



# SUSTAINABLE DEVELOPMENT FOR INDUSTRIAL PARKS IN THE CITIES OF VIETNAM

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**Summary:** Since first established in 1991, industrial parks have played an important role in the economy and become the driving force for the country's socio-economic development. After 25 years of development, the emerging question today is: How the current industrial park model needs to be changed to catch up with socio-economic development trend and the world's sustainable development. This article addresses primary solutions for a sustainable development of urban industrial parks in Vietnam.

**Keywords:** Business park; industrial park; sustainable development.

Received: September 12<sup>th</sup>, 2016, revised: September 26<sup>th</sup>, 2016, accepted: October 13<sup>th</sup>, 2016



## 1. Introduction

Industrial parks are one of the key factors in the development of Vietnam's new urban areas from the perspective of planning and architecture. Industrial parks affect this development in two most recognizable ways: firstly, it changes the lifestyles of workers both in and around industrial parks in an industrial and urban style - the change in the humans behavior; the second is the development in the same style of residential areas, as well as the social and technical infrastructure around these parks - known as the urbanization or the change in the urban space and function. The more effectively developed an industrial park is, the more profound and practical all these changes can be, and the more practical the benefits for the people can become. However, the current issue is that these "cloaks" surrounding urban areas have become too tight and must obviously submit to the need for expansion from the population and socio-economic development. Then, the industrial parks at urban fringe or suburban area will soon be invaded by urban areas. It is imperative to put the benefits between urban and industrial development into a balance as well as to ensure the safety for the environments and the people.

Given Vietnam's urban planning and development situation, it can be confirmed that industrial park is a component of urban fabric, having a special function with no functional interaction with other components. Industrial parks are production areas for industrial goods and perform industrial production services. They have defined geographical boundaries with no residential areas inside. This is also the common situation among industrial parks around the world in their initial period, when space, community and humanity values were not the priorities of development [3].

Industrial parks, the initiative model of business parks, have undergone four generations of development with the improvement of qualities in space, attention to humans and communities gradually increasing. The concept of "business park" has been popularized worldwide and applied to some industrial projects in Vietnam, such as Megastar Business Park in Hung Yen province or Mapletree Business Park in Binh Duong province.



**Figure 1.** The first Industrial Park in the Northern of Vietnam - Thang Long IP (Dong Anh, Hanoi) [5]

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## 2. The understanding of business park

Business park is the common name of Industrial park, Science park, Research park, Hi-tech park, Technology park, Office park and other related functional zone such as Warehouse park, Distribution park, Logistics park, Incubator park or Corporate park. Under any name, Business Park is always a combination of two concepts: Park and Business. Park is the concept of green, water, open space, leisure, sports and entertainment. Business is the concept of well-planned and designed area for trade activities and manufacturing [2]. Nowadays, business park is the developed model of urban zones, based on service, business and industry to satisfy people's living, working and relaxing needs, as well as the needs for sustainable development (Figure 2). Based on their scales, characteristics and development specification, business parks have now developed through four generations.

First-generation business parks stemmed from the industrial zone model, functioning as industrial production and storage areas, with lacking public services, with little environmental landscapes, always secluded at day, inactive at night and can hardly reach a high quality of space. Sites are plotted up and sell off with a build permit to the incoming tenant, or pre-developed by the owner to be leased out. The first generation business parks are still being constructed to cater particularly for those businesses that are industrially based rather than research or commercially orientated. Although the scale of development is often too modest to afford the quality of environment and support facilities of the second and third-generation business parks, the general standard of architecture has improved to a degree so that even the most ordinary of sheds declares a concern for excellence, whether in the structural detailing, hard landscape design or graphics [1].

Learning from their first-generation counterparts, second-generation business parks are the first step in combining social and economic development through prominent usage of spatial forms of community life (stores, clubs, sports fields, schools...) and beautiful environmental landscape. This is considered the key to success for most designs and eliminates negative impressions of industrial parks' landscape. The most successful second-generation business parks do not isolate themselves on the edge of a freeway outside of great cities. More often, they fill voids left in urban perimeters to re-engage and revitalize suburban identities, or to re-characterize the visual blight left by earlier light industries made redundant by new technologies. These gateway developments often quote urban space typologies as the key to their design intentions [1]. Second-generation parks having been built in Vietnam include: Vietnam-Singapore Industrial Park VSIP (Binh Duong), MegaStar Business Park (Hung Yen).

Third-generation business parks are small-scale models of complete town, following master planning protocols and creating the infrastructure for new small-scale urban area (whose component are first-generation business parks). With scales about 100 - 200 ha, in proximity to airports and highways in a suburban location, low building density ratio 25 - 30%, third-generation business parks can be distinguished from their previous generations. Public service buildings are brought together to become landmarks or urban centers to serve developing units. At a large scale, the third-generation business parks can contribute to the private and public realms, while providing those types of advanced technology businesses that could not function optimally within an inner city environment with an ideal landscape in which to perform [1]. An example for this case is Hoa Lac Hi-tech Park in Hanoi, Vietnam.

Hi-tech production and research areas need to attract more experts and skilled workers. A complete model, consisting of production, office and housing, as well as stores, schools, amusement parks, etc. has been founded. It is the fourth-generation business park whose general layout resembles a small city with distinct boundaries, exceptional level of technical and social organization and is capable of becoming an important, high-value landmark of the entire region. Whereas the third-generation business parks evolved from carefully zoned industrial or business estates attached to the perimeter of new towns, the fourth-generation business parks have closed the circle to become a new town itself, providing a self-contained and self-sufficient district of intercommunicating neighborhoods [1]. In Vietnam, fourth-generation business parks have not been developed yet.



Figure 2. Business park is the developed model of urban zones [2]



### 3. The proposal to sustainable development

Most of Vietnam's industrial parks are only in their first-generation. High-tech parks such as Hoa Lac, Ho Chi Minh City, or Da Nang Hi-tech Park are in their second and third-generation. Therefore, it is obvious to develop second and third-generation industrial parks in the future to balance urban and industrial development and to ensure a sustainable development of the whole city.

To accomplish this task, it is necessary to change the view of the development. As per past regulations and development reality of industrial parks, an industrial park is likely the isolated zone of the city, surrounded by fence and closed gates. In line with current sustainable development trend, it cannot be a secluded entity anymore and its functions have to be incorporated into other facilities. Public services and green, parks in industrial park need to be used for the community. Offices, commercial buildings and industrial parks need to be centrally planned and opened also for the community. High-quality technical infrastructure of an industrial park (for instance electricity, water, waste treatment, etc.) also needs to bring benefits to the citizen living in the surrounding areas and environment [3].

Strict regulations of the industrial types and CO<sub>2</sub> emission levels for each factory are needed for the whole environment as well as increasing awareness among enterprises when "living" in a community. Most importantly, the management staff needs to be well-trained and committed to solving some issues arising from industrial production affecting the communities, especially environment-related issues.

Regarding architecture and landscape, industrial parks need to be developed in the "park-like" concept for sustainability. As per the current regulation, the ratio of industrial lots is more than 55%, the ratio of greenery should be more than 10% and the construction density in each lot varies from 50 to 70% depending on the height of the building [4]. The ratio of industrial lots needs to be kept below 50%, leaving more land for green area (about 15 - 20%) and the development of offices, services and commercials (suiting the requirements of developments). The construction density in each lot also needs to be below 50%. The heights, colors, materials for facades and other architectural details also need uniform regulations to plan and design urban areas harmoniously with the surrounding residential areas. The general landscape systems in industrial parks, such as roadside trees, factory fences, flower gardens, recreation places, etc. need to be designed by the concept of residential areas to create feelings of familiarity among the people [2].

After approximately 30 to 50 years in operation (equal to land rental period of industrial park projects), industrial parks, especially ineffective ones, need to be converted into better urban functional zone. This is a common concept in the world, but relatively new in Vietnam.

Some industrial parks have to convert their function even when their operation time has not yet expired, because they no longer suit the urban development trend. The Sai Dong industrial park in Hanoi can be taken as an example. After a 20-year development, this park is now surrounded by residential areas. The planning project to redevelop this park is undergoing.



**Figure 3.** Aztec West Business Park in Bristol, England [1]



**Figure 4.** Sai Dong Industrial Park in Hanoi [6]

The two main trends nowadays include upgrading and redeveloping. If still conforming to the urban master planning and zoning, the parks need further renovating and upgrading to higher generations, such as second or third-generation. This will not affect workers' jobs and accommodation, or other facilities within the area. If they are no longer in line with the planning, the parks need to transform their uses (redevelopment). However, which function should an industrial park follow depends on strategic and detailed planning to prevent causing pressure on the population, infrastructure and other social issues on the existing urban zone.

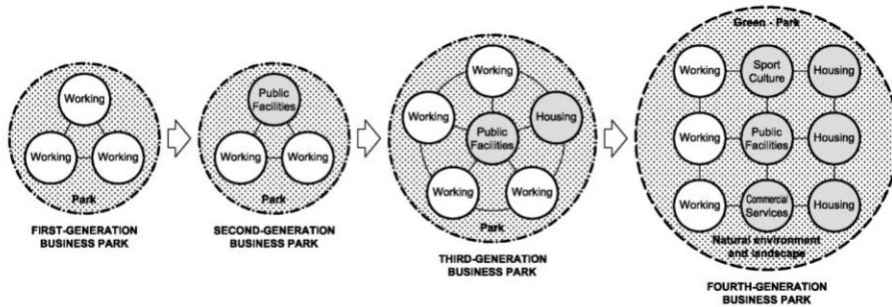


Figure 5. Upgrading of industrial parks to a higher generation

With a scale from 50 to 300 ha, an industrial park is corresponding to the scale of a neighborhood or an urban district with four to six neighborhoods. The current trend is to thoroughly utilize the technical infrastructure and the existing constructs, change them into offices, commercial centers, exhibitions and other public facilities such as schools, hospitals in appropriate areas. Lands for green, water, landscapes and open space should be prioritized. The remaining lands can be developed into high-quality residential areas.

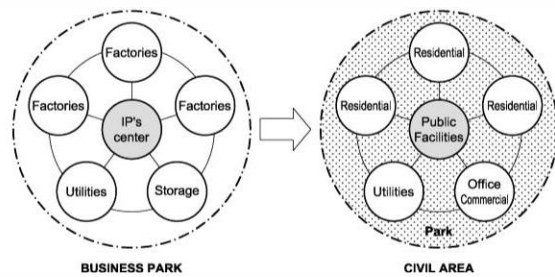


Figure 6. Redeveloping to the public facilities and residential area

#### 4. A case study of Tu Liem industrial park

##### 4.1 Existing situation

Tu Liem industrial park is located in Tu Liem North district, about 10km West far from Hanoi center. Established in 2000, this park is among the first-generation industrial parks in Hanoi for small and medium-size enterprises in light industries with industrial environment level of IV and V. With its main advantages in transportation (next to National road no. 32), short distance to the city center and suitable lot size (ranging from 0.2 ha to 1 ha), this park was rapidly developed and filled in. The occupancy is 81% now for the total site area of 93.02 ha.



Figure 7. Tu Liem industrial park location map [7]

As planned and constructed, the ratio of factory lots is very high, about 66% (including undeveloped area) and the ratio of green is too low, only 7% (Table 1). Despite of the high economic efficiency, the planning and architecture standard of this park is low with a proliferation of access roads, hard standing buildings, and an almost complete absence of landscaping.

At the time of establishment, Tu Liem industrial park was in a rural area of Hanoi. Since 2013, it has been officially annexed to an urban area and surrounded by residential area day by day. Its North is Minh Khai ward's residential area, located along the National road no. 32. Its South, East and West are residential areas and traditional villages of Xuan Phuong and Phu Dien wards (Figure 8). Along with that inevitable transformation, conflicts between industrial and civil development have reported in this area. Accordingly, the first-generation Tu Liem industrial park is no longer suitable to its location. Upgrading or redeveloping this park is an emerging issue.

Table 1. Existing land use

No	Land use	Area (ha)	Percentage (%)
1	Industrial park center	1.38	1.48
2	Factory lots	49.51	53.23
3	Green - Open space	6.47	6.96
4	Ponds	0.65	0.70
5	Infrastructure Plants (Waste water treatment plant and Power plant)	0.82	0.88
6	Pagoda	0.55	0.59
7	Roads	19.24	20.68
8	Cemetery	2.65	2.85
9	Undeveloped Area	11.75	12.63
	<b>Total</b>	<b>93.02</b>	<b>100.00</b>

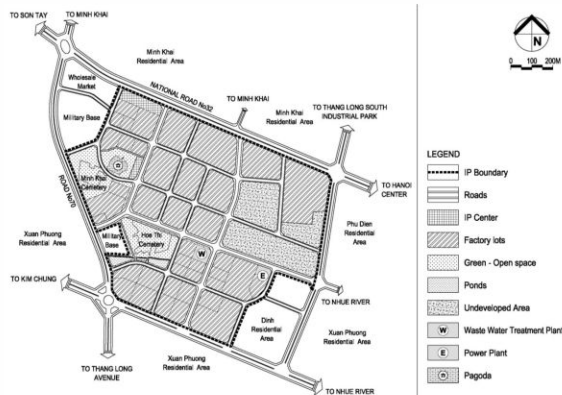


Figure 8. Tu Liem Industrial park existing land use plan

4.2 Planning options

a. Option One: Upgrading plan

Tu Liem industrial park needs to be upgraded to a second-generation one to avoid the shortfalls of first-generation park and combine the qualities of successful inner city life, beautiful landscape to create a sense of place and society. All undeveloped areas must be considered in line with this concept. For the benefit of those working in this park and also for all surrounding residents, a community center is re-planned in lot CC next to Xuan Phuong and Phu Dien residential areas. For the same purpose, lot RP is dedicated to a recreation park with very good connection to the community center. Offices are also arranged in lot OF, facing the main road (Figure 9). Table 2 shows the changes of land use upgrading plan.

Table 2. Upgrading plan - Land use

No	Land use	Area (ha)	Percentage (%)
1	Industrial park center	1.38	1.48
2	Factory lots	49.51	53.23
3	Green - Open space	6.47	6.96
4	Ponds	0.65	0.70
5	Infrastructure Plants (Waste water treatment plant and Power plant)	0.82	0.88
6	Pagoda	0.55	0.59
7	Roads	19.24	20.68
8	Cemetery	2.65	2.85
9	Community center	5.78	6.21
10	Recreational park	3.97	4.27
11	Office	2.00	2.15
	<b>Total</b>	<b>93.02</b>	<b>100.00</b>

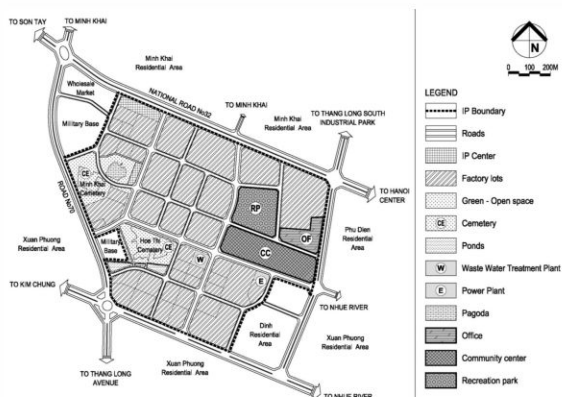


Figure 9. Tu Liem Industrial park upgrading plan

b. Option Two: Redeveloping plan

By other way, Tu Liem industrial park can be redeveloped to two neighborhoods of 43.95 ha and 49.07 ha with about 6,300 and 7,000 people. Based on the concept of the New Urbanism neighborhood, a community center is planned at the center of the site with the distance of 400 - 450 m to the edge. Park and public facilities such as people's committee office building, square, cultural building, health care, kindergarten, elementary school, daily market, shops and retail mall, etc. are located here with priority. Mix-use areas (apartments, shops, office, etc.) with high-rise and mid-rise buildings are planned along the edge-roads. Low-rise houses are arranged next to the community center and park. The existing roads structure already gives the traffic on a fine network of interconnecting streets (Figure 10). The percentage of all functional components in each neighborhood is carefully examined to ensure a suitable development in this area (Table 3).

These two new neighborhoods will be in harmony with all the surrounding residential area instead of isolated old-fashioned industrial park.

Table 3. Redeveloping plan - Land use

No	Land use	Neighborhood 1		Neighborhood 2	
		Area (ha)	Percentage (%)	Area (ha)	Percentage (%)
1	Community center	5.44	12.38	5.78	11.78
2	Mix-use	12.09	27.51	19.43	39.60
3	Residential	10.44	23.75	6.99	14.24
4	Green - Park - Pond	4.13	9.40	5.97	12.17
5	Roads	10.39	23.64	8.85	18.04
6	Cemetery	0.91	2.07	1.74	3.55
7	Pagoda	0.55	1.25	0	0.00
8	Power plant	0	0.00	0.31	0.63
	<b>Total</b>	<b>43.95</b>	<b>100.00</b>	<b>49.07</b>	<b>100.00</b>

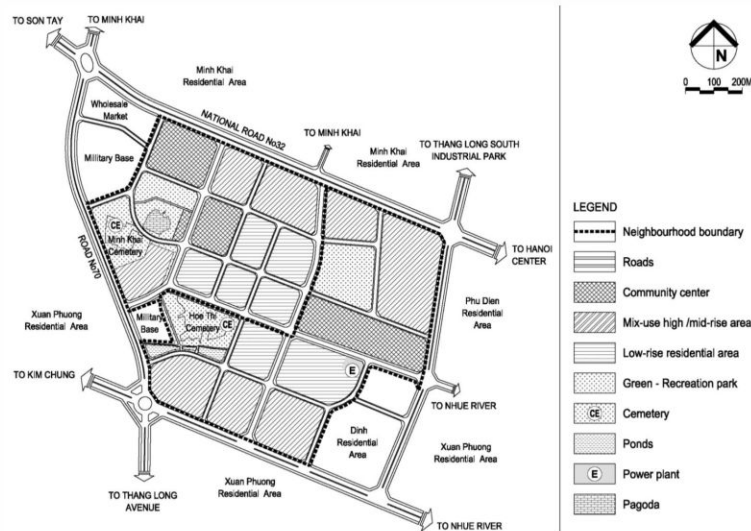


Figure 10. Redeveloping Tu Liem industrial park into two new neighborhoods



## 5. Conclusions

In conclusion, industrial parks should be an integral part of urban fabric and have an inter-relationship with other urban components. For sustainable development, Vietnam's industrial parks should be upgraded to a higher generation to meet the strict environmental requirements, reduce building density and reserve more area for greenery, landscape and other public amenities in the form of park-like industrial park. If an industrial park development affects the urban growth, it should be redeveloped and transformed into a public center or a high-quality residential area.

With the crucial change concerning developments and new orientations regarding upgrading or redevelopment, it is expected that industrial parks will be able to make a significant contribution to the socio-economic development and sustainability in Vietnam.

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