relations management has a direct influence on the sustainability of industrial parks as it affects the size, morale and productivity

of the workforce. Due emphasis should therefore be given to ILO Labour Standards, in particular the following aspects of labour relations management:

- a **Decent work** - Industrial operators should ensure employees' right to proper working conditions and such rights as equal pay for equal work. A widely-adopted practice in this respect is for operators to undertake due diligence on the enterprises during the resident identification and approval processes, in order to identify firms with poor social and safety records;
- b **Labour unions** - Labour unions should be permitted in industrial parks in accordance with the host countries' applicable rules and regulations; and
- c **Legal issues and dispute settlement** - It is vital to establish a mutually-agreed dispute settlement mechanism for conflicts arising within an industrial park.

Industrial parks can and should however be leveraged as platforms that go beyond such basic protections of worker rights and safeguards, and promote superior standards of worker welfare, standards and practices

to attract talent, enhance workforce skills, and contribute to quality jobs and a knowledge-based economy.

## 4.4 ENERGY MANAGEMENT IN PARK OPERATIONS

After park operation has begun, the use of renewable energy and low-carbon technologies, as well of industrial symbiosis where relevant, can be ensured through conducting ongoing energy audits to determine energy use. Industrial park operators, in addition to regularly conducting such audits,

should support industries in implementing energy management systems and in identifying energy efficiency and renewables opportunities.

As industrial parks create clusters of energy-consuming entities, industrial park operators can

<sup>55</sup> Cambridge Science Park website: <https://www.cambridgesciencepark.co.uk/about-park/past/>

<sup>56</sup> Wuhan East Lake New Technology Industrial Development Zone: <http://www.wehdz.gov.cn/>

<sup>57</sup> IPDC, *Industrial Sub-Lease and Factory Shells Rent Implementation Directive of Ethiopia* (2015)

help optimize energy use through ‘energy symbioses’, renewable energy. Therefore, due emphasis should be given to the following aspects of energy management: by promoting energy saving practices, implementing energy management systems, and using clean and

- a Matching energy supply and demand:** To ensure that users in industrial parks have access to sufficient (but not an over-supply of) energy, it is essential to properly project and manage each user’s demand, based on sound consumption-based systems. Modern park operators therefore generally establish firm-level metering systems. Furthermore, prospective residents must provide energy demand and consumption plans as part of their application.
- b Promoting of energy efficiency:** As improvements in energy efficiency benefit both the industrial park in general as well as individual residents, industrial park operators are increasingly identifying opportunities to reduce energy consumption, for instance by stimulating and facilitating ‘energy symbioses’, and energy clustering and cooperation among residents. Such cooperation can be achieved through clustering buildings and processes, energy exchange, collective production and joint energy services. Surplus energy (e.g. heat, electricity, steam, biogas, etc.) from a plant can thus be transferred to other companies in the park (or even to nearby communities), as presented in Box 6 below:

The Helsingborg Business Park in Öresund, in southern Sweden, hosts some 20 chemical and service companies, the biggest one being Kemira Kemi, which also owns the park. Due to the energy-intensive industries on-site, its total energy turnover is considerable, at around 1,000 GWh/year. However, approximately 600 GWh/year (or 60%) of this figure is climate-neutral, being either ‘green electricity’ or ‘recovered energy’ in the form of repurposed steam, hot water, compressed air and cooling water. Approximately 350 GWh/year of the recovered energy is supplied as district heating to the nearby city of Helsingborg, corresponding to 1/3 of total district heating demand<sup>58</sup>.

**Box 6: Industrial Energy Symbiosis in Sweden’s Helsingborg Business Park**

Although corporate energy efficiency barriers may include contractual commitments, energy prices, limited knowledge of the topic, etc.<sup>59</sup>, various strategies can be used by park operators to overcome these. Some of these strategies include:

- Introducing incentive schemes for good energy management practices;
  - Increasing the companies’ knowledge and engagement on these issues through energy-efficiency information campaigns and encouraging companies to implement and maintain a certified energy management system such as ISO 50001; and
  - Developing and implementing energy cooperation plans, including through identifying horizontal energy services that are attractive to businesses and establishing appropriate responsive processes.
- c Renewable and clean energy:** Provision for the integration of renewables and clean energy in an industrial park should ideally be addressed during the feasibility study and planning phase, with systems built into park management thereafter in order to encourage the continued adoption and use of these technologies during park operation. Industrial park managers should also, in all cases, at least establish programmes to identify opportunities to expand the utilization of renewable and clean energy. This can often be done by facilitating access to government-subsidized preferential financing for renewable and clean energy transition or use, and/or government incentives for research and development initiatives related to clean energy.

<sup>58</sup> Helsingborg Business Park: [www.industrypark.se](http://www.industrypark.se)

<sup>59</sup> E. Worrel, *Productivity benefits of industrial energy efficiency measures* (2011)

## 4.5 WASTE MANAGEMENT IN PARK OPERATION

It is important for the park’s management to adopt and continuously monitor the implementation of a waste management plan in park operations. Park Management should also encourage waste prevention, reuse, recovery and recycling, through programmes promoting cleaner production, resource efficiency, recycling and materials exchanges, in order to facilitate transactions between waste generators and industries that can use waste as raw materials. For waste treatment and disposal, the industrial park must put in place the appropriate infrastructure and technologies for the treatment

of the wastes generated by the park’s resident firms, depending on the characteristics of the waste they generate, and implement standards on what resident firms can discharge into common wastewater management systems. Park Management should maximise synergies with local authorities as regards the efficiency of waste collection and management. Finally, the use of low-carbon technologies, as well of industrial symbiosis where relevant, can be encouraged through conducting ongoing Greenhouse Gas (“GHG”) emission inventories.

### 4.5.1 Waste Management Plans

Industrial park waste management typically begins by developing a comprehensive plan that serves as a blueprint for waste management activities and encourages waste reduction and avoidance.

Amongst other more conventional benefits focusing on park cleanliness, such plans give industrial park operators an opportunity to strategically consider their own cost-efficiencies, as well as on park users’ “value added” benefits and their broader collective socio-environmental responsibilities. For instance, rather

than using landfills for large volumes of domestic and industrial wastes, there is potential for industrial parks to transfer these wastes and by-products to a centralised waste processing facility. Such a facility can maximise industrial land use in the park’s strategic core, as well as facilitate and encourage the (co-)processing of domestic wastes and industrial by-products into valuable materials.

The conventional waste management strategies should be based on principles such as:

- a** Reducing hazardous substances, pollutants and contaminants at the source by upgrading production systems and technology, as well as modifying inputs and products;
- b** Reuse or in-process recycling of the product in its original or in a modified form. For example, wastewater or chemicals used in tanning can be reused through an onsite chromium recovery unit;
- c** Recycling through the separation and sorting of materials otherwise destined for treatment or disposal, for reincorporation into the same or different products, either at the factories, on-site in common facilities or off-site;
- d** Recovery through the extraction of raw materials for their subsequent use as manufacturing inputs, by establishing materials exchange or marketplace programmes facilitating transactions between waste generators and industries that can use waste as raw materials;
- e** Treatment through applying technologies to reduce the volume, mass and toxicity of waste prior to disposal. Waste can, for instance, be treated through thermal, chemical and biological processes, depending on the form, quantity, characteristics and degree of segregation of the waste;
- f** Industrial symbiosis through the synergistic and cooperative exchange of industrial by-products, energy, water, by-products, and processing wastes among closely situated firms<sup>60</sup>;

<sup>60</sup> M.R. Chertow, *Industrial Symbiosis: Literature and Taxonomy, Annual Review of Energy and Environment* 25 (2000), 313-337.



- g** Circular economy practices, extending product lifespan through promoting green designs, resource-efficient cleaner production, and efficient industrial waste, water and energy management and repurposing at the factory, or through common onsite or off-site exchange systems and infrastructure; and
- h** Disposal through the release of unused waste materials into the environment, after at-source reduction, reuse, recycling, recovery, and treatment, using the most appropriate method based on the waste characteristics. Landfills, incineration and composting are the most widely practiced methods of waste disposal. Park operators should ensure that their disposal sites are suitably located, fairly close to the source of the waste, separate from residential and commercial areas, off floodplains and on a geologically-stable base<sup>61</sup>.

#### 4.5.2 Chemical waste management

Hazardous wastes must be safely handled and managed. Chemical waste may or may not be hazardous, depending upon its characteristics (i.e., ignitability, corrosiveness, reactivity and toxicity), components, legal classification<sup>62</sup>, and/or other

information listed on its Material Safety Data Sheet (MSDS), Product Data Sheet or Label.

The strategies for chemical wastes management include the following:

- a** Reducing chemicals consumption through resource-efficient and clean production processes. Some chemicals can also be reused, recycled and recovered by deployment of product-as-service business modalities such as chemical leasing<sup>63</sup>;
- b** Treatment and disposal of chemical waste with methods appropriate to its characteristics, paying attention to the fact that many chemicals may react adversely when combined. Incompatible chemical products and wastes should therefore be stored in separate areas, mitigating the risk of violent exothermic reactions that may cause flammable gas releases and explosions;
- c** Safe disposal in containers that are chemically compatible with the material they will hold; and
- d** Pre-treatment of chemical waste effluents prior to final treatment in centralized treatment plants. The nature of such pre-treatment will depend on the characteristics of the effluent and must be performed by the company in its factory or in appropriate common facilities by the companies generating the waste.

#### 4.6 MANAGEMENT MODELS

An industrial park can be developed and operated by the government – at the national, state or local level; by private enterprise – whether by a construction company developer or consortium, or manufacturers association; or by some sort of public-private partnership (PPP) – for instance through a joint

venture between government and private enterprise. Different government ministries, public agencies and state-owned development and facilities management corporations regularly invest in industrial parks, given the public interest they present for the economy.

<sup>61</sup> S. Yahaya, C.H. Ilori, S.J. Whanda and J. Edicha, "Landfill Site Selection for Municipal Solid Waste Management using Geographic Information System and Multi-Criteria Evaluation," *American Journal of Scientific Research* (2010)

<sup>62</sup> Chemical waste may fall under such regulations as Control of Substances Hazardous to Health (COSHH) in the United Kingdom or, in the United States, the Clean Water Act and Resource Conservation and Recovery Act or Occupational Safety and Health Administration (OSHA) regulations.

<sup>63</sup> UNIDO Chemical Leasing website: <https://chemicalleasing.org>

The developer or owner, whatever its ownership structure, pays for the initial development of a park<sup>64</sup> and then, during the operations phase, leases or sells the developed and serviced plots and/or factory shells to private firms in order to recoup its costs. Furthermore, regardless of the industrial parks' ownership model, the private sector invariably plays a vital role in them, both as the parks' residents, and also very often as the design consultants, construction contractors and manager of public projects<sup>65</sup>. This

participation by private firms provides critical expertise and, in so doing, reduces government risk.

Where the operator is a separate entity from the site's owner or developer, the industrial park owner or developer is responsible for establishing and defining the industrial park operator's specific responsibilities, to be enshrined in an "Operator Agreement". There are three common industrial park management approaches:

- a** Management by public entity: Public management is a widely-adopted approach in many developing countries, where a government has a large economic stake in an industrial park. This can either be done directly by a Ministry, Agency or Authority, or through a commercially-oriented State-Owned Enterprise (SOE) or Special Purpose Vehicle (SPV). In the latter scenarios, the government owns, funds and invests in the company, giving the State strong influence over day-to-day decision-making regarding the park's operations;
- b** Management by private entity: Under this model, the park operator, a private company, is contracted by the industrial park's owner/investors, sometimes including resident firms that own plots and factory buildings in the park. This approach is mainly adopted where private investors have largely investments and/or own industrial parks. Private management contracts to specialized facilities management companies are also regularly established at government/state owned industrial parks; and
- c** Joint management by public and private entities: Industrial parks owned in public-private partnership are jointly managed by the government and private investors. While the power-sharing mechanism described in the SPV's Articles of Association allows the parties to divide responsibilities as they deem most appropriate, it almost invariably leaves day-to-day park management and technical decisions to the private partner(s), vesting the public partner(s) with land acquisition, compensation and resettlement, and government relations and interface (for instance around required permits).



- **China:** There are four models for industrial park management in China. A majority of parks are managed by administrative committees that consist of 14 to 20 government bureaus, representing different tasks in connecting the industrial park with the local government, essentially creating a local administrative structure within the park. This is the case, for instance, in the Dalian Economic Technological Development Zone. Industrial parks can also be jointly-managed by an administrative committee and an investment holding/development corporation, where the administrative committee is responsible for the governmental administration and enterprise management, and where the development corporation handles infrastructure and utility management. An example of this arrangement may be seen in the Tianjin Economic Technological Development Zone. In some cases, a state-owned enterprise is in charge of the park, as in the Caohejing Hi-Tech Park. The fourth model is based on cooperation between the Chinese government and a foreign government (e.g. China-Singapore Suzhou Industrial Park). In this model, an Administrative Committee serves as an agency of the city government and the Development Company is responsible for construction and for investment promotion.

<sup>64</sup> The developer must acquire the required land and pay for the development of common infrastructure such as wastewater and rainwater drainage systems, access and internal arterial roads, street lighting, perimeter fencing, and often also for the park's internal power distribution lines and substations, water and sewerage systems (including treatment facilities), an administration building, and fixed telephony landlines.

<sup>65</sup> Indigo Development, *Eco-Industrial Park Handbook for Asian Developing Nations* (2001)



- **Thailand:** Industrial Estates Authority of Thailand (IEAT), a public entity under the Thai Ministry of Industry, oversees all industrial estates in Thailand. The majority of these industrial parks are privately developed, and jointly-operated by a private developer and IEAT. Some parks are however fully-owned and operated by IEAT, with few parks being privately owned, built and operated.



- **Viet Nam:** Industrial zone governance in Viet Nam is quasi-decentralized, with provincial and municipal governments being responsible for attracting FDI and regulating the zones, and the central government being in charge of policymaking and property allocation. The majority of industrial parks are developed and managed by provincial/municipal governments and/or private developers. A few high-tech parks and economic zones are however directly managed by central ministries.



- **Germany:** In Germany, there is a distinction between “municipal industrial areas” and “industrial parks”. In municipal industrial areas, the municipality invests in the required infrastructure and utilities required to attract private companies. Industrial parks, in contrast, are usually initiated by local government to foster inter-linkages among industries, but managed by a private legal entity<sup>66</sup>.



- **Colombia:** Many industrial parks in Colombia are the result of real estate development by construction companies in areas designated for industrial use in municipalities’ territorial development/sequencing plans. The developer normally builds a number of buildings which are then sold or rented out to companies. In some cases, the park manager (usually the same private company) only provides such basic services as security and common areas maintenance (e.g. exterior and street lighting, gardening and road maintenance). However, in other cases, the park manager also provides such services as water supply and wastewater treatment, energy supply, and is engaged in capacity-building and community outreach. Recently, some companies have sought to spur collaboration among resident companies through resource efficiency and industrial symbiosis programmes providing benefits for resident companies. The Malambo Industrial Park’s business model for instance emphasizes renewable energy, resource efficiency, as well as social and economic community outreach<sup>67</sup>.



- **Peru:** While Peru has established 70 industrial zones, most of them do not have a dedicated management function and cannot therefore be considered industrial parks. For example, in numerous unmanaged areas zoned for mixed-use development, industrial establishments set up operations on their own land. Economic Development Zones and some “Free Zones” are however managed by public authorities. Since 2010, the concepts of industrial parks and logistics parks have been gaining traction and a significant number of new, privately-developed and operated industrial parks are also now being developed, predominantly in the Lima region.



- **Republic of Korea:** The Republic of Korea has a long history of government-led industrial parks and economic development, its first industrial parks having been introduced by 5-year plans in the 1960s. Republic of Korea’s industrial parks are today managed by the Korea Industrial Complex Corporation (KICOX), the national agency for supervision and management of industrial complexes, which has been operating industrial complexes since 2005, including by providing support for overall corporate activities and technology development, as well as park management and marketing<sup>68</sup>.



- **Turkey:** Turkey’s industrial parks are developed by public-private partnerships, with the private sector represented by Chambers, Associations or Manufacturers’ Groups that have come together for this purpose. Upon completion of the development phase, all industrial park plots will have been sold to private enterprises. Accordingly, all operational parks are operated by either a contracted private entity (an external park operator firm) or a private entity (e.g. a firm or cooperative) set up by the park’s resident firms that are also plot owners.

#### Box 7: Industrial Park Management Models



<sup>66</sup> GLZ, *German Experiences to obtain Energy Efficiency Gains in Cities through Eco-Industrial Parks* (2015)

<sup>67</sup> UNIDO, *Implementation Handbook for Eco-Industrial Parks*(2017)

<sup>68</sup> J.M. Park and H.S. Park, *A Review of the National Eco-Industrial Park Development Program in Korea: Progress and Achievements in the First Phase, 2005-2010* (2016)



# 5

## Industrial Park Regulation

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## 5.1 INDUSTRIAL PARK POLICY

One common and important economic objective of many countries is to achieve steady, inclusive and sustainable growth, through the delivery of better services and opportunities to their manufacturing enterprises. Achieving this objective and these sub-goals requires stable and smart policies to facilitate investment. This is as true for industrial parks as it is for other areas of industrial policy. The objective of industrial parks development should therefore be part and parcel of a country's overall industrial policy.

Industrial parks represent an effective industrial policy tool because they can be used as a policy microcosm, either through the geographically-concentrated application of national industrial policy or through a dedicated subset of policies applied to industrial parks for inclusive and sustainable industrialization – bringing together coordinated and business-enabling investment, trade, fiscal and financial policies (including incentives), infrastructure, energy and environmental policies, as well as institutional support systems, including consultancy and training, workforce development, R&D and innovation support.

Some of the more successful industrial park programmes have developed institutionalized mechanisms for addressing investment climate constraints. Indeed, policy advocacy is an emerging

and important component of industrial park management<sup>69</sup>, grounded in continuous listening to the industrial park investors' experiences regarding how prevailing laws and regulations, performance requirements, incentives and administrative practices affect their operations, and what changes would support them in expanding (and thus their economic impact)<sup>70</sup>.

Establishing industrial support systems in industrial parks is also easier than it is at the country-wide level, due to the clustering of the enterprises they facilitate. Industrial clusters can be thought of as geographic areas where there are a large number of interconnected firms that operate in the same or related industries. Enterprises are pivotal in any cluster; however, clusters also include other organizations, such as training, research and educational institutions, government bodies, as well as business support bodies. As such, they can receive more structured and practical support in the micro-setting of an industrial park than at the country-wide level. Various support programmes have been carried out around the world in order to enhance these industrial park clustering effects.

Examples of some successful industrial park policies may be found below, in Box 8:



- **India** became the first country in Asia to set up an Export Processing Zone with the establishment of EPZ in Kandla, Gujarat in 1965. Following China's success in implementing SEZs from 1978 onward, India's 2000 Trade Policy laid out a regulatory framework for the development of SEZs, eventually formalized under the SEZ Act in 2005, replacing the EPZ scheme, and providing a number of additional benefits. The goal was to promote exports, attract investment, create employment and give momentum to the manufacturing sector. The SEZ Act provides, amongst other benefits, income tax holidays and exemptions from indirect taxes. Indian State Governments play a key role in establishing SEZ units, and in creating on-site and off-site SEZ infrastructure. Any proposal for setting up a new SEZ has to be submitted to the State Government, which forwards it for consideration, with recommendations, by the Department of Commerce of Ministry. SEZ in India can be set up by any private, public, joint, domestic or foreign-owned company. In 2015, the government of India launched the Foreign Trade Policy 2015–2020, aiming to increase merchandise exports from US\$450 billion to US\$750 billion, including through building new mega-coastal economic zones and the reform of existing SEZs. The

<sup>69</sup> UNCTAD, *Investment Promotion Agencies as Policy Advocates*, Investment Advisory Services, Series A, Number 2 (2008)

<sup>70</sup> A. Tavares-Lehmann, P. Toledano, L. Johnson, and L. Sachs, L., *Rethinking Investment Incentives: Trends and Policy Options* (2016)

policy also stressed the importance of an Electronics Hardware Technology Park Scheme, a Software Technology Park Scheme and a Bio-Technology Park Scheme. The National Manufacturing Policy also recognized the importance of industrial parks in the form of National Investment and Manufacturing Zones. The objective of the National Manufacturing Policy is to increase manufacturing's share of GDP from 16% to 25% and to create 100 million jobs by 2022. Under the policy, the Central Government creates an enabling framework and provides incentives for PPP-based infrastructure development for large integrated industrial townships<sup>71</sup>.



- **The Republic of Korea**, in 1962, introduced the Industrial Location Policy under the Industrial Placement and Factory Construction Act, in order to provide industrial sites with good infrastructure at reasonable cost. The policy facilitated the establishing of large industrial zones and the clustering of regional industries, with the establishment of the country's first industrial park (Ulsan Industrial Centre) the same year. In the early 1970s, the development of large-scale industrial parks became an industrial policy priority, with a focus on six core strategic industries of steel, machinery, shipbuilding, electronics, non-ferrous metals and petrochemicals. In the 1980s and the 1990s, the government also began promoting small and medium-sized industrial parks in underdeveloped provinces, establishing small-scale agro-industrial parks throughout the country to attract SMEs and to improve incomes in rural communities. In the 1990s, the focus shifted to information-oriented and knowledge-based industries such as biotech, with innovation-oriented or high-tech industrial parks constructed in large provincial cities under the Industrial Sites and Development Act. Post 2000 efforts were geared towards improving the competitiveness of the first generation industrial parks and to make them environmentally-friendly. Exclusive foreign industrial complexes and foreign investment zones have also been introduced to attract FDI. Specialized parks, such as Cultural Industrial Parks and Telecommunication Industrial Parks, have also emerged. The Republic of Korea currently has 41 national industrial complexes, 510 local industrial parks, 11 urban high-tech industrial parks and 444 rural industrial parks<sup>72</sup>.

Box 8: National Industrial Park Policies in India and Republic of Korea

Socio-economically successful industrial park policy approaches can also be developed and implemented. For instance, one of UNIDO's contributions to the Sustainable Development Goals is through facilitating

the transformation of existing industrial parks into Eco-Industrial Parks (EIPs) around the world, as demonstrated in Box 9, below:

An Eco-Industrial Park (EIP) is a community of businesses located on a common site, whose residents not only seek to achieve enhanced economic performance but also environmental and social performance. Firm-level competitive advantages in these parks are derived from collective solutions aimed at generating enhanced resource productivity, deployment of technological solutions that facilitate industrial synergies and symbiosis, and from socially-responsible practices that both enhance workforce productivity and minimise potentially costly negative social externalities. Eco-Industrial Parks can contribute to better integration of industry into society through the creation of shared economic opportunities and benefits, as well as improved ecosystems. Eco-Industrial Parks promote resource efficiency, productivity and a circular economy, making a contribution to sustainable cities, by rejecting the notion of any required trade-off between economic growth and environmental protection<sup>73</sup>. UNIDO collaborates with the World Bank

<sup>71</sup> Ministry of Commerce and Industry of India, *Foreign Trade Policy 2015 – 2020* (2017); Ministry of Commerce and Industry of India, *National Manufacturing Policy (2011)*; Aggarwal, A., *Special Economic Zones in India: Growth Engines or Missed Opportunity?* (2016)

<sup>72</sup> Kim, J.I., *Lessons for South Asia from the Industrial Cluster Development Experience of the Republic of Korea*, Asian Development Bank (2015); Kim, K., *Industrial Parks in Korea - Outline and Recent Policy*, KIET Occasional Paper No. 69 (2008)

<sup>73</sup> UNIDO Department of Environment (2017), retrievable at: [https://www.unido.org/sites/default/files/2017-05/UNIDO\\_leaflet\\_01\\_Eco\\_Industrial\\_Park\\_170203\\_0.pdf](https://www.unido.org/sites/default/files/2017-05/UNIDO_leaflet_01_Eco_Industrial_Park_170203_0.pdf)

Group and Germany's GIZ to promote the development of standardized approaches for the implementation of Eco-Industrial Parks in developing countries<sup>74</sup>. In addition, UNIDO promotes the development of national programmes for Eco-Industrial Parks in countries with developing and transitional economies and, in doing so, promotes inclusive and sustainable industrial development (ISID). To date, UNIDO's EIP program has been working in China, Colombia, Egypt, India, Morocco, Peru, South Africa, Thailand, Ukraine and Viet Nam.

#### Box 9: Eco-Industrial Parks

Industrial parks can moreover be utilized as a policy instrument to further enhance the business climate through even more ambitious experimentation with

new industrial policies and legislation, as is for instance done in Free Zones and SEZs such as Dubai's Jebel Ali Free Zone, presented in Box 10 below:



Dubai is the trade and service hub for the Arabian Gulf and the broader Middle-Eastern region. The United Arab Emirates' Jebel Ali Free Zone ([www.jafza.ae](http://www.jafza.ae)), the largest free zone in the region, was established in 1984 in order to support foreign trade and investment at Dubai's Jebel Ali Port and has contributed greatly to the UAE's economic development, acting as a model for zones in the other emirates, for instance Sharjah's Hamriyah Free Zone ([www.hamriyahfz.com](http://www.hamriyahfz.com)). Apart from the infrastructure and tax incentives it offers, Jebel Ali is supported by its own investment laws, is the first free zone in the world to have been ISO 9002 certified, and is backed by Dubai's International Arbitration Centre's world-class dispute resolution system. FDI in the Jebel Ali, comprising 6,000 companies from 100 countries, represents 32 percent of total FDI flows into Dubai, contributes 21 per cent to Dubai's GDP and employs more than 144,000 people. In 2015, the zone handled \$ 87.6 billion in trade<sup>75</sup>.

#### Box 10: The Jebel Ali Free Zone in Dubai

Unless a country has established a powerful and independent industrial parks authority, investment support should be provided by the line ministries (e.g., the Ministry of Industry and Trade, Ministry of Economy, etc.), local authorities, and related statutory and regulatory agencies, which are mandated to draft, amend and enforce industrial parks regulations, preferably through a standing committee of line ministry, relevant agency and private sector representatives that ensures that these stakeholders are informed of each other's objectives and actions, and make coordinated decisions. Given that institutional and administrative areas

of regulatory responsibility are spread out over a variety of bodies and often jealously guarded by the concerned entities, implementation of industrial park policy is often ineffective if granted to a single line ministry or even to a committee chaired by such a line ministry. It can thus be helpful to place such committees under the overall chairmanship of the office of the Prime Minister or Head of State. Box 11 below provides an example of a national regulatory approach to industrial park investment policy formulation and investment facilitation in a conflict-affected country, Iraq:



UNIDO's support for industrial park development in Iraq between 2010 and 2014 led to a number of mutually reinforcing outcomes, including an improved institutional, policy and regulatory environment for industrial zones, as well as increased capacity in industrial zone management. The project notably helped the Government design a comprehensive and conducive legal and institutional framework for industrial parks, including through an "Industrial Cities Law" approved by the Shura Council, the Office of the Prime Minister, the Council of Ministers and the Council of Representatives (Parliament). The composition of the Steering Committee took into account the multiple stakeholders in industrial parks, including the Ministry of Planning, the Ministry of Industry and Minerals, the National Investment Commission, the Free Zone Commission within the Ministry of Finance, and the Governorates and Municipalities. The ongoing coordination between these multiple Ministries led to this project-based Steering Committee structure gradually transitioning into a formal, standing High-Level Industrial Parks Committee chaired by the Ministry of Industry and Minerals. The Committee governs industrial park development, including through its oversight of a semi-autonomous Industrial Zones Authority, established under its aegis.

#### Box 11: Iraq Industrial Parks Policy Oversight Framework

## 5.2 FOREIGN DIRECT INVESTMENT (FDI) GUARANTEES

As noted in Section 1 (Introduction), one of the most common rationales for setting up and promoting industrial parks in various countries is in order to attract FDI to their economies. This goal will not however typically be possible to achieve through industrial park policy alone, and is likely to require that the country adopt broader FDI guarantees.

Some important determinants of FDI include a country's labour costs and skills, transportation costs, infrastructure, market size, raw material availability, and to a lesser extent fiscal pressure<sup>76</sup>. Macroeconomic and political stability in the host country are also critical to foreign investors' decision

on whether to invest or not<sup>77</sup>. As these factors are largely tied to broader national economic policies, competitive FDI policy more specifically tends to be focused on adopting overarching framework laws for FDI, guaranteeing the transparent and non-discriminatory treatment of foreign investors (e.g., freedom to invest, national treatment, etc.), the right to employ foreign management and critical technical personnel, freedom of capital and current account transfers, limited and fair compensation in the event of expropriation, as well as efficient and transparent commercial dispute settlement through national and international arbitration.

## 5.3 FOREIGN EXCHANGE POLICIES AND REGULATIONS

Developing countries often implement policies designed to improve their Balance of Payments (BoP) position and foreign exchange reserves coverage. The main method for enhancing the inflow of foreign exchange into the country is through exporting goods to foreign markets with strong and stable convertible currencies. Export-oriented incentives provided in developing countries include export

credits, insurance and warranty programmes, "VAT-back" and Duty-Drawback schemes, and various tax exemptions. All of these can be made available to residents of industrial parks, where the government can often deliver and administer the programmes efficiently, given the agglomeration of companies thereby induced.

<sup>74</sup> UNIDO, *Implementation Handbook for Eco-Industrial Parks* (2017)

<sup>75</sup> Khaleej Times, *Jafza: At the Forefront of Innovation* (2016). [https://www.khaleejtimes.com/20161228/no-titleSee;Jebel Ali freezone, Introduction to Jebel Ali Free Zone, Main Benefits, Ways to Form Your Company](https://www.khaleejtimes.com/20161228/no-titleSee;Jebel%20Ali%20Free%20Zone,%20Main%20Benefits,%20Ways%20to%20Form%20Your%20Company). <https://www.varaluae.com/company-formation-in-dubai/free-zones-dubai/jebel-ali-freezone/>; Dubai Free Zone Company Formation, *Taxation in Dubai Free Zones*. <https://www.companyincorporationdubai.com/taxation-in-dubai-free-zones>

<sup>76</sup> UNCTAD, *World Investment Report 1998 – Trends and Determinants*, (1998)

<sup>77</sup> UNIDO, *Africa Investor Survey Report 2011 – Towards Evidence-Based Investment Promotion Strategies* (2012)

The key foreign exchange policy that foreign (as opposed to domestic) investors seek is one stemming however from a different concern altogether. While FDI may be resource and export-oriented, in countries with large domestic markets or those with access to large regional markets, it is often market-seeking investment and has no particular preference for exports over any other sales. FDI, regardless of the market orientation of its sales, is generally deemed to be beneficial and desirable to recipient countries for the numerous reasons previously presented (i.e., job creation, technology transfer, supply chain linkages, etc.), although such benefits may not be automatic and their likelihood can be augmented through investment-enabling measures<sup>78</sup>.

While host country governments might deem the reinvestment of earnings in their economies to be the preferred outcome from foreign investment (and

#### 5.4 ARBITRATION FOR FOREIGN INVESTORS

In order to attract and retain foreign investment, every country should create an efficient, simple, fair and transparent system for commercial disputes settlement.

Particularly high-value and complex international investment disputes are sometimes resolved by international arbitration – as an alternative to the settlement of investment disputes by national courts. This form of arbitration is the designated default dispute resolution process in disputes between governments and companies under international trade or investment treaties. One advantage of this approach is that the parties to the dispute can select (or at least be assured of) arbitrators who have technical expertise in the field in question.

The 1966 Convention on the Settlement of Investment Disputes between States and Nationals of Other States (ICSID Convention) is one of the preferred

indeed, this is often investors' preference as well), what FDI (with all of its associated economic benefits) ultimately requires and seeks is the legal flexibility guaranteeing investors' rights to repatriate or reinvest profits and capital according to their business needs and preferences, and to pay their global supply chain providers with the proceeds from their sales, free of any bureaucratic impediments to foreign exchange transactions. This means that what FDI requires from investment locations is the highest possible degree of capital and current account convertibility and financial transactional freedom and flexibility. This further means that, apart from basic Central Bank clearance rules, the protections against transfer pricing, and Anti-Money Laundering (AML) and Anti-Terrorism Financing (ATF) safeguards, and foreign exchange policy and regulations should generally strive to be free from market-inhibiting controls.

instruments for resolving investment disputes of this nature. The International Centre for Settlement of Investment Disputes (ICSID) is an international institution, headquartered in Washington DC, established under the Convention for the arbitration of investment disputes between foreign investors and the investment's hosting State<sup>79</sup>. Besides the ICSID, an international commercial arbitral forum (and more importantly, a set of clear rules) is offered by the United Nations Commission on International Trade Law (UNCITRAL), established in 1966.

Other important international arbitral forums often preferred by investors include those of the International Chamber of Commerce (ICC) in Paris and of the London Chamber for International Arbitration (LCIA), as well as such regional forums as the Dubai International Arbitration Centre (DIAC).

The principle legal guarantee as regards State enforcement of international or foreign arbitral awards is to be found in its ratification of the New

<sup>78</sup> Potentially partially mitigating some of these benefits, some economic literature has advanced the case that market-seeking FDI brings a greater risk of domestic crowding-out effects, coupled with lower Global Value Chain (GVC) integration potential overall, than does export-oriented FDI.

<sup>79</sup> International Centre for Settlement of Investment Disputes (ICSID). <https://icsid.worldbank.org/en/Pages/about/default.aspx>

York Convention on the Recognition and Enforcement of Foreign Arbitral Awards of June 10, 1958 ("the NY Convention"). Indeed, the NY Convention provides common standards for the recognition and enforcement of foreign arbitral awards. The provisions of the NY Convention can be summarized in the rule that foreign arbitral awards are generally recognized and enforceable in a member state of the NY Convention, except in certain defined exceptional circumstances. As of end-April 2019, there were 159 parties to the NY Convention, including 156 of the 193 United Nations member states plus the Cook Islands, the Holy See, and the State of Palestine. The United Nations Office of Legal Affairs - International Trade Law Branch (OLA/ITLB) offers assistance in any matter related to the adoption of the NY Convention,

including reviewing national legislation and providing advice on the adoption of the UNCITRAL Model Law on International Commercial Arbitration.

Generally the single most important question, however, for the bulk of industrial park investors, is the presence, in their host countries, of world-class local arbitration rules and centres, to which access is guaranteed by the countries' investment, alternative dispute resolution or industrial park laws and regulations (as well as sometimes the 'Developer Agreement' as regards the industrial park developer/operator itself). As noted above, this can be provided through the adoption of a framework consistent with the UNCITRAL Model Law on International Commercial Arbitration<sup>80</sup>.

#### 5.5 INVESTMENT INCENTIVES

As there is constant global competition for increasingly scarce FDI, investment incentives have long been a policy tool used in pursuit of national and regional

economic development goals<sup>81</sup>. Investment incentives may be classified into three broad categories:

- a Financial incentives (direct subsidies, grants and loans);
- b Fiscal incentives (tax holidays and reduced tax rates); and
- c Other incentives, including subsidized land, infrastructure and services, as well as various regulatory concessions.

The most common incentives in industrial parks relate to the provision of subsidized serviced land and infrastructure. For example, the Suzhou Industrial Park (SIP) in China, which offers some of the best zone infrastructure in the country, has invested in land levelling, roads, electricity, water supply and drainage, waste water disposal and treatment, gas supply, heating and a broad range of telecommunication services – including broadband and international roaming<sup>82</sup>.

Additional fiscal incentives are also often frequently offered. One such common incentive for the resident enterprises of industrial parks is customs duty exemptions and deferrals. These are aimed at lowering

production costs, through their cost implications for machinery and parts, for the improvement of enterprise cash flow through the deferral of duty payments aligned with just-in-time delivery, and at promoting export activity by exempting duties on goods in transit as well as on raw materials and inputs incorporated into subsequently-exported goods. Corporate income tax holidays and reductions have also been commonly used to improve the balance sheets of enterprises during periods of new investment. Direct financial incentives are rarer.

An interesting example of investment incentives are those offered by Turkey, as shown in Box 12 below:

<sup>80</sup> United Nations Commission on International Trade Law. [http://www.uncitral.org/uncitral/en/uncitral\\_texts/arbitration.html](http://www.uncitral.org/uncitral/en/uncitral_texts/arbitration.html)

<sup>81</sup> UNCTAD, *World Investment Report, Investment and New Industrial Policies* (2018)

<sup>82</sup> D. Z. Zeng, *Building a Competitive City Through Innovation and Global Knowledge: The Case of Sino-Singapore Suzhou Industrial Park*, World Bank Policy Research Working Paper 7570.





The Turkish investment incentives system comprises four different schemes, equally available to both local and foreign investors, both inside and outside industrial parks:

- The General Investment Incentives Scheme;
- The Regional Investment Incentives Scheme;
- The Large-Scale Investment Incentives Scheme; and
- The Strategic Investment Incentives Scheme.

Under these various schemes, VAT zero-rating and refund mechanisms, customs duty suspensions, income tax reductions and withholding allowances, social security premium support, interest rate support, and land can all be provided in support of new investment. These incentives differ according to the type, size and location of the investment. Moreover, additional incentives are provided to enterprises located in industrial parks, including:

- Exemption from real estate taxes for five years from the date of completion of plant construction;
- Reduced water, natural gas and telecommunication tariffs;
- Exemption from title registration taxes when merging or separating industrial park plots;
- Exemption from municipal taxes relating to the construction and operation of plants; and
- Exemption from the municipal tax on solid waste if the industrial park does not avail itself of municipal solid waste management services<sup>83</sup>.

#### Box 12: Turkey's Investment Incentives

Regardless of their specific elements and levels, any industrial park investment incentives should take the following key considerations into account:

- a Incentives have public opportunity costs, which should be applied “smartly” to support primarily strategic sectors;
- b Incentives systems should be performance-oriented, easy to use and transparent;
- c Incentives' impacts should be measurable;
- d Incentives should be relevant to the specific conditions, endowments and comparative advantages of the host country and region (e.g., location, infrastructure, sectors);
- e Incentives must take into consideration the international rules-based investment frameworks established by the WTO, OECD, FATF and EU (which will be discussed later in this chapter); and
- f Incentives should not discriminate against certain ownership structures, and the treatment of domestic and foreign investors should be on equal footing.

Examples of incentives based on “Triple-S specificity”<sup>84</sup>, with sector-, size- and site-based performance indicators, may be found in certain Chinese industrial parks, as illustrated in Box 13, below:



Direct subsidies are offered by certain industrial parks in China to both domestic and foreign investors whose projects meet certain criteria (e.g., attracting high-calibre talent, promoting industrial upgrading and scientific and technological innovation). Available incentives include:

- Incentives for industrial transformation and upgrading – To encourage inefficient enterprises and enterprises with poor environmental performance to upgrade; a certain proportion of investment in the associated fixed assets can later be refunded;
- Tax credits for expanding modern service firms – the Wuhan Economic Development Zone, for example, provides supports to enterprises in modern services to ramp up production, offering financial rewards of up to RMB 100,000, RMB 200,000 or RMB 300,000 respectively for those qualifying enterprises whose annual operating income is over RMB 100 million, growing at an annual rate of over 10%, 20% or 30%, and having made a positive tax revenue contribution; and
- Support for strategic local development projects – Strategic projects that may serve as growth drivers and contribute in an exceptional manner to local economic development may be granted support upon approval by the district government and the management committee governing the hosting industrial park.

#### Box 13: Performance Incentives for Investors in Industrial Parks in China

The effectiveness of any incentives in contributing to economic impact depends, in all cases, on industrial parks' regular monitoring and evaluation of enterprise-level information. Indeed, as assumptions that led to the original incentives based on intended performance outcomes may cease to apply later in the

investment's lifecycle, they need to be periodically revisited, adjusted and phased out, as appropriate. An example of such monitoring and evaluation, and incentives reassessment on systemic level, may be found in actions taken in Viet Nam in recent years, as illustrated in Box 14, below:



UNIDO investment promotion assistance to Viet Nam in 2011 involved an industrial investment survey and the preparation of the resulting “2011 UNIDO Viet Nam Industrial Investment Report”, analysing the characteristics of foreign-invested enterprises operating in the country's industrial parks. The survey revealed that more than half of FDI companies operate in industrial parks, especially in the provinces of Binh Duong, Dong Nai and Ho Chi Minh City. The Survey found that business activity in Viet Nam's industrial parks mainly consisted of labour-intensive and low-tech, export-oriented manufacturing. The survey further found that, despite receiving more generous incentives than investors outside of industrial parks, foreign investors located in industrial parks were not performing any better in terms of their economic impacts. Indeed, they generated fewer backward linkages to local suppliers. The Report further concluded that, while Viet Nam's industrial parks effectively attracted FDI and absorbed surplus labour, they made low contributions to technology transfer and had limited other spill over effects. As a result, it was recommended that Viet Nam re-evaluate its investment incentives framework for industrial parks.

#### Box 14: Measuring Industrial Park Incentives' Impact on Business Performance in Viet Nam

<sup>83</sup> Investment of Support and Promotion Agency of Turkey. <http://www.invest.gov.tr/en-US/investmentguide/investorsguide/Pages/Incentives.aspx>; <http://www.invest.gov.tr/en-US/investmentguide/investorsguide/Pages/SpecialInvestmentZones.aspx>

<sup>84</sup> UNIDO, *Economic Diversification Strategies: A Key Driver in Africa's New Industrial Revolution* (2012)

## 5.6 DEDICATED INDUSTRIAL PARK LEGISLATION

Because they are governed as often as not by a patchwork of national laws and policies, not all industrial park programmes have dedicated or specific enabling legislation. When they do, some of the areas' industrial park legislation may cover includes the following:

- a Efficient industrial park location selection for production and trade;
- b Improving transportation and communication facilities and connections between industrial parks and markets;
- c Improvement of physical infrastructure and brownfield superstructure in industrial parks, including through planning and development control frameworks;
- d Rights with respect to the establishment, use and operation of infrastructure facilities within industrial parks;
- e Investor qualifications and plot allocation;
- f Investment incentives;
- g Cluster support programmes within industrial parks;
- h Environmental (i.e., pollution and energy) obligations of industrial park developers, operators and users;
- i Enhancing co-operation among enterprises in industrial parks, as well as between industrial parks and research centres; and
- j Designation and organization of the industrial park governance framework and responsible institutions, including the operation, management and supervision organs, along with their duties and powers, and administrative support mechanisms such as 'one-stop shops'.

Examples of industrial park laws incorporating some of the above principles and concepts include those of Viet Nam and of Ethiopia, as discussed in Box 15 below:



- **Viet Nam:** The enactment of Viet Nam's Law on Investment in 2005 contributed considerably to the rapid development of the nation's industrial and economic processing zones. Under the Law, investors in these zones enjoy preferential taxes, including as regards the country's enterprise tax, import tax and land use tax. According to the Ministry of Planning and Investment (MPI), Viet Nam now has 326 industrial and economic zones, offering 94,900 ha of serviced industrial land. On May 22, 2018, the Vietnamese government issued Decree No.82/2018/ND-CP ("Decree 82") to regulate the management of industrial and economic zones. The Decree provides a framework for the planning, establishment and operation of the zones, as well as for investment therein. Under the Decree, the MPI assumes primary responsibility for, and collaborates with relevant central and municipal government institutions, in securing the Prime Minister's approval for the planning and development of industrial parks.



- **Ethiopia:** Ethiopia's Growth and Transformation Plan (GTP I and GTP II) identifies industrial parks as one means for the country's industrialization and promotes the establishment of industrial parks for the following priority national sectors: textiles and garments, leather and leather products, sugar, cement, metals and engineering, chemicals, pharmaceuticals and agro-processing. Ethiopia plans to increase the number of operational industrial parks from the current five to about 30 by 2025, as part of its efforts to make the country an industrial hub over the same period. To support this program, the Industrial Park Proclamation No. 886/2015 was adopted to provide a framework for the establishment, development, administration and supervision of industrial parks. Under the Proclamation, industrial parks must be designated by the Investment Board but can, in principle, be developed by the federal or regional governments, through PPPs with the IPDC, or by private developers. Additional investment laws, including the Investment Proclamation 769/2012, provide a wide-ranging incentives package for investments in priority sectors with high export potential. The government has also restructured three important institutions to drive investment and competitiveness. These include the Ethiopian Investment Board (EIB) that serves as a policy and strategy formulation and oversight body; the Ethiopian Investment Commission (EIC) responsible for attracting and regulating foreign investors; and the IPDC, responsible for the planning, development and operation of public industrial parks, including pre-built and fully-serviced factory shells<sup>85</sup>.

Box 15: Industrial Park Legislation in Viet Nam and Ethiopia

## 5.7 INDUSTRIAL PARK ONE-STOP SHOPS

As noted immediately above in the discussion on dedicated industrial park legislation, some of the reasons such laws may be required are in order to make the industrial parks' legal compliance obligations and interface with government oversight agencies more efficient. Specific mention was made, in that context, of the value of establishing one-stop shops for the delivery of administrative services to business. Indeed, dedicated staff from each relevant line ministry or agency should be assigned

to a one-stop shop to offer a seamlessly-integrated administrative services package to investors. Whether such enabling legislation is adopted or such one-stop shops are established through sub-statutory and administrative means, such as inter-agency memoranda of understanding and service-level agreements and their usefulness and importance to investors are certain. Some examples of industrial park one-stop shop programmes may be found in Box 16, below:

Industrial parks host a wide range of stakeholders. Efficient and coordinated operation of the industrial park is often a challenge in this context, due to the diversity of these actors and their interests, and their different levels of involvement in the industrial park. An industrial park one-stop shop with proper decision-making power is a good solution for providing a single point of contact to facilitate the various stakeholders' requirements, particularly for regulatory compliance. It improves administrative efficiency in obtaining necessary services and government approvals, as well as simplifying the associated procedures. If the park operator was a private entity, it would usually be unable to provide these services, beyond a "front office" facilitation function. The types of services provided by one-stop shops, and the type of institutions represented, vary depending on national laws and the characteristics of each industrial park. Around the world, the following services may be provided by an industrial park's one-stop shop:

<sup>85</sup> Growth and Transformation Plan ("GTP 1" and "GTP 2")

- Business registration and licensing
- Investment incentives information
- Employment permits
- Planning and construction
- Social security registration and account management
- Tax and custom services
- Port or airport cargo clearances
- Access to publicly-funded innovation and start-up promotion services
- Quality control services (e.g. lab testing)
- Utilities (electricity, telecom, water and gas) account management
- Environmental approvals
- Legalisation and notarisation
- Tourism information services
- Land administration
- Access to banking services (provided by commercial banks located on-site or in separate premises)
- Access to housing

Thilawa Special Economic Zone in Myanmar, for instance, is equipped with a one-stop shop to ensure quick and easy tenant registration and business compliance environments. It is staffed by representatives of various ministries, who are fully-authorized to grant the necessary approvals and registration services to investors. Some of the institutions represented in the Thilawa SEZ one-stop shop include:

- Commerce and Consumer Department, Ministry of Commerce;
- Department of Customs, Ministry of Finance;
- Department of Revenue, Ministry of Finance;
- Department of Immigration and National Registration, Ministry of Immigration and Population;
- Labour Department, Ministry of Labour;
- Department of Human Settlement and Housing Development, Ministry of Construction;
- General Administration Department (GAD), Yangon Southern District;
- Myanmar Port Authority;
- Directorate of Investment and Companies Administration (DICA).

Suzhou Industrial Park (SIP)'s one-stop shop in China, occupies 5,000 square meters, with 61 counters and nearly 100 employees. The SIP one-stop shop accepts and processes 85% of applications on the spot, 10% in under two working days, and 5% in under seven working days. In addition to online and offline inquiry services, it also has an online platform for the evaluation and approval of import and export applications. Its future plans include building a corporate database, promoting information-sharing platforms, and further improving the quality of online services.

It should be noted that in both of the above examples, one-stop shop services are mostly related to regulatory compliance and are financed and provided by government entities.

#### Box 16: Industrial Park One-Stop Shops

Many enterprises in developing countries, particularly those located in countries that do not have well-established quality infrastructure (QI) to support manufacturing industry, face enormous challenges in joining the global market. Integrating QI facilities and services into one-stop services provides, among other things, support services to resident firms to

help them comply with the export market's technical regulations and standards.

An example of such quality infrastructure and services can be found in certain Chinese and Ethiopian industrial parks, as illustrated in Box 17.

**The Suzhou Industrial Park (SIP)**, whose development started in 1994, is located in Suzhou City, Jiangsu Province in China. After 25 years of development, it has now been transformed into a high-tech and eco-friendly industrial zone consisting of thousands of enterprises and innovative start-ups focused on information and communication technologies, medical equipment manufacturing, cloud computing and artificial intelligence, etc. Quality control facilities, especially testing and inspection services, have been constantly developed and provided within the park as one-stop services, to support quality assurance, R&D, innovation, and business linkage within the park, as well to the local and international markets.

SIP established a testing laboratory, the so-called Suzhou IP Converged Communications Open Laboratory. It was accredited in 2011 by the China National Accreditation Service for Conformity Assessment (CNAS), the laboratory accreditation authority in China<sup>86</sup>. The laboratory was authorized to provide testing services for electronics and electronic products under various high and low temperature, moisture, and vibration conditions. Moreover, the laboratory is allowed to use the CNAS logo and issue internationally-recognized test reports. The Laboratory also offers comprehensive public services in product testing, industrial consulting, and staff training in the fields of R&D, production, integration, and application.

**Integrated Agro-Industrial Parks (IAIPs)** are a geographical cluster of independent firms grouped together to gain economies of scale and positive externalities by sharing infrastructure – roads, power, communication, storage, packaging, by-product utilization, effluent treatment, logistics and transport, laboratory facilities, etc. The programme has been under development by the Ethiopian Government with support from UNIDO and the Food and Agricultural Organization (FAO), to accelerate the agro-industry sector in Ethiopia. The IAIPs in Ethiopia will develop and establish specialized quarantine facilities, quality control labs, quality certification centres, etc. in order to provide quality assurance and quality control over various agricultural products<sup>87</sup>.

#### Box 17: Quality Control Services in Industrial Parks in China and Ethiopia

## 5.8 MULTILATERAL, REGIONAL AND BILATERAL INVESTMENT AGREEMENTS AND RULES

Globalisation and the growth of international trade and investment are leading to increasing numbers of multilateral, regional and bilateral investment (or trade and investment) agreements between countries<sup>88</sup>. On the multilateral front, WTO principles related to investment include reducing barriers and discriminatory treatment, for instance through the National Treatment (NT) principle<sup>89</sup>, as notably enshrined in the rules set forth under the WTO's Subsidies and Countervailing Measures (SCM

and Trade-Related Investment Measures (TRIMS) agreements. Multilateral rules also include those of the OECD<sup>90</sup>, FATF<sup>91</sup> and EU Code of Conduct<sup>92</sup>. As regards bilateral and regional investment rules, UNCTAD's Roadmap for International Investment Agreements (IIAs), presented in the UNCTAD 2015 World Investment Report<sup>93</sup>, sets out five action areas, which countries should align with in investment agreements:

<sup>86</sup> Suzhou Industrial Park. [http://www.sipac.gov.cn/english/categoryreport/IndustriesAndEnterprises/201108/t20110805\\_108984.htm](http://www.sipac.gov.cn/english/categoryreport/IndustriesAndEnterprises/201108/t20110805_108984.htm)

<sup>87</sup> UNIDO, *Agro-Industrial Parks Feasibility Study and Business Plan* (2015)

<sup>88</sup> Note: As of 2018, there are 287 free trade agreements (FTAs) and 287 regional trade agreements (RTAs) in force around the world; in 2000, these numbers were respectively 94 and 79. See: WTO Database, retrievable at: <http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx>

<sup>89</sup> Note: Indirectly, by facilitating investment-based "third modality trade" and market access, such trade-related principles as the reduction of Non-Tariff Barriers (NTBs) and access to Most-Favoured Nation (NTB) tariff rates for movements of both final products and their production-related inputs, can also influence export-oriented corporate location and investment decisions.

<sup>90</sup> Note: Including transparency commitments under the: OECD Agreement on the Exchange of Information on Tax Matters; 2017 Multilateral Convention to Implement Tax Treaty Related Measures to Prevent Base Erosion and Profit Shifting ("BEPS Treaty"); OECD 2017 Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations; and OECD Controlled Foreign Company "CFC" Rules.

<sup>91</sup> Financial Action Task Force (FATF) *anti-money laundering (AML) and anti-terrorism financing (ATF) standards*.

<sup>92</sup> Council of the European Union Resolution on a Code of Conduct for Business Taxation of December 1, 1997.



- Safeguarding the right to regulate, while providing protection to investment;
- Promoting and facilitating investment;
- Ensuring responsible investment;
- Enhancing systemic consistency in the treatment of investment; and
- Reforming investment dispute settlement mechanisms.

As underscored by the third bullet in the above list, modern “new generation” IIAs increasingly include a sustainable development orientation. In addition to increasing direct references to country-level Sustainable Development Goals (SDG), this orientation is, more importantly, reflected in their inclusion of clauses relating to the protection of health and safety, labour rights and the environment.

As the fundamental aim of all industrial parks is to attract investment, it is important that their legal and policy frameworks be designed so as to comply with these various rules.

A final word is in order regarding SEZs, FTZs and EPZs. These schemes are forms of industrial parks generally established as “Distinct Fiscal Territories”

within their host countries, as permitted under World Customs Organization (WCO) rules. As such, they usually establish areas where customs tariffs are suspended in order to facilitate trade and enhance exports, through reduced company operating costs and cash flow. They also often offer tax incentives. It is crucial to bear in mind, when setting up any such regimes, that certain tax incentives can have disruptive effects on competition among countries, notably when tied to export requirements, and those zones thus run a more significant risk of falling afoul of the various multilateral rules discussed above. It is therefore particularly important that these zones’ policy frameworks be aligned with these international fair taxation rules, prohibitions against tax-induced export subsidies and rules on the non-discriminatory treatment of foreign investment.

<sup>93</sup> UNCTAD, *World Investment Report – Reforming International Investment Governance* (2015)





# 6



## Industrial Park Investment Marketing and Facilitation

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Lack of effective marketing and investment facilitation activities can lead to failure to attract quality investment to an industrial park, even though it may have strong infrastructure, legal arrangements and services in place. Conversely, there is broad consensus that a country's marketing and investment facilitation efforts can positively impact investment, as the establishment of national investment

promotion agencies (IPAs) in almost every country suggests. It is therefore essential to establish a clear and effective investment marketing and facilitation strategy, offering and emphasizing the package of tailored investor support services that industrial parks offer, including any "one-stop shop" service delivery mechanism.

## 6.1 SECTOR IDENTIFICATION AND INVESTMENT TARGETING

If industrial parks are to offer more than mere industrial real estate solutions and are to serve more fundamental economic interests, then identifying those sectors that can provide a long-term competitive advantage for the host country or region should form

the basis for the subsequent actions under any industrial parks investment promotion strategy<sup>94</sup>.

The following approaches are recommended for effective and impactful sector identification and associated investment attraction:

- a Identifying the opportunities and challenges associated with attracting various sectors into the economy, including as regards their relative comparative advantages, occupants' expectation as to what industrial parks should offer and raw material linkage, through survey and a consultation process with the relevant stakeholders. UNIDO's industrial policy approach recommends that an assessment of priority industries and ensuing investment promotion efforts be undertaken along three dimensions: the growth dimension, the pro-poor dimension and the environmental dimension (see Figure 5). Leveraging its experience and expertise in evidence-based research and statistics, UNIDO has successfully assisted governments in establishing strategic pathways to industrial sector prioritisation and targeting<sup>95</sup>;
- b Sector-specific interventions (including sector-specific industrial parks) aimed at reducing the constraints of these industrial sectors that impede their competitiveness, as for instance demonstrated by Ethiopia's industrial parks' investment targeting activities (see Box 18 below):

Ethiopia's economy is predominantly agriculture-based. Agriculture supports 85% of the population, constitutes 46% of GDP and 90% of export value. The development of agro-industry therefore presents Ethiopia with an opportunity to accelerate industrial and economic development. UNIDO's PCP for Ethiopia focuses on three light manufacturing sectors: agro-food processing; textiles and apparel; and leather and leather products. These sectors were selected due to their job creation potential, strong linkages to the agricultural sector, high export potential and capacity to attract private sector investment. In this overall context, in full alignment with the Ethiopian Industrial Development Strategic Plan (2013–2025), which emphasizes Ethiopia's goal of becoming Africa's light manufacturing hub by 2025, the development of integrated agro-industrial parks is a key objective of the PCP for Ethiopia<sup>96</sup>.

### Box 18: Agro-Processing Investment Targeting in Industrial Parks in Ethiopia

<sup>94</sup> FIAS, *Special Economic Zones – Performance, Lessons Learned, and Implications for Zone Development* (2008)

<sup>95</sup> UNIDO, *Industrial Policy for Prosperity: Reasoning and Approach*, Working Paper 2/2011 (2011)

<sup>96</sup> Ministry of Industry, *Ethiopian Industrial Development Strategic Plan 2013–2025* (2013); Programme for Country Partnership for Ethiopia.: <https://www.unido.org/programme-country-partnership/ethiopia>

- c Targeting anchor investors that can be regarded as leaders in their respective sectors. This not only sends a strong signal to other potential investors to look more closely at the market and cost conditions of the industrial park in question but can also help to directly "crowd in" the lead investor's existing international suppliers. A virtuous cycle then regularly ensues, whereby word-of-mouth marketing by existing investors complements and amplifies formal investment promotion efforts.

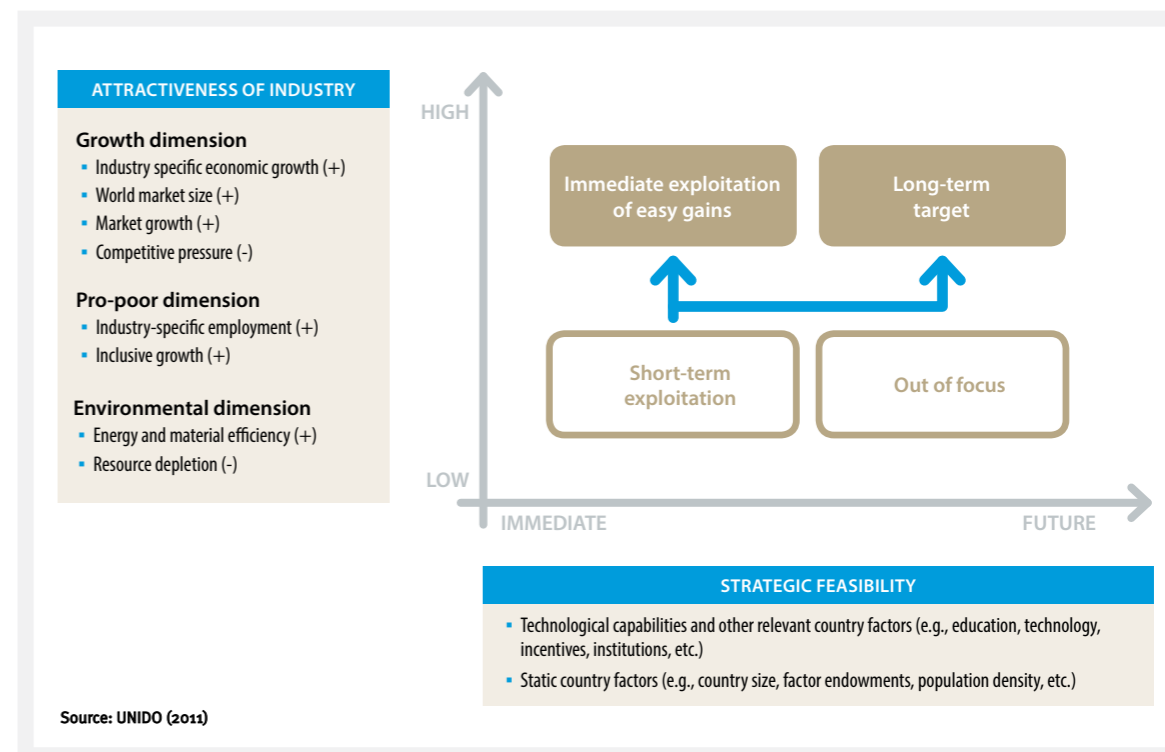


Figure 5: UNIDO Approach to Determining Priority Industries for Investment Promotion

## 6.2 INVESTMENT PROMOTION

Studies confirm the effectiveness of investment promotion as a relatively "safe" and non-distortive industrial policy tool whose impact on FDI can be significant<sup>97</sup>. Results suggest that sectors targeted through specific investment promotion campaigns receive on average more than twice as much FDI inflow as non-targeted sectors and that the cost-benefit of

investment promotion is highly positive as compared with other policy measures<sup>98</sup>.

Image-building campaigns, while important, are just one element of investment promotion, which usually also comprise the following<sup>99</sup>:

<sup>97</sup> T. Harding and B.S. Javorcik, B. S., "Roll Out the Red Carpet and They Will Come: Investment Promotion and FDI Inflows", in *The Economic Journal* (2011), 121(S57), pp. 1445–1476.

<sup>98</sup> Academic research shows that US\$1 spent on investment promotion raises FDI inflows by US\$189. See: T. Harding and B.S. Javorcik, B. S., *Investment Promotion and FDI Inflows: Quality Matters*, Economics Series Working Papers 612, University of Oxford Department of Economics (2012)

<sup>99</sup> UNIDO, *Guidelines for Investment Promotion Agencies, Industrial Promotion and Technology Branch* (2003)



- a Fact sheets, videos and information briefs that seek to attract the interest of potential investors in a specific industrial park;
- b Newsletters that inform their target audience of investment developments, construction progress, plans and events related to the industrial park, typically circulated on a monthly or quarterly basis;
- c Media and public relations activities that publicise investment success stories and alert the domestic and international media, as well as select audiences, to upcoming events and favourable policy developments as regards industrial parks. These may entail press, radio and television briefings, conferences, organized inbound and outbound tours for national and international journalists, and tours by government representatives to promote the industrial park programme in foreign markets;
- d A dedicated website and suite of social media channels; and
- e Mobilisation of the network of a country's diplomatic channels, as embassies and consulates are very often the first point of contact for potential foreign investors<sup>100</sup>.

A key risk in investment promotion campaigns relates to their proper timing. Premature campaigns based only on mock-up versions of the industrial park master plan, for instance lack transparent and verifiable information regarding a park's readiness to receive investors. Promotion campaigns are therefore

usually ineffective unless the construction work on an industrial park is in its final stretch<sup>101</sup>.

Another common impediment to effective investment promotion relates to coordination failures among stakeholders. Such activities as regards industrial parks should therefore:

- a Be synchronised with efforts undertaken by national IPAs;
- b Avoid sending mixed signals and creating confusion amongst potential investors about applicable investment policies, especially where there may be overlapping regulatory mandates and jurisdictions among relevant government agencies; and
- c Coordinate the exchange information amongst key industrial park stakeholders.

### 6.3 INVESTOR PERFORMANCE REQUIREMENTS

In an attempt to ensure that industrial park investment measurably contributes to its host country's economic development, some nations set performance criteria tied to the conditions and industrialisation level of the economy. In the case of industrial park resident enterprises, such performance requirements can be characterized as “stipulations imposed on investors,

requiring them to meet certain specified goals with respect to their operations in the host country. They are and have been used by developed and developing countries together with screening mechanisms and incentives, to enhance various development objectives”<sup>102</sup>.

<sup>100</sup> Note: It may for instance be noted that 15 percent of Chinese investors with the intention to invest in Africa indicated that their first contact points were African Embassies in Beijing. Potential returning diaspora investors are also likely to contact their home country's embassy before investigating any other information channels. See: UNIDO, *Africa Investor Report 2011: Towards Evidence-Based Investment Promotion Strategies* (2012)

<sup>101</sup> T. Farole, *Special Economic Zones in Africa – Comparing Performance and Learning from Global Experience*, World Bank (2011)

<sup>102</sup> UNCTAD, *Foreign Direct Investment and Performance Requirements: New Evidence from Selected Countries* (2003)

The issue of performance requirements is a contentious one, as their older and more traditional forms (e.g., export, equity, local employment, technology transfer and local content requirements) are inconsistent with the WTO Trade-Related Investment Measures (TRIMS) and Subsidies and Countervailing Measures (SCM) agreements which entered into force in 1995. That said, new industrial policy (NIP) approaches see moderate performance requirements as a legitimate means to spur and channel desirable investor behaviour and to attract FDI in strategic and specific

industrial “sectors”, of a specific “size” and in specific geographical “spaces”<sup>103</sup>. A particular feature of NIP is this “Triple-S specificity”<sup>104</sup>. Such performance requirements should moreover be time-bound and well-justified (e.g. infant industry protection) and follow a path towards gradual relaxation<sup>105</sup>. Still, performance requirements are more often applied in LDCs that have more flexibility as to their use, due to the exceptions that the international rules-based trading system allows for developing countries.

### 6.4 INVESTOR SUPPORT, FACILITATION AND AFTERCARE SYSTEMS

The first few years following an enterprise's establishment are critical to its survival and development. Thus, supporting the enterprise both during as well as after the establishment phase is of prime importance. There is an overall consensus that the mandate of IPAs must go beyond mere marketing towards investment facilitation in order to have a lasting impact on FDI inflows and retention.

and support services for FDI entry, in order to assist foreign investors in navigating host country licensing and permitting processes. As important as this function may be in attracting new FDI, harnessing “quality” FDI in the medium to long-term requires a shift to investment facilitation aimed at securing the re-investment of earnings by existing investors, which is all too often neglected<sup>106</sup>. The prevailing approach also unnecessarily favours FDI over domestic investment.

Successive UNIDO investor surveys and reports have consistently found that a proactive and strategic approach to investor aftercare is unfortunately still the exception. The norm, especially in developing countries, is often to only offer investment advisory

UNIDO classifies investment support into four phases: the decision/pre-investment stage (Phase 1), the entry stage (Phase 2), the implementation stage (Phase 3) and the operation/aftercare stage (Phase 4)<sup>107</sup>, as illustrated by Figure 6:

<sup>103</sup> For the neo-classical approach, see: Djankov, R. La Porta, F. Lopez-de-Silanes and A. Shleifer “The Regulation of Entry”, in *The Quarterly Journal of Economics* 117(1), 1-37. For a new industrial policy approach, see: UNCTAD and UNIDO, *Economic Development in Africa Report 2011: Fostering Industrial Development in Africa in the New Global Environment* (2011)

<sup>104</sup> UNIDO, *Economic Diversification Strategies: A Key Driver in Africa's New Industrial Revolution*, Working Paper 2/2012 (2012)

<sup>105</sup> UNCTAD, *World Investment Report, Investment and New Industrial Policies* (2018)

<sup>106</sup> S.M. Lundan, “Reinvested Earnings as a Component of FDI: An Analytical Review of the Determinants of Reinvestment”, in *Transnational Corporations* (2006) 15(3), pp. 35-66.

<sup>107</sup> UNIDO, *Africa Investor Report 2011: Towards Evidence-Based Investment Promotion Strategies* (2012), Pg. 148; UNIDO, *Vietnam Industrial Investment Report 2011: Understanding the Impact of Foreign Direct Investment on Industrial Development* (2012), Pg. 145.



Figure 6: Four Phases of Investment Support

The effective delivery of aftercare is aided by a communications strategy including such elements as regular investor surveys and a customer relationship management (CRM) system, providing the industrial park operator with information on residents' strategic business focus, operating climate perceptions and expansion plans. The effectiveness of aftercare

support programmes also depends on industrial park planning-stage site selection, which should take into account the proximity of reliable and organized local suppliers and labour markets, as well as proximity to regional transformation hubs if the parks will not act as such hubs themselves.

High-quality investment facilitation during all four phases (and particularly during Phase 4) can set off several cycles of sequential investments linked to one or more expansion projects. It is important

that industrial park operators and the government recognize this in their efforts to better satisfy investor support services needs throughout the various stages of their investment lifecycle.

### 6.5 INVESTMENT FACILITATION COORDINATION AND DELIVERY FRAMEWORKS

At the national level, unless a country has established a powerful and independent industrial parks authority, investment support should be provided by the line ministries, and related statutory and regulatory agencies, mandated to adopt policies and to deliver administrative services to industrial parks and their residents, preferably through a standing committee that ensures these stakeholders are informed of each other's plans and actions, and take coordinated decisions. At the local level where an industrial park is located, the interaction and

coordination of concerned regulatory entities, local government authorities and the operator is imperative as well, notably to provide on-site one-stop shop services. Moreover, the industrial park operator should coordinate with regional-level private sector associations in its investment promotion efforts.

Figure 7 provides a possible delivery model for conducive and coherent industrial park investment facilitation:

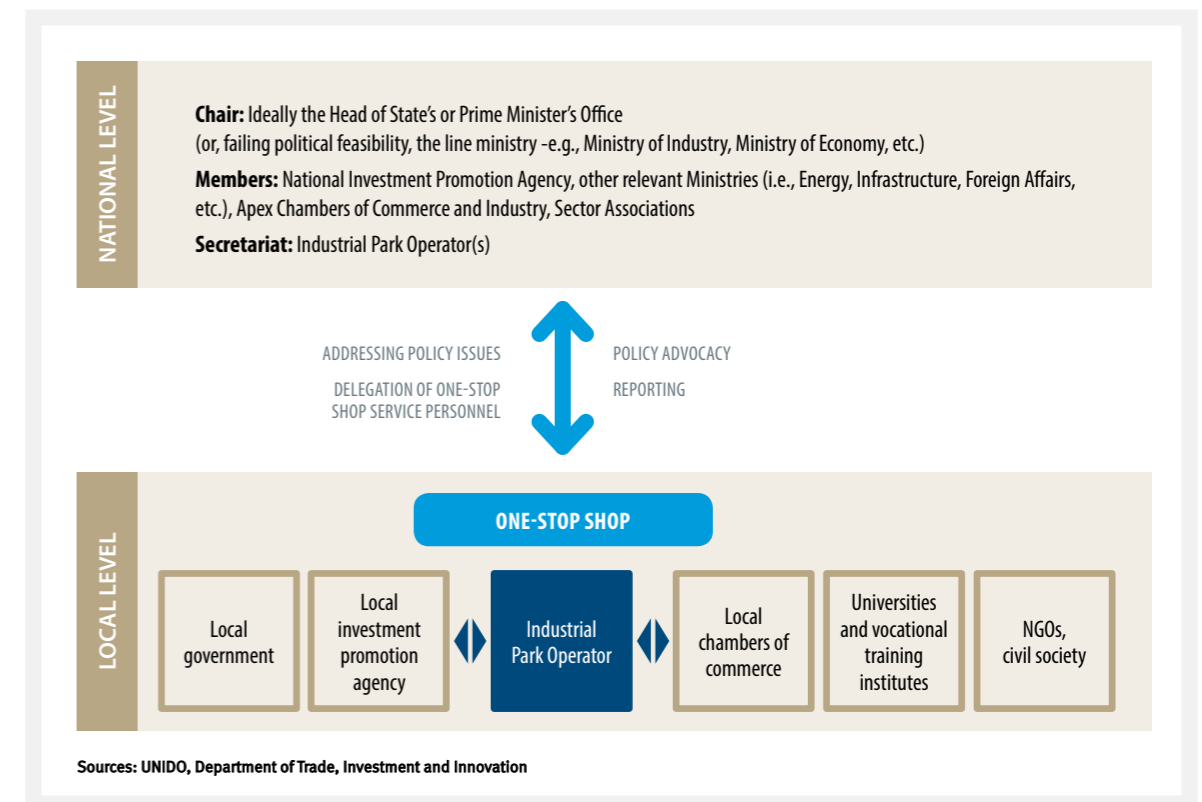


Figure 7: Delivery Model for Effective Industrial Park Investment Facilitation

<sup>108</sup> UNCTAD, *Aftercare: A Core Function in Investment Promotion*, Investment Advisory Series A, No. 1 (2007)



# 7



## Industrial Park Risk Management

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### 7.1 RISK MANAGEMENT CYCLE

While industrial parks present many economic opportunities, they also present a number of risks, whether with respect to their planning, development or operation, business interruption, the environment or social impacts.

Moreover, industrial parks are inherently complex systems comprising numerous users, which all interact with an operator, a host community and various regulators, requiring compliance with a large number of protocols, rules and standards.

The risks that industrial parks present are better managed when analyzed using a systematic approach to identify, prioritize and mitigate them. Clear risk identification, prevention and mitigation plans at both the company and park level are critical. Figure 8 below summarises the risk assessment and management process.

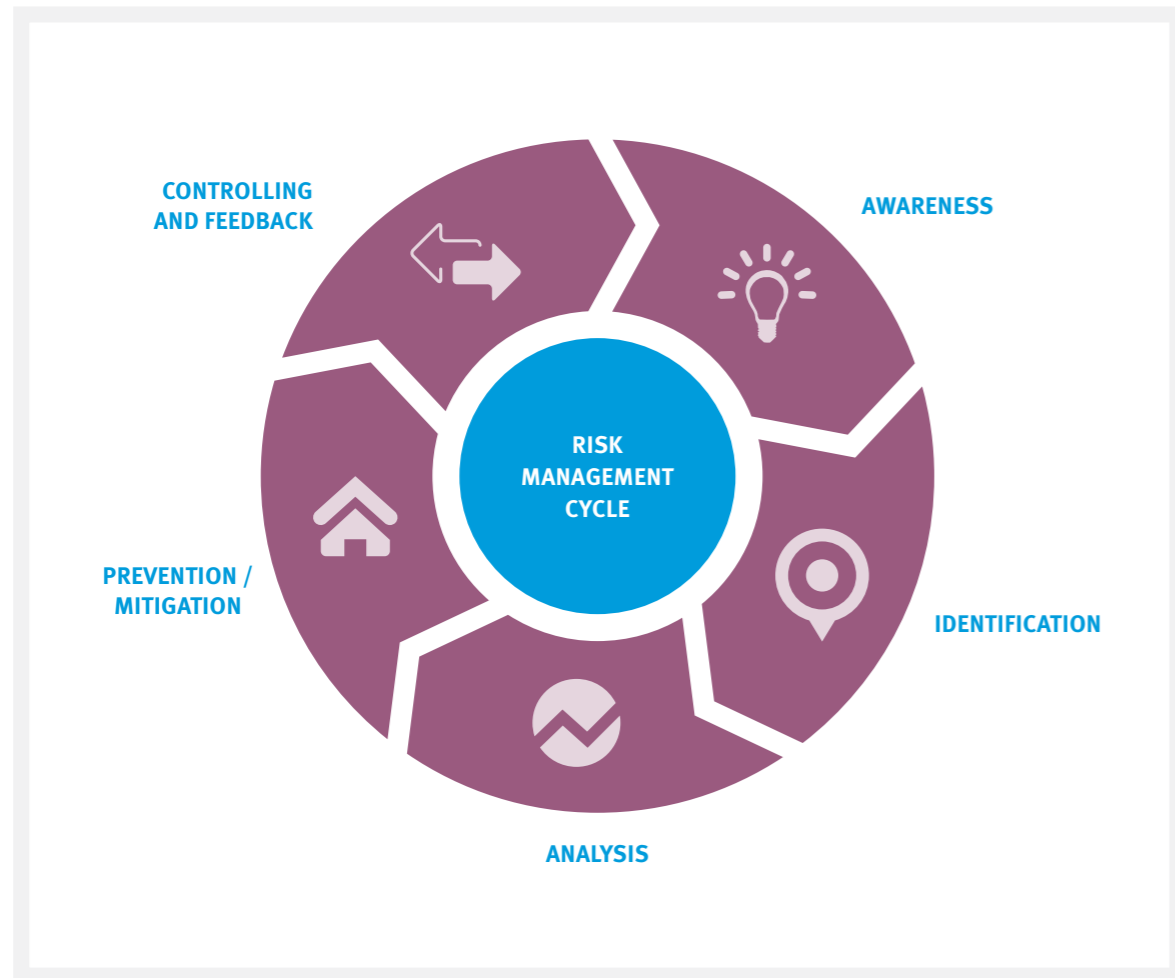


Figure 8: Risk Assessment and Management Cycle

### 7.2 POTENTIAL INDUSTRIAL PARK PROJECT RISKS

Potential industrial park risks include the following:

<b>PLANNING RISKS</b>	<ul style="list-style-type: none"> <li>▪ Planning compliance</li> <li>▪ Surrounding population density</li> <li>▪ Traffic and congestion</li> <li>▪ Adjacent projects</li> <li>▪ Utilities capacity</li> <li>▪ Enterprise layout</li> <li>▪ Land title</li> <li>▪ Demand risks</li> <li>▪ Economic justification</li> </ul>	<b>ENVIRONMENTAL AND HAZMAT RISKS</b>	<ul style="list-style-type: none"> <li>▪ Storm flood</li> <li>▪ Fire/explosion</li> <li>▪ Hazardous materials</li> <li>▪ Waste and wastewater disposal</li> <li>▪ Natural disasters</li> </ul>
<b>STRATEGIC RISKS</b>	<ul style="list-style-type: none"> <li>▪ Construction risks</li> <li>▪ Supplier and partner non-performance risks</li> <li>▪ Policy instability</li> <li>▪ Promoter capacity</li> <li>▪ Operations</li> <li>▪ Governance</li> <li>▪ Technology</li> <li>▪ Regulatory framework</li> </ul>	<b>HUMAN RESOURCE AND OCCUPATIONAL RISKS</b>	<ul style="list-style-type: none"> <li>▪ Accidents/health</li> <li>▪ Operational safety</li> <li>▪ Reduction and retention</li> <li>▪ Knowledge management</li> <li>▪ Emergency support</li> <li>▪ Management</li> </ul>
<b>FINANCIAL RISKS</b>	<ul style="list-style-type: none"> <li>▪ Stock exchange /capital market fluctuations</li> <li>▪ Exchange and interest rate fluctuation</li> <li>▪ Liquidity / cash flow</li> <li>▪ Fraud</li> <li>▪ Financial viability</li> </ul>	<b>FIXED ASSET RISKS</b>	<ul style="list-style-type: none"> <li>▪ Security</li> <li>▪ Energy supply</li> <li>▪ Property damage</li> <li>▪ Machinery breakdown</li> </ul>
<b>MARKET AND COMMERCIAL RISKS</b>	<ul style="list-style-type: none"> <li>▪ Competitors / Market share / Reputation</li> <li>▪ Business interruption</li> </ul>		

Source: Adapted from Oldani Insurance Group Ltd. (2015) and Locus Economica (2019)

Table 8: Industrial Parks Risks

### 7.3 RISK IDENTIFICATION AND PRIORITIZATION

Risk assessment plans for industrial parks have become an intrinsic element of the planning process for their development. Each industrial park is designed and operated in its own specific context and set of conditions and, therefore, the relevance of the individual risks differ for each one. Proper identification, analysis and prioritization of potential site-specific risks are thus the first steps required in any risk mitigation plan aiming to ensure the secured and sustained operation of any industrial park.

Some of the core issues in developing a risk identification and prioritisation plan are to respond to the following questions: How can the risk level be defined? How can the risk be measured? What is the risk tolerance threshold for the industrial park?<sup>109</sup>

In some situations, it may be possible to use procedures set forth in manuals dealing with risk analysis, classification and prioritisation. These methods and procedures typically address risks

<sup>109</sup> W. Huan, et al., *Kappa Analysis or industrial park risk evaluation index system* (2012)

such as: strategic, planning, financial, market and contractual risk, and risk of accidents with on-site and/or off-site consequences, risks associated with fixed installations, as well as with the handling, storing, processing and transporting of hazardous materials.

Some of the major industrial park planning risks relate to legal uncertainty as to who has legal rights and interests in the land (such as rights of way) and what unknown creditors' liens or potential litigation may exist against it (land title risk), around whether there is land use compatibility for the industrial park project within the context of the existing master plans, ecosystems and adjacent communities, and what sorts of negative externalities the park may have as to local utility capacity and traffic.

As an infrastructure and real estate project that must ultimately get built, and industrial park's construction-related risks, including as they relate to delivery time and costs, are the principal areas of risk the project will face in its early (2-3) pre-occupancy and pre-operational years. Furthermore, as an infrastructure mega-project, the funding and financial risks of any industrial park are also considerable. Changes in the availability or cost of financing due to foreign exchange and interest rate fluctuations on borrowed debt financing for the project's funding, the impact of capital market shocks, on the ability to raise capital for

the project through equity mechanisms, and improper cash flow management, are key risks that need to be managed in this regard.

Moreover, given the difficulty in predicting market demand over the long term, commercial and market risks are best addressed through involving expert transaction advisors in the project's financial structuring, as well as through prudent project phasing.

In industrial park operations, there two main types of potential incidents: hazards from accidents and other abnormal occurrences, and hazards from normal operations. Some sub-categories of these hazards include: acute fatalities, long-term health effects, property damage, major economic damage, and biophysical damage through the air, water or soil.

Once risk prioritisation has been completed, risk assessment should be conducted for all relevant risks. Risk assessment includes the description of the activity to be carried out, describing why it is relevant, the opportunities it provides for the industry or industrial park, and the risk emerging therefrom.

The basic principles for initial risk identification, assessment and prioritisation can be captured in matrices such as presented in Tables 9 and 10, below:

Risk area	Risk	Likelihood	Frequency	Consequence / Risk Level	Description	Priority
1.						
2.						

Sources: Developed by UNIDO

Table 9: Strategic, Planning and Development Risk Identification

Industrial Park / Resident Activity	Incidents and abnormal occurrences				Normal operations		Risk Level
	Impact to air, water, land	Infrastructure impact	Human health impact	Long term human health impact	Property/project value impact	Impact to air, water, land	
1.							
2.							

Sources: Developed by UNIDO

Table 10: Operational Risk Identification

### 7.4 RISK MANAGEMENT STRATEGIES AND PLANS

A sound risk management plan includes risk prevention and limitation measures, actions in case of incidents, responsible partners and required communications actions<sup>110</sup>.

To this end, management plans should include a definition of the responsibilities of all the concerned stakeholders. Clear decision-making processes and protocols should furthermore be established. Moreover, national occupational health and safety, environmental, accident and disaster compliance

requirements must all be fulfilled, as well as compliance with the safeguards of the international agencies that have made a financial contribution to the industrial park. Finally, Industrial Park Management and the park's resident enterprises must also ensure their employees are informed of their responsibilities before any incident occurs. Risk avoidance, reduction, sharing and retention are the four widely-adopted risk control strategies. These four strategies are illustrated in Figure 9, below:



Figure 9: Industrial Park Risk Management Strategies

Avoidance is the preferred strategy, as it aims to eliminate the potential causes of any given identified risk. Avoidance can notably be accomplished through partial or full-scale project termination. Avoiding a project's risky components can also be achieved by reducing a project's scope and/or scale.

Reduction of the severity of a loss from risk occurrence is the next best strategy. This can be done through effective risk monitoring and rapid response. Risk-sensitive components of a project may also be outsourced to specialized institutions.

Sharing of risks is the third recommended approach, if avoidance or reduction is not feasible. Industrial

park operators or residents can often enter into contracts with third-parties to share the burden of loss from risks. Insurance is the most commonly used risk-sharing arrangement. Contracts between park residents and operators should also be drawn up, as well as periodically reviewed, in order to properly assign the liabilities, responsibilities, and actions of the parties in case of an incident.

Retention or acceptance is a passive risk management strategy that involves simple acceptance of risks' consequences. It is a viable strategy for risks where the cost of avoiding, reducing and/or sharing the risk would be greater than the anticipated total losses caused by the identified risks.

<sup>110</sup> Queensland government. <https://www.business.qld.gov.au/running-business/protecting-business/risk-management>

The selection of the appropriate risk control strategy depends on the nature, type and costs of the risk, as well as the resources available to take relevant actions. One or more of these strategies may be used simultaneously.

Some industrial park planning risks can be mitigated through strong due diligence and through insurance mechanisms. A variety of mechanisms, including quantity surveying, subcontractor liability and (once again) insurance can, amongst others, be used to mitigate strategic construction risk. Commercial risk insurance, hedging instruments, concessional development finance, debt syndication, as well as a rental-based (as opposed to plot sales-based) financial model are some of the strategies that may be employed to address financial risk. For the management of any and all of these risks, there is

however no substitute for market-driven, evidence-based, bankable, robust and rigorous, expertly-prepared feasibility studies.

Finally, the provision of safety training and protective equipment, and the adoption of adequate handling protocols for dangerous substances and effective damage control systems, are other commonly-adopted measures to reduce risks related to production hazards in industrial parks. The establishment of emergency response systems through proper risk reporting channels can likewise meaningfully contribute to risk reduction, by instituting a continuous risk learning system enabling its users to anticipate similar risks based on past experience.

Some strategies for managing the more common risks in an industrial park context include the following<sup>111</sup>:

- a Energy supply risk management:** Ensuring an adequate and continuous supply of energy is vital for the efficient operation of an industrial park; energy is therefore one of the key pre-conditions to attracting resident enterprises. However, many industrial parks, particularly in developing countries, suffer from operation disruptions due to energy supply cuts. Park developers should thus thoroughly assess enterprises' total energy needs as well as the supply capacity of the nearby energy grid and sources, in order to meet demand. Planning and providing alternative energy sources, as well as emergency energy supply systems, will help to further ensure the continuous supply of energy.
- b Land acquisition risk management:** Identifying and procuring land for an industrial park project is often a challenge, due to legalities, expropriation considerations, social issues and high land prices. If inadequately addressed, these factors can result in delaying or even terminating the project. Park developers should thus thoroughly assess land ownership and use risks prior to starting construction.
- c Human resource risk management:** The availability of a sufficient and adequately skilled workforce, as well as satisfactory working conditions, are necessary preconditions for industrial park success. To overcome associated risks, park operators and residents may provide such incentives as free transportation services, training programmes, etc. It is also crucial to give priority to enterprises with development perspectives.
- d Environmental risk management:** Whether aimed at ensuring an industrial park's basic environmental sustainability or its attainment of more ambitious Eco-Industrial Park standards, adopting a robust Environmental Management Strategy and system are critical. Moreover, when one opts primarily for a risk reduction strategy, the hazards during industrial park operations can often be reduced by implementing advanced monitoring and hazard source-tracing technologies, as well as setting clear safety standards and operation guidelines. For example, the use of real-time monitoring systems in industrial parks enables a timely collection of data about production safety and improves prevention of production hazards. Box 19, below, presents a Chinese example in order to show how such technologies can assist in this regard.

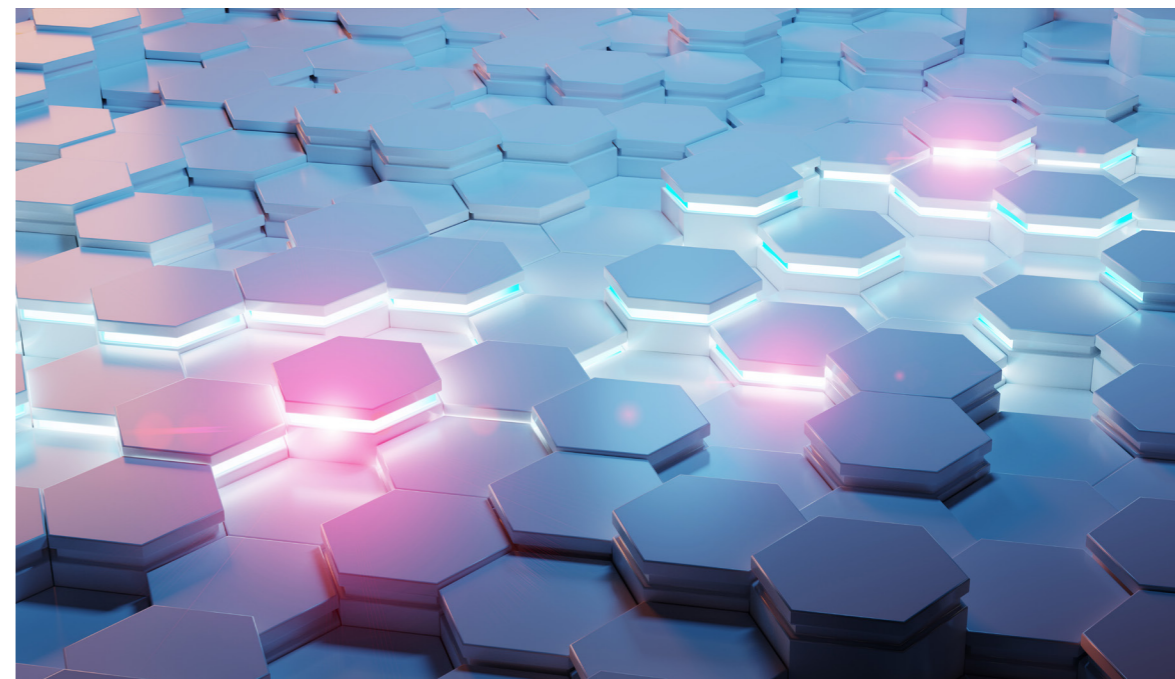
<sup>111</sup> The list is non-exhaustive and only includes some of the most common types of strategies for managing industrial park risks.

The Jiangsu Sino-US Environmental Monitoring Co., Ltd., has developed a three-dimensional infrared based monitoring technology with a multi-scan reflective light path on different façades. The technology incorporates meteorological stations at different heights that gathers real-time meteorological data. It is developed to monitor the industrial park environment, workplace safety, mobile emergencies, industrial ports, oil fields and other fields.

The technology has been implemented in an atmospheric online monitoring programs within the Dafeng Port Chemical Industrial Park, which provides a 24-hour qualitative, quantitative and traceable analysis to 27 chemical companies polluting emissions and early warning function for an effective accident prevention.

Due to its significant contribution to public health and safety, the technology has been listed by the Jiangsu Provincial Environmental Protection Department as among 10 innovative technologies developed to improve environmental sustainability and pollutions control in 2018. It also contributes to the implementation of the national "Water Pollution Prevention Action Plan", "Air Pollution Prevention Action Plan" and "Soil Pollution Prevention Action Plan" in the Province<sup>112</sup>.

Box 19: Pollution monitoring technology for industrial parks in Jiangsu Province, China



<sup>112</sup> Jiangsu Provincial Environmental Protection Department [http://hbt.jiangsu.gov.cn/art/2019/1/28/art\\_1564\\_8104633.html](http://hbt.jiangsu.gov.cn/art/2019/1/28/art_1564_8104633.html)





# Industrial Park Performance Evaluation

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In order to define industrial park success, it is necessary to establish a reference framework, i.e., a set of goals against which to measure performance, along with key performance indicators (KPIs). KPIs can be defined for an entire industrial park, an individual facility, or various processes at the park or an individual facility.

In line with the core ‘inclusive and sustainable industrial development’ (ISID) principles, these guidelines set forth three indicator categories comprising a total of 13 key industrial park performance indicators: economic performance indicators, social performance indicators and environmental performance indicators.

**Economic performance indicators relating to the ISID pillar “advancing economic competitiveness”:**

1. Good economic governance
2. Economically-enabling site & infrastructure ‘hardware’
3. Economically-enabling services ‘software’
4. Economically impactful nature\*

**Social performance indicators relating to the ISID pillar “creating shared prosperity”:**

1. Socially appropriate site & social infrastructure
2. Quality social management system & social services\*
3. Occupational health & safety\*
4. Good labour relations & welfare\*
5. Social inclusiveness

**Environmental performance indicators relating to the ISID pillar: “safeguarding the environment”:**

1. Environmentally appropriate site
2. Green infrastructure
3. Green systems\*
4. Efficient & clean production, emissions & waste management\*

\* Indicators not applicable to new sites that are not yet fully operational

Source: Developed by UNIDO

**Box 20: The 13 Key UNIDO Indicators of Industrial Park Performance<sup>113</sup>**

For reasons relating to ease-of-use and practicality, the following methodology has been adopted in the selection of UNIDO’s proposed performance indicators, which (due to the simplicity of their design)

can be utilized and applied by any civil servant with public management experience or, if preferred, by any experienced management consultant contracted to this end:

- Our approach is one of “Composite Indicators”, taking into account various quantitative “inputs”<sup>114</sup>. Each of the 13 indicators is measured on the basis of a two-digit performance score, composed of a set of measured and aggregated “inputs”<sup>115</sup>. Any positive result indicates the presence of a “good practice Industrial Park” performance characteristic. The distance below or above the median point of that two-digit performance score gives a general sense for “how the industrial park is doing” relative to a good practice Industrial Park, consistent with ISID principles. The “distance to the frontier” (the highest possible mark of performance for the indicator) gives a general sense for how much more the industrial park in question could still improve in order to become a truly “best practice” Industrial Park, from an ISID principles perspective as well as based on the reviewed literature on the subject.

<sup>113</sup> While these set of performance indicators, indicator with quantitative inputs and quantitative inputs scoring basis (see Table 11, 12 & 13) provide a reference framework to measure industrial parks performance, stakeholders are encouraged to tailor them based on the existing context and nature of industrial parks. For example, indicators measuring scale, distance, frequency, volume, etc. may vary based on the nature/type of industrial parks, available infrastructure, etc. and can be standardized based on specific needs of a country or industrial parks.

<sup>114</sup> As famously used, for instance, by the World Bank’s Doing Business Indicators methodology.

<sup>115</sup> Quantitative measures of various aspects of characteristics of these performance indicators (i.e., “sub-indicators” if one wishes).

- The proposed indicators *compare industrial park performance against national performance outside the park* (i.e., rather than the performance of other parks, other countries, the same park over time, etc.). The critical advantages of this approach are that data is easier to source, and that industrial park performance can be contrasted with an objective benchmark (national performance) to assess whether industrial park performance is better than the national standard<sup>116</sup>.
- For each of the three “indicator sets” (i.e., “Economic”, “Social” and “Environmental”), one can also aggregate the respective sub-indicators in order to get an overall performance score (for “Economic Performance”, “Social Performance”, and “Environmental Performance”). Once again, any result “greater than or equal to 1 or 51%” indicates the presence of a good practice Industrial Park performance characteristic, consistent with ISID principles, provided that the indicator represents a positive practice to be encouraged. A result “less than 1 or 49%” gives a general sense for how much more the industrial park in question could still improve in order to become a truly “best practice” Industrial Park as regards that “indicator set”. Any results that differs from the above two sets of performance scores (i.e. greater than or equal to 1 or 51%” or less than 1 or 49%) represent NA (Not Applicable).
- Indicators have been selected so as to provide a performance “snapshot” for measurement. An industrial park’s performance is thus captured based on the actual achievement of certain benchmarks, as opposed to being based on “reductions”, “increases” or “growth” in data-points. While the latter approach can indicate the presence of efforts and trends, it is also based on subjective data, including widely-variable industrial park baselines and scales, which are not comparable to benchmarks outside the industrial park, and supposes that data from several previous years’ industrial park results is available, it is thus (where even feasible) less meaningful as a source of performance metrics. Snapshots can, on the other hand, be tracked over time, enabling Project Managers to indirectly produce “year-on-year” time series if they so desire.
- Each of the chosen indicators are measured on the basis of a two-digit performance score, composed of a set of measured and aggregated “inputs” either at the level of the entire industrial park or an aggregate or aggregate-mean of the industrial parks’ resident firms and are measured both “hard” and “soft”, and “prerequisite” and “outcome” performance indicators are included.
- Proposed metrics have been retained only where data that can be sourced within the industrial park is *also be sourced outside of the industrial park* (i.e., nationally), in order to compare the industrial park against standard national performance.
- While some of these indicators (particularly those relating to site and infrastructure characteristics) are appropriate to new industrial parks, others (notably those relating to impact and services use) are not particularly informative until a park is fully operational. The methodology and its indicators should thus be viewed as “modular” and flexible in order to be “varied” depending on the state of operational readiness and implementation for the industrial park under assessment. Indeed, one can quite easily tailor and adapt the proposed performance measurement framework simply by omitting some of the proposed indicators, if they are less relevant to the industrial park’s current lifecycle stage.
- The selected indicators have screened out those providing “absolute” (but non-comparable) metrics; they have been designed or selected so as to be *comparable* regardless of the industrial park’s scale.

It should finally be noted, in order to avoid any doubt, that our understanding of the definition of the Industrial Parks whose performance the proposed

indicators are meant to measure rests on certain assumptions:

<sup>116</sup> The framework proposed is designed to be easily modified. Where a given quantitative input cannot be sourced, the row with the input in question can simply be omitted, with the overall aggregate scoring methodology easily adjusted correspondingly.



- First, that there is an industrial park “operator” in place, responsible for day-to-day management of the industrial park, and that industrial parks exclude traditional “industrial zones” in the sense of “industrially zoned areas” on a master-plan;
- Second, that acquiring a serviced plot with access to utility connections is easier in the industrial park than it is outside the park;
- Third, the existence of legislated mandatory national pollution control norms and Environmental Impact Assessment requirements, a Labour Code with generally ILO-compliant labour norms, as well as the existence of some sort of environmental protection agency in the industrial park’s host country; and
- Fourth, that an industrial park is not, at its core, necessarily a Special Economic Zone, with dedicated and enhanced business-enabling legislation.

The implication of these assumptions on indicator selection is that our set of proposed indicators thus primarily focuses on industrial park operational performance and “compliance plus” issues, rather than on “policy” matters as such.

## 8.1 ECONOMIC PERFORMANCE INDICATORS

UNIDO’s four proposed key indicators related to the ISID Pillar “Advancing Economic Competitiveness” are as follows:

- *Good economic governance*
- *Economically-enabling site & infrastructure ‘hardware’*
- *Economically-enabling services ‘software’*
- Economically impactful nature\*

\* Indicator inappropriate to the evaluation of new sites that are not yet fully-operational (the remaining, italicized and non-asterisked indicators being more appropriate, with minor input adjustments).

Each of these key indicators is, as previously explained, composed of a number of input-level quantitative sub-indicators, presented in Table 11, which enable the computation of key indicator “scores”.



INDICATOR (WITH QUANTITATIVE INPUTS)	QUANTITATIVE INPUT SCORING BASIS	SCORE
<b>1. Good economic governance</b>		
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 participation in industrial park ownership	(Yes =1; No =0)	
If industrial park is on public land, Operator sourced on the basis of an open competitive tender	(Yes =1; No =0)	
Private sector represented on Board of Regulator	(Yes =1; No =0)	
Existence of 60% occupancy rate within 6 years (ha of land used by companies for productive use) <sup>117</sup>	(Yes =1; No =0)	
Existence and functioning of a formal Industrial Park marketing department/unit	(Yes =1; No =0)	
User Maintenance & 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)	
<b>Good Economic Governance Score</b>	<b>(Scale of 0-11)</b>	
<b>2. Economically-enabling site &amp; infrastructure ‘hardware’ (appropriate site selection)</b>		
Unencumbered land title	(Yes =1; No =0)	
Phased site development strategy and implementation	(Yes =1; No =0)	
Proximity to urban centre*(with country significant population) <sup>118</sup>	(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 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)	

<sup>117</sup> Comparative Assessment, based on global averages, suggests 60% occupancy rate within 6 years.

<sup>118</sup> Measure of proximity depends on specific national context and type of industrial park.



[% 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)
<b>Economically-Enabling Site &amp; Hardware Score</b>	<b>(Scale of 0-11)</b>
<b>3. Economically-enabling services 'software'</b>	
Regular, Scheduled Maintenance of buildings, as well as dedicated Rapid-Response or Emergency Maintenance, Repair, Rectification & 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 programs on effective offer	(Yes =1; No =0) (Depending on # of programs 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)
[#services offered through One-stop shop in industrial park /# services offered through One-stop shop in nearest urban community]	(≥1 =1; <1 =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 & 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)
<b>Economically-Enabling Software &amp; Services Score</b>	<b>(Scale of 0-16)</b>
<b>4. Economically impactful nature: Employment, investment, turn-over</b>	
[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)
[(Investment/ha) In Industrial Park /(Investment/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)
[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\$]	(≥1 =1; <1 =0)
[US\$ Economic value addition ('EVA', calculated as output-inputs) per capita In Industrial Park/US\$ EVA 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)
[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\$]	(≥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)
<b>Economically Impactful Nature Score</b>	<b>(Scale of 0-13)</b>
<b>Economic performance score</b>	<b>(Scale of 0-61)</b>

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

Table 11: UNIDO Indicators of Industrial Park Economic Performance

## 8.2 SOCIAL PERFORMANCE INDICATORS

UNIDO's five proposed key indicators related to the ISID Pillar "Creating Shared Prosperity" are as follows:

- *Socially-appropriate site and social infrastructure*
- Quality social management system and social services\*
- Occupational health and safety\*
- Good labour relations and welfare\*
- Social inclusiveness\*

\* Indicator inappropriate to evaluating new sites that are not yet fully-operational (the remaining, italicised and non-asterisked indicators being more appropriate, with minor input adjustments).

Once again, each of these key indicators, as previously explained, is composed of a number of input-level quantitative sub-indicators, presented in Table 12, which enables the computation of key indicator "scores":

INDICATOR (WITH QUANTITATIVE INPUTS)	QUANTITATIVE INPUT SCORING BASIS	SCORE
<b>1. Socially-appropriate site &amp; social infrastructure</b>		
Project ESIA conducted and filed with appropriate authorities	(Yes =1; No =0)	
Proximity to public transportation (i.e., bus, subway or light- rail)	(Yes =1; No =0)	
Proximity to residentially zoned areas	(Yes =1; No =0)	
Power lines in Industrial Park are buried, for workforce safety	(Yes =1; No =0)	
Presence of outdoor street-lighting throughout the Industrial Park	(Yes =1; No =0)	
Childcare facilities	(Yes =1; No =0) (Depending on # and types of services)	
Faith and prayer facilities for major denominations and religious groups represented in the workforce	(Yes =1; No =0) (Depending on # and types of services)	
Climate-appropriate (ideally centralized and resource-efficient/ sustainable) HVAC equipment and systems in buildings	(Yes =1; No =0)	
Proximity to mini-mart or supermarket retail services*	(Yes =1; No =0)	
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)	
Complaints box or Hotline available in industrial park	(Yes =1; No =0)	
Separate women's and men's restrooms in each building	(Yes =1; No =0)	
Disabled-inclusive building design (i.e., access ramp and elevator in each building)	(Yes =1; No =0)	
Site is not on traditional, indigenous or tribal land	(Yes =1; No =0)	
[Average commute time to Industrial Park workplace for employees / Average commute time to workplace 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)	
Operable windows in Industrial Park buildings, ensuring natural ventilation	(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 common cafeteria/canteen/restaurant/catering	(Yes =1; No =0)	
On-site multi-purpose athletic fields, gym, recreation, leisure, entertainment, community and cultural facilities	(Yes =1; No =0)	
<b>Socially-Appropriate Site &amp; Social Infrastructure Score</b>	<b>(Scale of 0-23)</b>	
<b>2. Quality social management system and services</b>		
Social impact management & monitoring system (SMS) in place in 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)
Presence of public or subsidized transportation system for workforce between key points in or near Industrial Park	(Yes =1; No =0)
Industrial Park Community Solidarity Program 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 <sup>119</sup> Certifications	(Yes =1; No =0)
Industrial Park Operator ISO 9001 <sup>120</sup> Certifications	(Yes =1; No =0)
Industrial Park Operator SA 8000 <sup>121</sup> Certifications	(Yes =1; No =0)
Industrial Park Operator AA1000AP Certifications	(Yes =1; No =0)
Industrial Park Operator AA1000AS Sustainability or AA1000SES <sup>122</sup> Stakeholder Engagement Standard Certifications	(Yes =1; No =0)
Existence of Industrial Park dedicated internal Ombudsman	(Yes =1; No =0)
<b>Quality Social Management System &amp; Social Services Score</b>	<b>(Scale of 0-19)</b>
<b>3. Occupational health &amp; safety</b>	
[Expenditure on health and safety (EHS) per capita in industrial park /EHS per capita nationally]	(≥1 =0; <1 =1)
[% firms with OHSAS 18001 Certification <sup>123</sup> In industrial park /% firms with OHSAS 18001 Certification Nationally]	(≥1 =1; <1 =0)
Existence of Internal Park Operation Fire Safety Guidelines	(Yes =1; No =0)
Perimeter fencing and access control posts	(Yes =1; No =0)
On-site hospital, clinic or dispensary within industrial park	(Yes =1; No =0)
Public or common night transportation or blue-light system in place in industrial park	(Yes =1; No =0)

<sup>119</sup> International Organization for Standardisation. ISO 26000 - Social Responsibility <https://www.iso.org/iso-26000-social-responsibility.html>

<sup>120</sup> International Organization for Standardisation. ISO 9000 Family - Quality Management. <https://www.iso.org/iso-9001-quality-management.html>

<sup>121</sup> Social Accountability International. SA8000® Standard. <http://www.saintl.org/index.cfm?fuseaction=Page.ViewPage&PageID=1689>

<sup>122</sup> AccountAbility. <http://www.accountability.org/standards/>

<sup>123</sup> British Standards Institution (BSI). BS OHSAS 18001 Occupational Health and Safety Management. <https://www.bsigroup.com/en-GB/ohsas-18001-occupational-health-and-safety/Introduction-to-BS-OHSAS-18001/>



[(# fire alarms/building) in Industrial Park / (# fire alarms/building) nationally]	(≥1 =1; <1 =0)
[(# sprinklers/building) in Industrial Park / (# sprinklers/building) nationally]	(≥1 =1; <1 =0)
[# crimes reported per capita in Industrial Park / # crimes reported per capita nationally]	(≥1 =0; <1 =1)
Access by fire services to all parts of Industrial Park	(Yes =1; No =0)
[% employees with private health insurance coverage in Industrial Park / % employees with private 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)
CCTV cameras and security patrols in place	(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)
<b>Occupational Health &amp; Safety Score</b>	<b>(Scale of 0-17)</b>
<b>4. Good labour relations &amp; welfare</b>	
Presence of aggregated, publicly accessible labour complaints or incidents and Complaint Measurement mechanism data available	(Yes =1; No =0)(Depending on sophistication & transparency of system)
Presence of on-site Regulator, Operator or Third-Party Authorised Labour Inspectors or Counsellors	(Yes =1; No =0)
Absence of instances of child labour and forced labour <sup>124</sup>	(Yes =1; No =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)
[Aver. Salary in industrial park / Aver. 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)
[% industrial park employees commuting <15km / % national employees commuting <15km]	(≥1 =1; <1 =0)
[% employee annual turnover in industrial park / % employee annual turnover nationally]	(≥1 =0; <1 =1)

<sup>124</sup> See: ILO Standards on Child Labour: [https://www.ilo.org/moscow/areas-of-work/child-labour/WCMS\\_248984/lang-en/index.htm](https://www.ilo.org/moscow/areas-of-work/child-labour/WCMS_248984/lang-en/index.htm); Forced Labour Protocol: <https://www.ilo.org/global/topics/forced-labour/lang-en/index.htm>

<b>Good Labour Relations &amp; Welfare Score</b>	<b>(Scale of 0-12)</b>
<b>5. Social inclusiveness</b>	
[% 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]	(≥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)
[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)
<b>Social Inclusiveness Score</b>	<b>(Scale of 0-10)</b>
<b>Social performance score</b>	
<b>(Scale of 0-81)</b>	

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

Table 12: UNIDO Indicators of Industrial Park Social Performance

### 8.3 ENVIRONMENTAL PERFORMANCE INDICATORS

UNIDO's four proposed key indicators relating to the ISID Pillar: "Safeguarding the Environment" are as follow:

- *Environmentally-appropriate site*<sup>125</sup>
- *Green infrastructure*
- *Green systems\**
- *Efficient and clean production, emissions and waste management\**

\* Indicator inappropriate to the evaluation of new sites that are not yet fully-operational (the remaining, italicised and non-asterisked indicators being more appropriate, with minor input adjustments).

Once again, each of these key indicators is, as previously explained, composed of a number of input-level quantitative sub-indicators, presented in the Table below, which enables the computation of key indicator "scores":

<sup>125</sup> i.e., whether the actual physical land/site of the industrial park has inherent characteristics, is situated in a location and is zoned in a manner that are environmentally propitious (i.e. chosen, compatible with existing master plans and zoned in such a manner as to result in few if any negative environmental externalities).

INDICATOR (WITH QUANTITATIVE INPUTS)	QUANTITATIVE INPUT SCORING BASIS	SCORE
<b>1. Environmentally-appropriate site</b>		
Site EIA conducted and filed with appropriate authorities	(Yes =1; No =0)	
Site compatibility with Land Use Master Plan as regards non-agricultural use and environmentally-sensitive areas, such as forests, wetlands, mangroves, floodplains, wildlife refuges	(Yes =1; No =0)	
Internal Zoning Plan adopted	(Yes =1; No =0)	
[% plots actually allocated to non-polluting or light manufacturing activities in Industrial Park /% of GDP represented by non-polluting or light manufacturing activity 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)	
<b>Environmentally-Appropriate Site Score</b>	<b>(Scale of 0-5)</b>	
<b>2. Green infrastructure</b>		
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 & 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 toxic and hazardous waste collection, storage and treatment or disposal management system	(Yes =1; No =0)	
Presence of Public Wastewater Sewerage System, STP and/or of Wastewater Treatment Plant (WWTP)	(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 re-use systems	(Yes =1; No =0)	
Presence of CETP	(Yes =1; No =0)	
Presence of Organic Composting reception point for organic, vegetable and soil waste transformation into fertilizer and/or of Bio-digesters	(Yes =1; No =0)	
Segregated recycling reception bins, bells and/or containers for: paper & card; recyclable plastic containers; recyclable metal; glass; wood; and brick or stone materials and debris	(Yes =1; No =0)	
% of buildings with Leadership in Energy and Environmental Design (LEED) <sup>126</sup> Certification	(Yes =1; No =0)	
% of buildings with German Sustainable Building Council DGNB <sup>127</sup> Certification	(≥51% =1; ≤49% =0)	
% of buildings with Building Research Establishment Environmental Assessment Method (BREAM) <sup>128</sup> Certification	(≥51% =1; ≤49% =0)	
% of buildings with World Green Building Council (WGBC) <sup>129</sup> Certification	(≥51% =1; ≤49% =0)	

<sup>126</sup> See: Leadership in Energy and Environmental Design. <https://new.usgbc.org/leed>

<sup>127</sup> See: DGNB System. [https://www.dgnb-system.de/en/system/certification\\_system](https://www.dgnb-system.de/en/system/certification_system)

<sup>128</sup> See: Building Research Establishment Environmental Assessment Method (BREEAM). [https://www.breeam.com/BREEAM2011SchemeDocument/Content/03\\_ScoringRating/scoring.htm](https://www.breeam.com/BREEAM2011SchemeDocument/Content/03_ScoringRating/scoring.htm)

<sup>129</sup> World Green Building Council. (n.d.). Rating tool. <http://worldgbc.org/rating-tools>

[% 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 & 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 & systems adoption)
<b>Green Infrastructure Score</b>	<b>(Scale of 0-23)</b>
<b>3. Green systems</b>	
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)
Annual environmental audits performed on each firm	(Yes =1; No =0)
Operator Annual Environmental Report released to public	(Yes =1; No =0)
[% firms having obtained a “Green” (e.g., “Green Label”, etc. 20), ISO14001, ISO 50001, International Sustainability and Carbon (ISCC) <sup>21</sup> Certification or Global Reporting Initiative (GRI) <sup>22</sup> 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 =0; <1 =1)
Natural Disaster Assessment and Risk Management Plan & System in place, as appropriate	(Yes =1; No =0)
Operator possesses UN Global Compact Registration	(Yes =1; No =0)
Operator possesses ISO14001	(Yes =1; No =0)
Operator possesses International Sustainability and Carbon Certification (ISCC)	(Yes =1; No =0)
Operator possesses ISO 50001 or Green Certification	(Yes =1; No =0)
Operator possesses 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 <sup>23</sup> 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)
<b>Green Systems Score</b>	<b>(Scale of 0-18)</b>
<b>4. Efficient &amp; clean production, emissions &amp; waste management</b>	
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)
[(Power use in KWh /US\$ of Sales) in Industrial Park / (Power use in KWh / US\$ of Sales) nationally]	(≥1 =0; <1 =1)
[(Water use in m <sup>3</sup> /US\$ Sales) in Industrial Park / (Water use in m <sup>3</sup> /US\$ Sales) nationally]	(≥1 =0; <1 =1)
[(m <sup>3</sup> of wastewater recycled/US\$ in Sales) in Industrial Park / (m <sup>3</sup> of wastewater recycled/US\$ in Sales) nationally]	(≥1 =1; <1 =0)
[(Solid waste generated/US\$ Sales) in Industrial Park / (Solid waste generated/US\$ Sales) nationally]	(≥1 =0; <1 =1)
[(Tonnes of solid waste recycled/US\$ in Sales) in Industrial Park / (Tonnes of solid waste recycled/US\$ in Sales) nationally]	(≥1 =1; <1 =0)
[(m <sup>3</sup> of SO <sub>x</sub> , NO <sub>x</sub> , N <sub>2</sub> O, CO, CH <sub>4</sub> , CFC, HC emissions)/US\$ Sales in Industrial Park / (m <sup>3</sup> of SO <sub>x</sub> , NO <sub>x</sub> , N <sub>2</sub> O, CO, CH <sub>4</sub> , CFC, HC emissions)/US\$ GDP]	(≥1 =0; <1 =1)
[(Hazardous waste produced/US\$ in Sales) in Industrial Park / (Hazardous waste produced/US\$ in Sales) nationally]	(≥1 =0; <1 =1)
[(US\$ Million/year heavy industry <sup>130</sup> Sales)/ha in Industrial Park] / [(US\$ Million/year heavy industry Sales)/ha nationally]	NA <sup>131</sup>
[% 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)
<b>Efficient &amp; Clean Production, Emissions and Waste Management Score</b>	<b>(Scale of 0-13)</b>
<b>Environmental performance score</b>	<b>(Scale of 0-59)</b>

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

<sup>130</sup> e.g., cement, iron and steel, and chemicals.

<sup>131</sup> Not applicable.



## Concluding Remarks

The expansion of industrial parks offers enormous opportunities for industrialisation and economic growth around the world through these parks' enabling role in the attraction of investment, integration into global value chains, creation of competitive employment opportunities, while safeguarding the environment.

These opportunities can however only be effectively capitalized on when a robust approach to the planning and implementation of industrial parks is taken. These guidelines have therefore sought to present industrial park stakeholders with guidance on international good practices in industrial park development, operation, promotion and regulation, including as regards what needs to be done, by whom and by when. The document has moreover sought to help industrial park stakeholders manage risk, and to provide a practical tool to measure and enhance industrial parks' performance. That said, these guidelines only seek to provide a general reference tool to assist decision-makers in planning and implementing new industrial parks, or in upgrading operational ones. A range of specific derivative documents and tools can and still should be developed to supplement this document and facilitate its implementation.

Furthermore, the opportunities they present can only be maximised when a collaborative multi-stakeholder approach to the planning and implementation of industrial parks is taken. As stakeholder engagement and building solid partnerships

are important to the promotion of learning and to knowledge exchange concerning industrial parks, UNIDO therefore offers its services in assisting local implementers in making the best use of these guidelines. The scope of such engagement may range from organizing international and regional forums, conferences and technical workshops, to the creating industrial park learning and knowledge exchange platforms. It may also include stakeholder engagement through UNIDO's PCP programme and training on the use of UNIDO's COMFAR feasibility studies tool.

In closing, UNIDO wishes to note its intention and hope that these guidelines will be regularly updated and strengthened, so as to take new developments and evolving trends into account in the global industrial landscape, as well as the ongoing input from UNIDO Member States and partners. Indeed, a fundamental shift is occurring in the way companies do business and it is reshaping the competitive landscape for manufacturing; such change can be expected to continue at an increasing pace. Given the intense international competition for industrial FDI, as well as trends such as "industrial towns" and the intensifying "green shift" toward a "circular economy", amongst others, it will be important that industrial parks, and particularly those in developing economies, continuously evolve and improve their market offering if they are to remain relevant in today's fast-changing world.



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