Land resource management in industrial zones in Hanoi, Vietnam

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**Abstract.** Hanoi, the capital city of Vietnam, is one of the two major economic centers in the country. It has played a crucial role in the country’s economy, especially with the operation and development of industrial zones. As of 2022, there are eight industrial zones in Hanoi, covering a total area of over 1,427 hectares. These industrial zones have contributed significantly to the economic and social development of the capital city, attracting both domestic and foreign investment and creating numerous job opportunities. However, during the construction and development of these industrial zones, there have been many shortcomings, including ineffective use of land resources, wasting resources, misuse of land for the wrong purposes, violating space and environmental requirements, and negatively impacting the image and appearance of the capital city. One of the reasons for these issues is the ineffective land resource management in industrial zones. Therefore, there is a need for more effective and coherent solutions to managing this industrial zone. Through field investigations and surveys in Hanoi industrial zones, with the expert method, and research of published documents, the author has proposed some solutions for managing land resources in industrial zones in Hanoi, to save land resources, ensure efficient use, and promote sustainable development for industrial zones in Hanoi.

**Keywords**: Industrial zone, Industrial zone management, Land resource, Land resource management.

1. Introduction

Hanoi is the main hub in the key economic region of Northern Vietnam, with a developed transportation network and synchronized urban infrastructure, making it an attractive area for industrial development. Along with the whole country, Hanoi's industrial zones (IZs) have been built since 1994, and up to now, there are 8 IZs operating with a total area of 1,427 hectares. The development of IPs has contributed significantly to the economic and social development of the capital city, specifically attracting 629 projects, including 325 foreign direct investment (FDI) projects with a registered capital of USD 5.4 billion and 304 domestic investment projects with a registered capital of VND 13,386 billion [14]. However, these contributions have not met the set targets. In fact, there are still many issues in the operation process of IZs, such as environmental pollution caused by industrial development; Inefficient use of industrial land, and misuse of land is still happening. Many land areas allocated for projects are still left idle, leading to wastefulness and unattractive images for IZs and the city. The majority of constructions in IZs are one-story factories with scattered construction, low land use efficiency per hectare of industrial land, many constructions built without planning, many areas expanding, encroaching on land, and temporary constructions. The landscape in IZs has not been invested in a reasonable and sufficient manner, lacking green spaces, water surfaces, landscapes, and public utilities serving workers, and the quality of the environment is not ensured. One of the reasons for these issues is the ineffective state management of land resources in IZs in Hanoi, which has many limitations that need to be adjusted.

1. The Scope and Method of case study

The scope of this article is the current state of land resource management in IZs in Hanoi, Vietnam. The research methods used in this article include field surveys, measurements, and mapping in five IZs, including Sai Dong B, Quang Minh and Thang Long, Nam Thang Long, and Hanoi Dai Tu; sociological surveys, specifically conducting questionnaires in four IZs, including Sai Dong B, Thang Long, Nam Thang Long, and Phu Nghia, with a total of 483 questionnaires for two target groups: workers directly working in IZs and residents living near IZs; and the method of studying, synthesizing, and processing data to clarify the current issues of land resource utilization, limitations, and difficulties in land resource management in IZs in Hanoi. Additionally, the research results of the article also use secondary data from documents, information websites, and legal documents of state management agencies as a basis for analysis and evaluation.

1. Ha Noi Industrial Zones land resource management situation

3.1. The situation of land resource utilization in industrial zones

As of 2020, Hanoi has a total of 18 IZs located within its administrative boundaries, approved by the Prime Minister and included in the planning portfolio, with a total area of nearly 5,200 hectares. Additionally, there are 13 IZs planned for development until 2030, including the upgrading of current industrial clusters, with a total area of 2,814 hectares [14].

**Table 1**. Land use situation of 8 industrial zones in Hanoi up to 2016.[1]

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No | Industrial Zones | Location | Establish | Land area (ha) | | | |
| Natural land | Industrial land available for lease | Industrial land already leased | Fill rate  (%) |
| 1 | Noi Bai | Soc Son | 1994 | 114.1 | 76.6 | 75 | 97.9 |
| 2 | Ha Noi- Dai Tu | Gia Lam | 1995 | 40.09 | 32.1 | 18 | 56.1 |
| 3 | Sai Dong | Gia Lam | 1995 | 47.3 | 35.8 | 35.8 | 100 |
| 4 | Thang Long | Dong Anh | 1997 | 302 | 206.2 | 205.7 | 99.8 |
| 5 | South Thang Long | Tu Liem | 2000 | 260 | 17.5 | 17.5 | 20 |
| 6 | Quang Minh 1 | Me Linh | 2004 | 344 | 304 | 224 | 80.3 |
| 7 | Phu Nghia | Chuong My | 2007 | 165 | 121 | 85 | 70.2 |
| 8 | Thach That | Thach That | 2007 | 155 | 120.4 | 116 | 96.3 |
| **Total** | | | | **1427** | **914** | **797** | **77.6** |

With 8 operating IZs, most of them have been leased and filled, and only a few industrial parks such as Hanoi Dai Tu and South Thang Long have low occupancy rates due to slow implementation by the investors. The IZs in Hanoi have a relatively high occupancy rate, indicating their attractiveness and ability to attract businesses to operate within the industrial parks. The average occupancy rate of Hanoi's industrial parks is 77.6% of the total industrial land area. This rate is considered high compared to many other localities across the country. However, a high occupancy rate does not necessarily mean a high efficiency in land use.

**Fig.1**. The occupancy rate of IZs in Hanoi compared to other provinces in Vietnam [15]

One current issue with IZs in Hanoi is the low efficiency in land use. Some IZs are built with densely packed structures, and businesses focus primarily on the economic indicator of filling the space to attract investment, without paying attention to working conditions, environmental quality, aesthetics, and landscapes of the industrial park. The land use planning structure in IZs is not yet suitable, and the proportion of land reserved for greenery and landscape is still low. According to QCVN 01:2019 of the Ministry of Construction, the area of greenery and landscape in industrial parks should be ≥ 10%, but in reality, this area in Hanoi's IZs is much smaller. The construction of manufacturing plants mainly involves one-floor structures, spread across the entire land area with high density, low land use efficiency, and a limited area allocated for greenery and landscape. This results in significant land waste and low land use efficiency per hectare, affecting the working environment and image of the IZs and the city. (Such as Quang Minh 1, Thang Long, Noi Bai, etc.)

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|  |
| **Fig.2**. The construction density is very high (70%), and the area reserved for landscaping is very low (<10%) - at Quang Minh 1 Industrial Zone - Hanoi. |

And not a few industrial parks leave many hectares of land abandoned. The common spatial model for industrial parks in Hanoi is a collection of factory plots with pre-built technical infrastructure systems for rent, along with a minimum proportion of administrative, service, and green spaces. Other necessary functions to support industrial park activities such as public works, commercial services, entertainment, etc that serve workers are less invested in building. The function of a warehouse is regulated, but it is rarely built as a separate part of the IZs, only in factories built by businesses themselves.

Land in industrial parks mainly comes from the conversion of agricultural land, clean land, good land, and valuable land... However, the use of industrial land is not reasonable because there are still many projects in IZs that are delayed, some have been delayed for over 20 years, and many hectares of land are left unused or used for the wrong purposes such as being rented out as warehouses, parking lots, schools, product display areas, or even abandoned for weeds to grow... causing a huge waste of land, affecting the environment and landscape of the IZs, specifically at the Nam Thang Long (over 25 hectares), Thach That (15 hectares), and Hanoi Dai Tu (20 hectares).

The rental prices of land for building factories in IZs are not reasonable. Through a survey of some IZs, it is found that the IZs established by the government with synchronized technical infrastructure are convenient but have a slower filling rate and fail to attract businesses to invest in building factories due to the high investment costs and land clearance fees resulting in high land rental taxes, such as the supporting IZ for South Hanoi with a rental price of 150 USD/m2/50 years, while IPs in neighboring provinces such as Ha Nam and Hung Yen have rental prices of 50 USD/m2/50 years. This leads to the situation where many completed IPs are left unused for a long time without a solution.

IZs licensed and supported by the People's Committee with faster development and filling rates (due to rental prices under 50 USD/m2/50 years lease term), face difficulties in management due to the historical development of IZs or their formation from industrial clusters. At the same time, many projects have too many special incentives, such as reduced land rental fees and business fees for a very long time, to attract investors easily, leading to many businesses renting large land areas to hold onto the land and delaying the implementation of construction and infrastructure investment to put into operation or to rent for other purposes. This is a reality that is causing significant land waste, difficulties in management, and environmental and landscape impacts in IZs, while the land is becoming increasingly scarce, especially in crowded cities like Hanoi. Some IZs with large areas of unused land and low working conditions and environmental quality can be mentioned, such as Hanoi-Dai Tu, Sai Dong B, and Nam Thang Long IZs.

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| --- | --- |
| Shopping Mall  Unused land for many years  Factories |  |
| Unused land in Ha Noi – Dai Tu |
|  |
| Current situation of land use in Sai Dong B | Abandoned land area in Quang Minh |
| **Fig.3**. Ha Noi Industrial Zones land use situation | |

3.2. Hanoi Industrial Zones land resources management situation

Legal documents: The management of land resources in IZs is governed by a system of legal documents such as Land Law No. 45/2013/QH13 dated November 29, 2013, of the National Assembly on land management and use; Decree No. 43/2014/NĐ-CP dated May 15, 2014, of the Government on state land management and use; Decision No. 32/2017/QD-UBND of Hanoi People's Committee dated September 28, 2017, on the issuance of "Regulations on state coordination in managing activities of industrial parks, export processing zones in Hanoi", National Technical Regulation on Construction Planning No. 01/2019/BXD issued under Circular No. 22/2019/TT-BXD; TCVN 4449-1987... However, these legal documents have not kept up with the pace of reality and often come after the actual situation. Therefore, when encountering problems, there will be difficulties in resolving and handling them, as follows:

* The Land Law No. 45/2013/QH13 dated November 29, 2013, of the National Assembly on land management and use does not specifically prescribe the planning of land use in industrial parks in special urban areas towards resource-saving and efficient use.
* Vietnamese Standard TCVN 4449-1987 sets the standard for large and very large urban areas like Hanoi, where the land area for the industry is 15-20m2/person [5]. This standard is no longer suitable because social conditions and people have changed. With such an area standard, for a capital with 10 million people, this is a very large criterion that wastes land resources.
* Decree No. 82/2018/NĐ-CP dated May 22, 2018, on the regulation of IZ and economic zones management does not uniformly regulate land lease bidding, adjustment of standards, old regulations, land tax increases, land prices...
* Decree No. 82/2018/NĐ-CP dated May 22, 2018, on the regulation of industrial park management and economic zones does not uniformly regulate land lease bidding, adjustment of standards, old regulations, land tax increases, land prices...
* Decision No. 32/2017/QD-UBND of Hanoi People's Committee dated September 28, 2017, on the issuance of "Regulations on state coordination in managing activities of industrial parks, high-tech industrial zones in Hanoi" does not clarify the role and responsibility of inspection, handling of land use violations or legal violations related to environmental protection. It only specifies active coordination among the IZs Management Board, Hanoi People's Committee, and Department of Natural Resources and Environment to resolve violations. This leads to problems of insufficient or overlapping inspection and handling, resulting in inefficiency and delay in handling violations.
* Decree No. 29/2008/ND-CP dated March 14, 2008, stipulates three types of IZs according to scale: 100ha; 100-300ha; >300ha. With the currently limited land fund of Hanoi, maintaining the three types above is not reasonable for encouraging small and medium-sized enterprises, and start-ups in specialized industries such as software, information technology, etc. They only have demand for small areas with available high-rises and infrastructure. This leads to many IZs having empty land and large plots difficult to lease.
* Currently, there is no clear legal document on the issue of land revocation for investment projects that violate land law, as well as for investment projects that do not put land into use, or delay putting land into use in industrial parks in Hanoi.

The management system is not flexible enough, and the allocation of functions, tasks, and powers among the management agencies from the central level to the IZs as well as at the local level is not really unified, not scientific, and lacks coordination in the management process. The inspection and supervision of compliance with industrial park activities as prescribed in Decision No. 32/2017/ND-UBND are still inadequate in reality. The coordination among the agencies is still not close enough, the number of specialized management officials is still low, and they are not assigned or work at each industrial park, leading to many violations of land use still happening with little supervision and detection by the management agencies. Members of the management system are mainly appointed by the government without considering the multidimensional and multi-stakeholder nature of IZ management, including the government, investors, communities, and consultants, leading to a formal, imposing, and lack of sharing of benefits among stakeholders for the sustainable development of IZs.

The implementation of IZs planning and management is still loose, with some IZs in Hanoi being approved for planning but still having violations in construction such as building density, planning corridors around the IZs (such as Sai Dong B and South Thang Long), and improper use of industrial land. Currently, planning and implementation of planning are the weakest links in the policy system for IZs development in Viet nam, and Hanoi.

The application of information technology and modern machinery and equipment is not widely used in the administrative management of the management agencies in general and the Hanoi IZs Management Board in particular. Data are rarely digitized and there are not spectified. This has greatly hindered the management work, especially in the context of strong integration and development.

The people are an extension of the management. Regulations for disseminating information to create opportunities for people to participate in management are already in place. However, information on investment, planning, etc. is often incomplete, lacking linkage and guidance on where and how people or workers can effectively participate. Evidence of this is that every time people need information on planning, they have to request it from the district People's Committee or the Industrial Zone Management Board. On the other hand, there is a lack of legal provisions for government agencies to respond to the contributions and opinions of people and workers working in the IZs regarding management to ensure equality before the law, thereby encouraging effective community participation.

This situation shows that land management in IZs has not been implemented rigorously and comprehensively, and the forms of punishment and sanctions are not strong or strict enough, thus violations still exist and recur. The lack of powerful and unified tools such as legal basis and management system is not tight and well-coordinated. All of this leads to the inefficient use of land resources in IZs in Hanoi, causing waste and not being suitable for sustainable development in the future.

1. Provide some solutions

4.1. Efficient land resource management

IZs in Hanoi occupy a large area of land, even small IZs cover several dozen hectares, and large IZs cover hundreds of hectares. This land was converted from clean agricultural and forestry land with high value. Land saving means determining the right amount of land to use without waste. In the past 20 years, FDI investment projects have been considered a spearhead for economic growth, so local governments have had many policies to attract investors, creating a "*red carpet*" for them and offering many incentives. This has led to a long-term situation of investors occupying valuable land. Therefore, it is necessary to strictly organize bidding for leasing industrial zone land, abandoning the "*introduction*" locations of industrial park to investor. Have to select investors who are competent, have adequate resources, and have enough strength to meet the requirements for developing the industrial zones.

The reality is that although industrial park planning has been approved, adjustments still occur frequently, leading to a significant deviation from the overall and initial planning goals. Therefore, this issue needs to be limited.

Regarding reserve land: this area accounts for more than 30% of the total area of ​​construction land plots. Companies often leave these areas empty for many years and do not take care of them to create landscapes in many IZs. Therefore, there need to be regulations for reserve land, specifically including the progress and plans for using this land in the stages of the project. If the responsible companies do not fulfill their obligations, they must be responsible for organizing the construction of landscapes, creating aesthetics for the rented land area, such as building amenities for workers, green landscapes, sports facilities, gardens, etc., to provide the factory with beautiful landscapes, amenities for workers, and ensure the climate and environment for each factory as well as the entire industrial park. If the responsible companies do not comply, the industrial park management board must impose penalties and withdraw the land. This needs to be regulated in the industrial park management regulations.

Do not allow consultants and investors to arbitrarily arrange single-story production buildings, occupy large areas of land for cheap land rental and low land taxes, and with overly long lease terms of up to 70 years, which is unreasonable and lacks vision. The comprehensive solution is to organize bidding, adjust standards and regulations, increase land taxes, reduce lease terms to less than 50 years.

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| **Fig.4.** Creating landscape, utility space for reserve land and vacant land | |

* 1. Increase land use efficiency by constructing multi-story buildings and changing reasonable adjustment indices for both construction and landscaping.

Proposal for a general problem on space management to increase the efficiency of land use in IZs in Hanoi.

We can quantify the components as follows:

+ a is the area of land according to the approved plan

+ b is the area occupied by buildings

+ c is the area for landscape

Thus, we have **a = b + c** (1)

In which a is the fixed area by the base land unit such as 1, 2, 4 hectares..., which is a constant quantity for the approved land lot.

Therefore, we can see that the efficiency of land use and environmental amenities depend on **b** and **c**. If **b** is large, **c** must be small, meaning that if the building density is high, the area for landscape and empty space will be low. Conversely, if **c** is large, **b** must be small, meaning that if the building density is low, the area for landscape will be higher. However, in this case, if the density decreases, the land use efficiency will also decrease, leading to uneconomical conditions. Therefore, this is a problem that needs to find the optimal solution for each type of production, applying low or high-rise construction types depending on the type of land.

In practice, to ensure the long-term benefits of the city, the article proposes the basis for adjusting the adjustment indices and flexibly regulating high-rise buildings for some construction items, provided that the industrial and technical types allow it as in Hanoi.

Compared to the planning standards to determine and manage the most suitable distribution of **a, b**, and **c** ratios to create a harmonious and attractive benefit for IZs in Hanoi as well as for investors. The problem here is to find the appropriate ratio, with adjustment indices increasing or decreasing to balance and optimize the components. Therefore, the article proposes adjusting the number of floors and construction adjustment indices and the area for landscape through a calculation formula applicable to large urban areas in general and Hanoi in particular to calculate land savings while ensuring the area for factory use. Specifically, after adding the high-rise and adjustment indices in formula (1) above, we get (2).

(2)

2

In which

**v1**: adjustment indicator for land use in special urban areas, where v1≤1 (for example, in Hanoi, which is a special urban area, the v1 must be ≤1 due to the need to save land. Therefore, the area of land used for building factories must be smaller or equal to the standard allowed).

**v2**: adjustment indicator for construction, which depends on the nature of the production industry, such as light industry. In Hanoi, industries that are allowed to build are mainly light industries, which cause less pollution. Therefore, the **v2** must be ≤1.

**v3**: adjustment indicator for landscape area, which depends on v1 and v2

b: area of land occupied by buildings in industrial parks according to the standard.

**v2/n**: adjustment indicator for building height. The **v2/n** must be ≤1, where **n** is the number of floors in the building. The value of n depends on the type of industry and ensures national security and safety requirements.

**c**: area for landscaping and green space in industrial zones.

For example, when changing the number of floors n, if **n=1**, the formula will yield the result **a= b+c**, which means that the area of land is equal to the standard allowed, and the height of the building is 1 floor. If **n=2**, which means the building has 2 floors, the area occupied by the building will decrease by ½, but the area of land used will still be maintained. When the area occupied by the building is reduced by ½, the area for open space and landscape will increase accordingly. Similarly, when n=3,4,5, etc., and the number of floors increases to 3,4,5 floors, the building density will decrease by 3,4,5 times, and the land use efficiency will increase. The area for landscaping will be larger because the area of the land plot a is fixed.

Depending on the function, type of land, land price, type of production, and degree of hazardousness in IZs, the city government or management may set the applicable values of **v1, v2, v3**, and **n**, which are suitable for the local conditions and the time of application. With reasonable adjustments to the building height and adjustment coefficients as in the above problem, not only will it increase the area for landscape, but it will also maintain the area of land use and create a better environment for industrial parks. When the number of floors is increased, factories will be easier to combine into beautiful shapes and create a more impressive space. The space in industrial parks will change and become more diverse in organization.

These indicators will help management have an overall view of the relationship and mutual impact of the objects in IZs, such as land use, buildings, and landscapes, to calculate, consider, and make more accurate and reasonable regulations for each industrial park and factory, in accordance with the long-term development strategy of the industrial park. These indicators and regulations can be incorporated into the management regulations of IZs in Hanoi.



**Fig.5.** The land use efficiency will be better when constructing multies-floor factories.

* 1. Supplement and refine the legal regulatory documents

The Land Law No. 45/2013/QH13 dated November 29, 2013 needs guidance documents on the content of land use in industrial zones for special cities like Hanoi.

Decree No. 43/2014/NĐ-CP dated May 15, 2014 regulates land recovery when not in use for IZs, but it only stops at general regulations. Therefore, the Hanoi People's Committee needs to issue specific regulations on land recovery for cases where land is not put into use, or is delayed in use compared to the progress of land use as stated in the land lease contract, or the lease of land to investment enterprises of IZs in Hanoi.

Decree 82/2018/NĐ-CP dated May 22, 2018 provides regulations on the management of industrial parks and economic zones. The proposal is to adjust the level of industrial park area from 3 types to 4 types for industrial parks in Hanoi (very large > 500ha; large 200-500ha; medium 50-200 ha and small <50 ha). Small IZs are suitable for specialized industries such as high-tech manufacturing, software technology, etc. This is in line with the development trend of businesses currently and in the future, while saving land and rental costs for businesses. The module of land lots divided by checkerboard pattern with a minimum module of 10,000m2 (1ha) has caused a huge waste and loophole in current regulations. To avoid this issue, the regulations need to be changed towards reducing the basic unit to only 1000m2 to have smaller, more efficient and suitable size levels for the development of new factories.

It is necessary to supplement regulations on land use in special urban areas such as Hanoi, and to supplement and adjust standards for calculating industrial land area for large urban areas, have to be lower than the TCVN 4449-1987 regulation (proposed at 7-10m2/person) in order to avoid long-term land waste.

It is necessary to promptly amend the Inspection Law and add the inspection of IZs to the specialized inspection list to help the Management Board of Hanoi's IZs effectively implement the "one-stop, one check" management mechanism. Currently, the Management Board does not have the function of inspection and handling of violations, but instead has to coordinate with specialized agencies to handle them, even though it is the direct management unit of IZs. At the same time, a regulation for the inspection and audit activities of IZs needs to be developed, in which the requirements, responsibilities, and obligations of the management agency and businesses in the inspection work need to be accurately defined. The individual responsibilities and powers of those directly involved in the inspection work need to be clarified, and sanctions against violators need to be stipulated. The quality and effectiveness of the entire inspection work, from the development of regulations, inspection plans, to the organization of implementation, all depend on the professionalism and ethics of the officials and employees in charge. Therefore, officials and employees in charge must have high responsibility, good moral character, professional qualifications, and a strong understanding of laws and policies to eliminate negative practices in the inspection of IZs.

**4.4. Application of digital technology in land resourse management**

In this era of rapid technological development, the application of digital technology and advanced equipment is essential in the operation and management of IZs. It brings about many benefits and conveniences, as well as saves time, labor, and resources in the management of IZs. With the main capabilities of interaction, reality simulation, support technology, decision-making rights, quick multi-dimensional information updating, transparency, and effectiveness, the applications have many effects on the management of industrial land resources in Hanoi. Specifically, software such as GIS, GIS3D, Mapinfor, SAGA, etc., with their database management systems, including spatial and non-spatial data, can collect, analyze, synthesize, and overlay information layers available in the database to create new information layers according to the user's needs. From the map information and stored attributes, reports and maps can be easily generated to provide a systemic view, allowing leaders to effectively plan and support decision-making processes on management solutions in IZs in all fields.

One of the benefits of applying digital technology in the management of industrial land resources is the quick and accurate reception of information from workers, residents, and the public through electronic information reception portals on phones or hotlines. Besides, interactive software applications such as Zalo, Facebook, Viber, etc., or dedicated software for IZs, are effective tools for communities to promptly reflect on shortcomings to functional agencies, thereby easily handling cases, saving time and effort.

1. Conclusion

In the current economic development context, the management of land resources in industrial zones in Hanoi is extremely necessary. Proper management of industrial land use helps to optimize land use, reduce waste of resources, and increase economic and environmental efficiency. Specific policies and regulations need to be in place and fully and strictly implemented to ensure the maximum benefits of industrial zones. Adding and improving legal regulations related to industrial land management, and introducing digital technology in industrial land management are also important factors in improving the effectiveness of industrial land management in Hanoi. In addition, active participation of investing enterprises in industrial zones in land resource management, compliance with legal regulations and ensuring safety, environmental protection, and social responsibility are also necessary. The collaboration of all relevant parties in industrial land resource management will contribute to sustainable development of industrial zones in Hanoi and make a positive contribution to the country's economic development.

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