

Smart industrial estate ... uplifting economic and social fundamentals?

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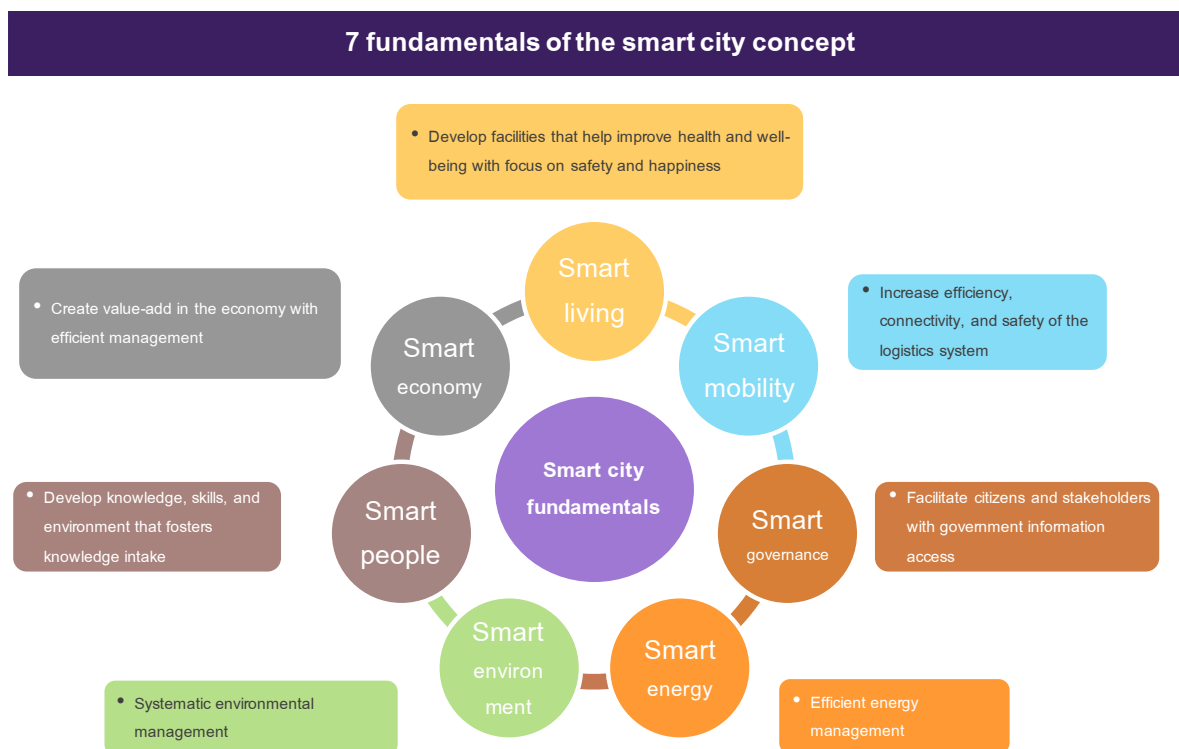
- The development of smart industrial estate is adapted from the smart city concept, by investing in smart technology to improve operational efficiency in areas such as energy, logistics, environment, security, and business activities. The smart industrial estate also requires investment in other areas to improve ecosystem within the industrial estate to ease doing business, foster knowledge and innovation, along with improve living environment.
- Three main stakeholders benefiting from smart industrial estate development are 1. Industrial estate developers 2. Businesses in the industrial estate and 3. Employees residing in the industrial estates. The first stakeholder, the developers, will benefit from industrial estate competitiveness enhancement, which will help attract high-tech industries into the area. Also, new revenue streams will be created and will support changing the structure of the estate or enhancing environmental friendliness. The second stakeholder, businesses, will save operation costs such as from energy, logistics, and environment, in addition to support innovation from R&D. The last stakeholder, employees, upgraded ecosystem will attract employees into the area, especially those in the middle or high-income.
- EIC estimates that during the years 2019-2022, investment for smart industrial estate development in Thailand will value at THB 55 billion. For sustainable success, the following 3 pillars are required: 1. A strategic plan that balances between economic and social development 2. Cooperation at the national and local levels regarding development and implementation and 3. Synergy of each database or each smart technology for maximum benefit.

The smart industrial estate applies and leverages the concept of smart city via the introduction of smart technologies to improve management efficiency.

The smart city concept, which is the concept in the era of digital transformation, adopts digital technology, for example, big data, artificial intelligence (AI), and internet of things (IoT) as tools to alleviate management issues within the cities such as regarding pollution, energy, traffic, and security in terms of life and assets. The mentioned problems occur in tandem with urbanization, as the original city structure is unable to withhold the growing number of residents, hence, technology will sustainably help improve and modernize living conditions.

The concept of smart city consists of 7 development fundamentals which are: smart environment, smart economy, smart mobility, smart energy, smart people, smart living, and smart governance. These smart solutions focus on reducing travel time and energy consumption, increasing environmental friendliness and security and sanitation, which requires increasing cooperation from citizens. Moreover, the smart city concept can be leveraged for usage in various types of areas, for example, smart industrial estate, smart campus, and smart nation, in which the development objectives are subjected according to each area.

Figure 1: Smart city fundamentals



Source: Smart City Thailand

Figure 2: Examples and benefits from using smart technologies

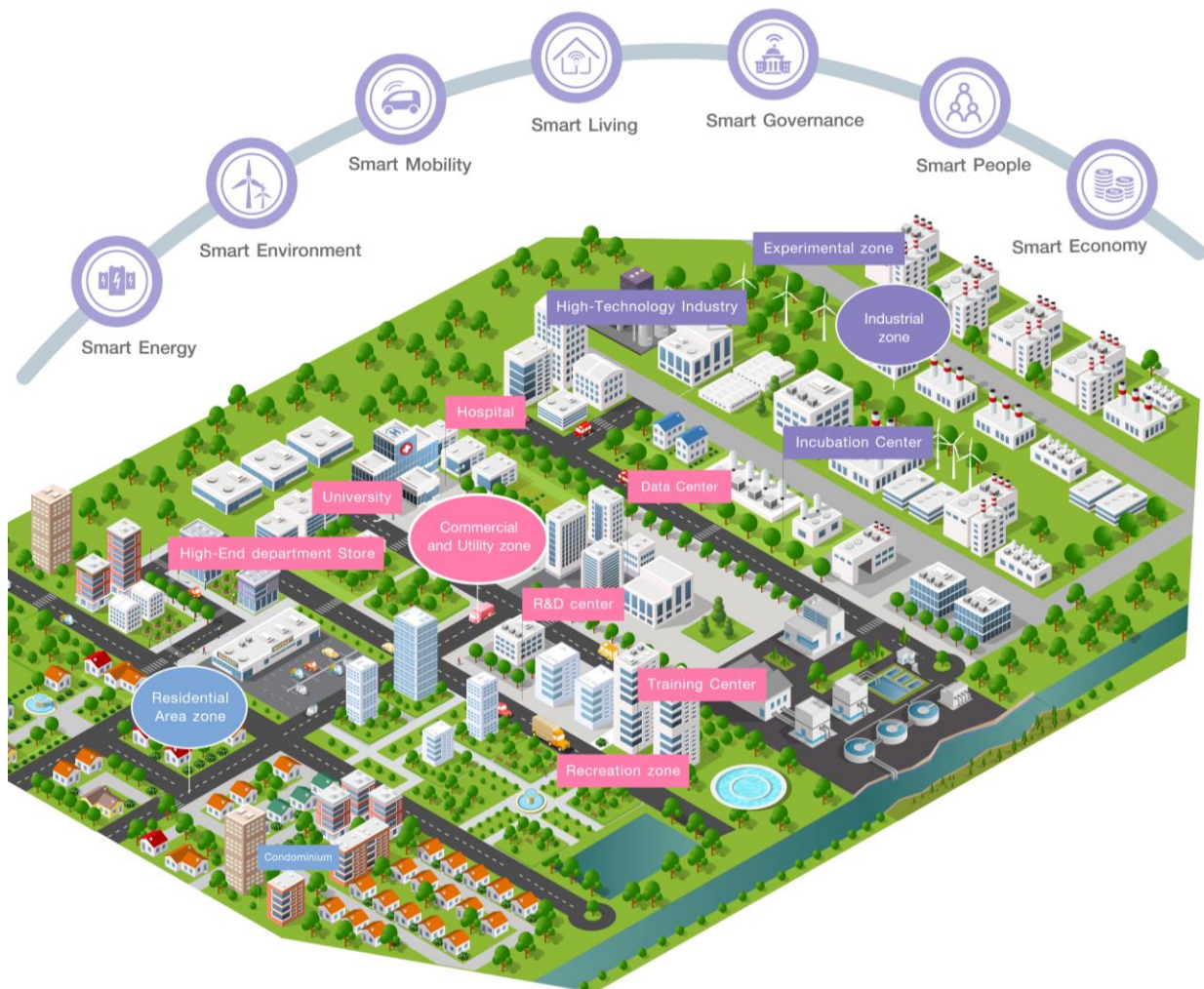
Elements	Smart Technology	Benefits from each type of technology
Smart Living	<ol style="list-style-type: none"> I. Real-time crime map II. Emergency response optimization III. Disaster early-warning system 	<ol style="list-style-type: none"> I. Reduce death rates by 3% and crime incidents by 10% II. Lower emergency response time by 20% III. Disaster risk reduction
Smart Mobility	<ol style="list-style-type: none"> I. Real-time connection between navigation and public transit information II. Smart traffic system III. Smart parking system 	<ol style="list-style-type: none"> I. Reduce commuting time by 4% from route adjusts II. Reduce commuting time by 4% from lower traffic near intersections III. Reduce commuting time by 2% from parking identification
Smart Governance	<ol style="list-style-type: none"> I. Digital business licensing and building permit request II. Digital business tax filing III. Digital citizen services 	<ol style="list-style-type: none"> I. II. III. Reduce delays arising from government process
Smart Energy	<ol style="list-style-type: none"> I. Water consumption tracking and quality monitoring II. Electricity distribution automation system 	<ol style="list-style-type: none"> I. Reduce water consumption by 15-25% II. Increase stability and efficiency in energy consumption
Smart Environment	<ol style="list-style-type: none"> I. Building energy management system II. Digital tracking and payment for waste disposal 	<ol style="list-style-type: none"> I. Reduce GHG emissions by 3% from improved heating, cooling, and lighting systems II. Reduce unrecyclable waste by 15%
Smart People	<ol style="list-style-type: none"> I. Online capability enhancement curriculum II. Online retraining programs III. Local e-career services 	<ol style="list-style-type: none"> I. Increase quantity of skilled labor II. Increase labor force efficiency
Smart Economy	<ol style="list-style-type: none"> I. Online capability enhancement curriculum II. Online retraining programs III. Online retraining programs 	<ol style="list-style-type: none"> I. Drive innovation II. Develop new entrepreneurs III. Labor can adapt to new career paths

Source: Mckinsey&Company, Neirotti et al. (2014)



Apart from smart solution investments, smart industrial estate requires investments in other areas to uplift internal environments. The investments will increasingly facilitate businesses and create knowledge and innovation, in addition to increasing residential demand. For example, investing in digital infrastructure and data center & database to facilitate smart factory, establishing a one-stop service center to liaison with government agencies, establishing alliances with universities or research institution together with developing experimental zones for R&D to endorse insights and innovation. Furthermore, the industrial estates need commercial and residential upgrades such as establishments of high-end department stores, restaurants, recreation areas, single-detached houses, and condominiums to answer the needs of inhabitants that are middle or high-income.

Figure 3: Examples of additional developments in smart industrial estates



Source: EIC analysis based on data from Kim and Wang (2014), Li et al. (2015), Zeng (2016)

Smart industrial estate development answers the needs of key industrial estate stakeholders, which consist of industrial estate developer, businesses in the industrial estate, and employees residing in the industrial estate. Advantages stakeholders gained are as follows

- 1. Industrial Estate Developers:** the estate's relative competitiveness will be enhanced, which will attract new investments into the area, especially from high-tech industries as they require more complex digital services or industries with focus on environmental-friendliness. Furthermore, new investments will bring in new revenue streams for industrial estates such as from providing smart technology services or from commercial area services.
- 2. Businesses in the industrial estate:** operating costs will be lowered from more efficient management of, for example, energy, logistics, environmental monitoring, and government liaison. Moreover, with the collaboration of research institution or universities, the digital infrastructure will foster knowledge and innovation. New investments would also be likely, in order to extend and reap benefits from tax exemptions.
- 3. Employees in the industrial estate:** the upgraded living environments and more urbanized areas will attract more employees in high-tech industries, most of whom are in the high income, which require more living requirements.

Chinese industrial estate developers that implemented the smart industrial estate concept executed the concept for industrial restructure and for eco-friendly environemnt.

An example of smart industrial estate concept implementation is from China's Suzhou industrial park. The park was established since 1994, under the collaboration of the Chinese and Singaporean government. After more than 10 years of operation, the park's facilities was no longer compatible with current economic, social, and political conditions. Furthermore, rising labor costs in the area contradicted dwindling tax exemption periods and rents.

As such, the Suzhou park leveraged the smart city concept and restructured its park that focus on electronics and biomedical industries. The park was able to restructure with various development plans, for example, the park collaborated with IBM to develop a data center and the park developed a centralized GIS database that aggregates data from the government, private, and public sectors. Other examples include establishing educational institutions with the collaboration of various renowned institutions and research centers, investing in digital technology such as in digital livelihood programs for use with digital ID platforms, and investing in smart logistics platforms. From such developments, the park was able to transform its main industry to biopharmaceuticals, nanotechnology, and artificial intelligence industries. The successful transformation caused the Suzhou park to generate GDP of approximately USD 38,000 million in 2018 for China with 6% CAGR growth throughout 2013-2018. The industrial estate's competitiveness was also ranked highest in 2016.

China's Qingdao Ecopark in China is another example. The park was developed under the collaboration of the Chinese and German government. The park used the smart city concept for environmental enhancements. Qingdao is now leading the way in the green economy, with its ambitious objective of becoming a low-carbon city and green manufacturing innovation center. The park started by developing smart buildings, passive house, that allow monitoring and control of unnecessary energy usage, resulting in a 90% energy reduction in the building. Furthermore, other technological investments such as smart green transport and smart manufacturing are being considered.

Investments under the smart city concept are expected to proliferate on a global scale with an expected average growth of 18% per year (18% CAGR).

According to International Data Corporation (IDC), **smart city investments should be worth USD 189 billion in 2023**. The majority of the smart city investments are likely to be energy-related i.e. smart grid, infrastructure-related i.e. cloud solution, security-related i.e. smart surveillance, and logistics-related i.e. smart logistics. A high portion of these investments, approximately 40%, should be invested within the Asia Pacific with China as the key market. Since 2011, China has been the world's largest investor in smart city following its 12th Five-Year Plan for Economic and Social Development and its Notion of smart city development. As such, by 2018, over 542 pilot smart cities were present in China. Another key market is Singapore with its smart nation plan established since 2014. Singapore focused on facilitating citizens and businesses based on 3-aspects: digital economy, digital environment, and digital society. While India started developing its smart

city since 2015 under the 100 smart cities mission where 20 cities were piloted in 2015 and expanded to 100 cities in 2018.

As for Thailand, EIC views that investments in smart industrial estates and smart cities in 2019-2022 should be worth THB 55 billion and THB 45 billion, respectively.

Both the public and private sectors have started to develop smart industrial estates in Thailand, for example, the Industrial Estate Authority of Thailand (IEAT) is developing a smart park in Rayong province to support Thailand targeted industries (new s-curve). Meanwhile, the Ministry of Digital Economy and Society is preparing an Eastern Economic Corridor Digital Innovation Zone (EECd), a promotional zone aimed to become South East Asia's industrial and digital innovation, trade and investment hub. The Ministry of Science and Technology with PTT group is also preparing an Eastern Economic Corridor of Innovation (EECi) to foster research and development. Lastly, Amata Corporation is preparing to transform all of its industrial estates to smart cities, starting with Amata City Chonburi. However, smart technology development requires cooperation with domestic and overseas companies both in terms of planning and investment. IEAT for example, joined forces with TOT to develop digital infrastructure while cooperating with Metropolitan Electricity Authority (MEA) to develop smart energy platform. Amata, on the other hand, allied with Japan's YUSA (Yokohama Urban Solution Alliance) to develop a smart city plan, cooperated with Hitachi to establish Lumada center for smart manufacturing development, and collaborated with the National Taiwan University to develop smart people.




Smart industrial estate and smart city developments are publicly supported under Thailand's smart city development plan. In the initial phase, the plan aims to develop 10 smart cities locating in 7 provinces, namely, Chachoengsao, Chonburi, Rayong (the 3 provinces in the EEC promotional zone), Bangkok, Phuket, Chiang Mai, and Khon Kaen. And within the following 5 years, a total of 100 smart cities will be developed, which will cover 76 provinces in Thailand. Smart city developers can register their smart cities with Smart City Thailand Office. Applicants can be from the public or private sector or can be joint ventures between the public and private sector. However, for registration, eligibility criteria apply, for example, the smart cities must possess clear zoning and targets, have guidelines for infrastructure development, and have at least 2 smart solutions with the smart environment as a basic requirement.

Developers or those that passed the smart industrial estate and smart city criteria from the Smart City Thailand Office can apply for incentives in various forms. For example, the mentioned groups can apply for regulatory sandbox, smart visa, funding from the digital infrastructure and the digital manpower fund sponsored by the Digital Economy Promotion Agency (DEPA), and an 8-years maximum tax exemption period with other incentives from the Board of Investment of Thailand (BOI).

However, some approval criteria for smart industrial estate and smart city development still pose caveats for private investment. Notable challenges is, for example, requests for BOI's 8-years tax exemption period requires investment in all 7 types of smart technologies, compared to normal industrial estate investments without smart technology that already receive 5-years tax exemption period. Another challenge is regarding smart city establishment requests, which requires at least 50% renewable energy

production, a requirement that could be inappropriate for industries that need stable energy supply. Therefore, the government should hastily cooperate with developers and adjust problematic criteria for more practicality.

Figure 4: BOI incentives

Incentives offered under the BOI				
Eligible businesses	Corporate income tax exemptions		Other incentives	EEC specific incentives
	5 years	8 years		
 Smart City Area Development	✓ Collaborate to offer smart environment services and at least 7 other services	✓ Offering 7 smart services	✓ For example, exemption of import duties for R&D or raw materials exports	50% corporate tax deduction from normal rates for 5 years
 Smart City System Development	✓ Offering lower than 7 smart services			
 Smart Industrial Estate Development	-			-

Source: Board of Investment of Thailand (BOI)

From the 7 areas of smart technology; smart environment, smart energy, and smart governance will be the 3 main areas that comparatively create substantial cost savings.

Smart environment technologies will reduce costs regarding environmental regulations, which are becoming more strict, for example, digital tracking and payment for waste disposal will benefit factories only paying for emitted pollution. Meanwhile, smart energy technologies will increase energy efficiency and hence reduce energy costs from unnecessary usage, examples are smart buildings and smart meter. Lastly, smart governance technologies will liaison between businesses and the government, help reduce time regarding regulatory and red tape issues. Examples are such as systems that directly request the government for land use, apply for construction permit, and apply for company registration. Investments in other technological areas that will improve the quality of life for residents in the estate are, for instance, smart mobility for travel and smart living for health and safety.

EIC evaluates that the key successes for smart industrial estate development lie in 3 factors – planning, collaboration, and synergy. Lessons learned from China’s park case study revealed that smart industrial estate development requires **comprehensive development planning** that factors in stakeholder benefits, has a balance between urban and industrial development, and uses smart

technologies that focus more on usefulness rather than on being cutting edge. **Collaboration and partnership** will support smart technology development, since such investment requires high expertise and investment. Moreover, developers will have to invest in multiple smart technology systems, which is beyond the developer's capability. As such, collaboration and partnership will help lower technological and financial limitations, leading way for higher success rates. There are various forms of collaboration or partnership as follows – 1. Collaboration on the national level for knowledge and technology transfer in addition to financial aid such as the case between the Japanese and Chinese investment in Thailand's Amata industrial estate 2. Co-investments between industrial estate and smart technology developers such as the case of IBM's database investment in Suzhou park and 3. Research collaboration between businesses in the industrial estate and institutions or research institution. But most importantly, locals need to cooperate as well so that residents can use and benefit from smart technology.

Lastly, synergistic advantages from database and smart solution integration will uplift operational efficiency and effectiveness in addition to maximizing technological usage. Normally, operational services such as those relating to traffic signals, security, health, energy, and environment will be separated by departments, so each will have their own database. With such database structure, silo problems between departments occur. Synergy via creating a centralized database will help increase policy and regulation efficiency. Improved efficiency can be witnessed in the case, for example, of reducing emissions generated from industries, buildings, traffic, and waste, where cooperation between various departments under the same database is required. Furthermore, synergy with smart technologies will maximize benefits such as the integration of Real-time road navigation, Intelligent traffic signals, and Emergency response optimization will facilitate transportation and traffic management, especially when accidents occur. Benefits received will be, such as faster rescue operations resulting in lower death rates.

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