

A Technology Infrastructure Approach for Developing Industrial Clusters in Hanoi Vietnam

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ABSTRACT

Our study objective is to propose recommendations for technology infrastructure of industrial clusters in Hanoi Vietnam. In industrial clusters there will be businesses specializing in the production of industrial goods and providing services for the production of industrial goods by using qualitative, analysis, synthesis research methods. Study results show that for developing industrial clusters, we would suggest to apply modern technology such as: applying Big Data, automation technology, robotic tech in order to reduce risks for workers in industrial park.

Last but not least, we will pay attention to: Technical infrastructure works related to fire prevention and fighting are the traffic system for fire trucks, water source, fire-fighting water supply system outside the house, power source for fire prevention and fighting system, and equipment for firefighting, motorized fire and rescue solutions.

Keywords: *Technology infrastructure, Industrial clusters development, Hanoi.*

1. Introduction

In recent decades, industry has become the spearhead economy of many countries around the world, especially developing countries. In Vietnam, since the end of the 20th century, the investment and development of industrial zones has been paid special attention by the state. At the beginning of the twentieth century, the number of industrial park projects has increased significantly, not only attracting domestic investment capital, but Vietnam is also a destination for many foreign investors. In particular, when the Industrial Revolution 4.0 spreads and the "presentation" of FTAs such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the Vietnam Free Trade Agreement - The European Union (EVFTA) is expected to bring many development opportunities to Vietnam's economy through export expansion, investment and application of science and technology, helping to improve Vietnam's supply chain.

In Hanoi city, Hanoi Industry and Trade are implementing specific solutions to speed up the construction progress of projects. In which, the most important task is that the Department will coordinate with the Department of Natural Resources and Environment to complete the dossier for the City People's Committee to submit to the Prime Minister to apply for the conversion of rice land; along with that is to immediately complete the issuance of construction permits with qualified industrial clusters... According to the direction of the city, the Department will urge investors and localities to apply for adjustment and extension of the implementation schedule. Projects for industrial clusters have expired; elaborating and appraising project feasibility study reports; environmental impact assessment report, etc.

Research Questions

What are recommendations for technology infrastructure of industrial clusters in Hanoi Vietnam?

What are other Solutions for clusters development in Hanoi Vietnam?

2. Literature Review

Next we summarize related studies in below table:

Table 1. Summary of studies

Authors	Year	Content, results
Lundvall	1993	According to modern global economic trends and the priorities of the development of society, social development becomes a strategic goal that provides stability and competitiveness of the territory.
Martin & Sunley	2002	In the field of forming a socially-oriented cluster policy, there are numerous works of foreign and domestic scientists. However, they do not represent systematic studies on the problems of identifying such clusters, diagnosing their development, developing mechanisms for their state support, creating the necessary infrastructure and development institutes, elaborating rules for interaction between cluster participants, the state authorities, and management bodies, their business structures, scientific and educational institutions, public organizations and so on.
Hayani & Godo	2005	Foreign technologies were imitated in different manners among the three countries in the postwar periods. Since the inception of modern economic development in the late 19th century, Japan had been making every effort to catch up with the West in industrial technologies by setting up modern government-supported plants modeled after advanced factories in the West, providing general education and vocational training for workers and engineers, and so on.
Kaliba	2014	Among cluster planning is plan for Capital Region Development.
Prokhorova et al.	2018	Within the industrial cluster, an active exchange of information between interrelated economic entities takes place, and the conditions for their economic activity are coordinated. The cluster mechanism allows reducing the

		element of uncertainty and provides a high degree of foresight of the market situation for the cluster participants. The initiative to form and develop industrial clusters should come from the executive and local government bodies that should promote the institutional development of clusters, including organizational support for cluster creation.
Kulpina et al.	2020	Need to identify key areas in Economy Clustering and to increase Efficiency and Resource Usage for Sustainable Social and Economic Development, in case Kuzbass.

(Source: author synthesis)

Beside, we need risk management solutions needed to reduce risks, via education or research paths (Thi Hang Nguyen, Van Huan Nguyen, Dinh Tran Ngoc Huy; 2021; Le, K., & Nguyen, M; 2021; DT Tinh et al, 2021; PM Dat et al, 2020; NT Hoang, DTN Huy, 2021; TDT Vu, DTN Huy, NTH Trang, NN Thach, 2021; PN Tram, DT Ngoc Huy, 2021).

3. Methodology

Not only this paper uses experiences, observations, practical situation with cases studies of industrial clusters in Hanoi, Vietnam, but it also uses will use qualitative, analysis, synthesis research methods. Relevant regulations and plans of clusters in Hanoi also researched.

4. Main findings

4.1. Technology infrastructure of industrial clusters in Hanoi Vietnam

We recognize 2 important parts of industrial clusters: first is social infrastructure base and second is technology infrastructure base during cluster development.

The system of common technical infrastructure works of an industrial cluster is specified in Clause 6, Article 2 of Decree 68/2017/ND-CP (effective on July 15, 2017) on management and development of industrial clusters such as: after:

The system of general technical infrastructure works of the industrial cluster includes the system of internal traffic works, sidewalks, trees, water supply, drainage, wastewater treatment, solid waste, electricity supply, and mats. Public lighting, internal communication, operator, security and other works serving the operation of the industrial cluster.

For developing industrial clusters, we would suggest to apply modern technology such as: applying Big Data, automation technology, robotic tech in order to reduce risks for workers in industrial park.

Last but not least, we will pay attention to: Technical infrastructure works related to fire prevention and fighting are

the traffic system for fire trucks, water source, fire fighting water supply system outside the house, power source for fire prevention and fighting system, and equipment for fire-fighting, motorized fire and rescue and rescue solutions.

Next, Equip with motorized fire fighting means: an industrial park with a total area of more than 300 ha must be equipped with 03 fire engines; the total area is larger than 150ha to 300ha, 02 fire engines must be equipped; the total area from 50ha to 150ha must be equipped with 01 fire truck; total area less than 50ha must be equipped with 01 portable fire pump as specified in Table 6 TCVN 3890:2009. At the same time, it is necessary to arrange a house with a roof to preserve these vehicles;

Then, establish specialized fire prevention and fighting teams: industrial zones, export processing zones, high-tech zones, industrial clusters with an area of 50 hectares or more must establish specialized fire fighting teams and arrange service conditions and facilities. This force (Article 13 of Circular 149/2020/TT-BCA dated December 31, 2020 of the Ministry of Public Security).

So, Industrial zones, export processing zones, hi-tech parks, industrial clusters with an area of 50 hectares must establish and maintain specialized fire fighting teams to ensure the number of people according to regulations, and at the same time arrange the following conditions: facilities for this force (norms of equipment for fire prevention and fighting equipment for specialized fire prevention and fighting teams are based on Appendix II and Appendix III of Circular 150/2020/TT-BCA dated December 31, 2020). For industrial zones equipped with fire trucks, the vehicle must be kept in a covered house (garage), always loaded with enough fuel and extinguishing agents, equipped with attached vehicles and tools, and comply with regulations. On management, preservation and maintenance according to the provisions of Circular No. 17/2021/TT-BCA dated February 5, 2021 of the Ministry of Public Security.

4.2. Recommendations for industrial clusters (CCN) in Hanoi

We would propose that:

First, The project's compensation and site clearance work has been carried out for a long time, mechanisms, policies and legal documents have changed a lot, so in the process of implementation, there are many difficulties, obstacles, and impacts on the environment, construction progress and synchronous completion of industrial park infrastructure. Leading to the work of attracting investment and the number of enterprises investing in the clusters is not much.

In order to attract investment in industrial zones, the Provincial Management Board of Industrial Parks has implemented synchronously and effectively solutions to improve the efficiency of State management of industrial zones, in which, we need to coordinate with District People's Committee to remove difficulties, accelerate the site clearance and invest in completing the essential infrastructure of Industrial Park. Along with that, continue to perfect the plan for development of industrial zones to integrate into the provincial planning according to the Regulation on Planning and Investment. At the same time, calling and attracting investors with capacity, experience, prestige and financial potential to invest in the construction and business of infrastructure of clusters, contributing to promoting socio-economic development provincial association.

Second, in a case of industrial cluster - Thach That which is a district with many concentrated craft villages and attracts a large number of workers in the area, in which, many groups of occupations have the size of the whole commune. Currently, in the district, there are 7 industrial clusters that have been invested in building technical infrastructure and put into operation with a total area of 160ha.

However, the demand for production space for craft village establishments is still very large. The investment in the construction of the Di Nau craft village industrial cluster will contribute to partially solving the demand for production premises for industrial and handicraft production establishments in the district, gradually bringing production facilities to the market in craft villages and residential areas in concentrated production areas with synchronous infrastructure investment. Thereby, contributing to promoting the development potential of industry, handicrafts and craft villages of Thach That district in particular and Hanoi city in general.

Construction firms need efforts to complete the procedures for investment and start the project implementation. At the same time, it is proposed that the city's departments, agencies and branches continue to create the most favorable conditions for investors in the process of project implementation; especially in removing difficulties and obstacles, shortening the time to carry out administrative procedures.

The Department of Industry and Trade, as the focal point for performing the state management of industrial clusters in the city, should regularly inspect, urge, and coordinate to resolve difficulties and problems, and promptly consult with the Ministry of Industry and Trade will advise the City People's Committee on solutions to speed up the implementation progress, ensure the completion of the project and put it into operation and exploitation on schedule.

Construction companies in such projects need to focus all its resources to quickly complete the investment in construction of technical infrastructure and industrial cluster; thereby attracting secondary investors to maximize the project's effectiveness and contribute positively to socio-economic development of Hanoi city.



(Source: author synthesis)

Fig.1. Development of Hanoi industrial clusters

5. Discussion and Conclusion

With the advantage of abundant labor resources, large land area, technical infrastructure, and traffic are gradually invested in synchronously, which are the conditions and advantages that help industrial clusters of Hanoi city become an attractive destination for investors in its production and business strategy.

Clusters will contribute to attract investment, industrial development has also contributed to promoting the growth of the industrial production industry, shifting the local economic structure towards industrialization and modernization, increasing exports and contributing to budget payment and creating jobs for many more local workers with increasing income.



(Source: author synthesis)

Fig.2. Hanoi city clusters

Research Limitation

For future researches, Authors can make further researches on standards of management of industrial clusters

Declarations

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Competing Interests Statement

The authors declare no competing financial, professional and personal interests.

Consent for publication

Authors declare that they consented for the publication of this research work.

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