

DEVELOPING INDUSTRIAL PARKS ASSOCIATED WITH ENVIRONMENTAL PROTECTION IN BAC NINH PROVINCE

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Abstract

After more than 20 years of re-establishment, from a purely agricultural province, Bac Ninh has basically become a modern industrial province. Industrial zones of Bac Ninh province began to be formed and developed in 1998. By December 2000, Tien Son was the first concentrated one of Bac Ninh to be built. By the end of 2015, the province had 16 concentrated industrial parks with a total area of 6,381.68 hectares and 12 industrial parks that have been granted investment certificates and decisions on establishment with a total planning area of 4,552.91 hectares. In which, there are 10 industrial parks operating with a planned land area of 3,696.94 hectares, with infrastructure investment capital of 775.30 million USD. By 2018, industrial parks had created a production value of 1,166,572 billion VND, export value reached 35,873 million USD, import value was 24,540 million USD, contributed 11,268 billion VND to the state budget, surpassing Ho Chi Minh City, becoming the leading locality in the country in terms of industrial production value and making great contributions to the socio-economic development of Bac Ninh province. In recent years, environmental protection in industrial parks in Bac Ninh has always attracted the attention of all authorities and investors, contributing to the sustainable development of industrial parks of the Province. Within the scope of this article, the author focuses on evaluating the achievements of the development process of industrial parks and the current situation of environmental protection in industrial zones in the province of Bac Ninh. On that basis, some solutions to protect the environment in industrial parks in Bac Ninh in the coming time are proposed.

Keywords: *Enterprises, environment, industrial parks.*

1. Introduction

Bac Ninh is a province located at the northeast gateway of Hanoi, with the smallest acreage in the country (823.1 square kilometers) and a population in 2019 of 1.446 million people. After more than 20 years of re-establishment, under the leadership of the Provincial Party Committee, the People's Council, the People's Committee of Bac Ninh, with the efforts, the spirit of solidarity and creativity of the whole political system, business community and people in the province, Bac Ninh has achieved many outstanding and comprehensive achievements in various fields. From a purely agricultural province, up to

now, Bac Ninh has basically become an industrial province in the direction of modernity, with many socio-economic indicators leading the country. The economy has developed comprehensively, the growth rate has always maintained at double digits. Average growth in the period of 1997-2016 reached 15.1%/year, in 2017 the figure was 18.6%. Bac Ninh's economic scale has continued to expand, accounting for 3.11% of the gross domestic products, ranking fourth in the country and the economic structure has continued to shift towards industrialization and modernization.

Industrial parks in Bac Ninh began to be formed and developed in 1998, along with that, the province's Industrial Parks Management Board was established under Decision No. 152/1998/QĐ-TTg dated August 25th, 1998 by the Prime Minister. It performs the function of direct state management of Bac Ninh's industrial parks; manages and organizes the performance of the function of providing public administrative services and other supporting services related to investment and production and business activities for investors in industrial parks of the province. By December 2000, the construction of Tien Son, the first concentrated industrial park of Bac Ninh, was started. Since then, construction planning management in industrial parks has been carried out in accordance with the order and regulations, meeting the requirements of investors and the province's socio-economic development orientation. Up to now, Bac Ninh has had 16 concentrated industrial parks approved to adjust and supplement by the Prime Minister according to Document No. 1511/TTg-KTN dated August 20th, 2014 and Document No. 2007/TTg-KTN dated November 6th, 2015, with a total acreage of 6,381.68 hectares; 12 industrial parks have been granted investment certificates and decisions of establishment with a total planning acreage of 4,552.91 hectares, industrial lands for lease are 3,181.94 hectares. In which, there are 10 industrial parks put into operation with a planned acreage of 3,696.94 hectares, acreage of industrial land for lease is 2,000.10 hectares, acreage of the leased one is 1,670.4 hectares, occupancy rate on the planned land area reached 83.49%, on the recovered land area reached 88.52%. The registered infrastructure investment capital was about 775.30 million USD (including 02 FDI projects with registered capital of 160 million USD, 12 domestic projects with registered capital of 11,390.69 billion VND) (Bac Ninh Provincial Statistical Office, 2017; Management Board of Bac Ninh's Industrial Parks, December 2018, December 2020). In recent years, environmental protection in industrial parks in Bac Ninh has always attracted the attention of all authorities and investors. Environmental protection has been strengthened, contributing to the reduction of pollution, improving environmental quality, gradually solving pressing environmental problems, making positive contributions to the sustainable development of industrial parks of the province.

Within the scope of this article, the author only analyzes the contents based on statistics, summarizes the process of construction and development of industrial parks in the province of Bac Ninh associated with environmental protection by the authorities of Bac

Ninh from 1998 to 2020. At the same time, the article is also based on Circular No. 07/2007/TT-BTNMT dated July 3rd, 2007 of the Ministry of Natural Resources and Environment, on guiding the classification of the list of establishments causing environmental pollution that need to be dealt with in order to evaluate the achievements of the development process of industrial parks and the current situation of environmental protection in industrial parks in Bac Ninh. On that basis, the author proposes some solutions to protect the environment in industrial parks in the province in the coming time.

2. Method

Data collection methods: The documents and data used in this article are mainly imported from the Bac Ninh statistical yearbook, data from agencies such as: Statistical Department, Management Board of industrial parks and Department of Natural Resources and Environment of Bac Ninh province in the period from 1998 to 2020.

Data analysis and processing methods: The data in the article are analyzed and processed using Microsoft Word software to clarify the construction and development process of industrial parks in province of Bac Ninh and the situation of environmental protection in industrial parks, on that basis, solutions to protect the environment to ensure that industrial parks in Bac Ninh develop sustainably are proposed.

3. Results

3.1. Achievements in combining development with environmental protection in industrial parks in Bac Ninh

a) The development of industrial parks in Bac Ninh province over the past time

Firstly, the results of attracting investment in industrial parks in Bac Ninh.

In the early years of industrial parks' construction, there were mainly small projects with low capital scale, focusing almost on agro-food processing, production of consumer goods and materials and high-end construction materials. In the electronics industry, there are only two projects of Canon Company, accounting for 14% of the total investment capital in industrial parks of the province (130 million of 896 million USD). At this stage, the investment rate was only 1 to 2 million USD per hectare and about 3 million USD per project. Since 2007, the industrial parks have attracted many foreign investment projects. The quantity and quality of which, especially FDI ones, increased sharply with investment rates reaching 13.07 million USD per project and 9.03 million USD per hectare. The structure of industries has changed drastically, forming a spearhead electronics - telecommunications industry. In the period from 2014 to 2018, the industrial parks attracted the number of projects increasing from 153% to 193% and the amount of registered investment capital increased from 237% to 431% compared to the period from 2009 to 2013 and the period of ten years between 1998 and 2008. By the end of 2018, there had been 1,329 projects, with a

total registered investment capital of 17,830.03 million USD. Investment rate in the period between 2014 and 2018 reached 17.72 million USD per project. In 2018, there were 901 enterprises operating in industrial parks, creating a production value of 1,166,572 billion VND. As a result, Bac Ninh industrial parks saw export value of 35,873 million USD, import value of 24,540 million USD and a payment of 11,268 billion VND to the state budget. Industrial production in the province surpassed Ho Chi Minh City, becoming the leading locality in the country. The industrial development index in 2018 increased by 7.4% compared to 2017. In which, the manufacturing industry increased by 7.4% due to the growth of 7.4% in manufacturing electronic, computer and optical products. Besides, production and distribution of electricity, gas and hot water increased by 13.5% and industry of water supply, waste treatment and wastewater increased by 1.5% (Management Board of Bac Ninh's Industrial Parks, December 2018; Table 1).

In 2020, 97 Certificates of Investment were newly issued for 71 FDI projects (328.73 million USD) and 26 domestic projects (2,798.64 billion VND, being equivalent to 121.68 million USD) with total registered investment capital of 450.41 million USD and 393 turns of adjusted projects were granted. There were 91 projects adjusted to increase investment capital by 408.04 million USD (the investment capital of 79 FDI projects increased by 374.06 million USD and that of 12 ones increased by 781.44 billion VND, being equivalent to 33.98 million USD), however, there were 4 FDI projects seeing the reduce of investment capital to 4.08 million USD. By the end of 2020, industrial parks in Bac Ninh had attracted 1,584 projects, with a total registered investment capital of 20,317.80 million USD. That of 1,089 FDI projects and 495 domestic ones reached 17,778.66 million USD and 2,539.14 million USD respectively. Currently, in Bac Ninh's industrial parks, there are 1,100 projects in operation, creating jobs for 331,609 workers. The average income of indirect workers is 9.5 million VND per capita a month and that of direct ones is 7.5 million VND per capita a month (Management Board of Bac Ninh's Industrial Parks, December 2020; Table 1).

In terms of territories, there are 37 countries and regions investing in industrial parks in Bac Ninh, of which South Korea has the largest number of projects and investment capital (499 projects with the capital of 11.6 billion USD), the second is Japan (79 projects with the capital of 1.34 billion USD) and followed by Taiwan... The proportion of FDI capital is increasing in industrial parks. All projects are in the fields of electronics, telecommunications and supporting industries, using modern technology to produce clean, non-invasive products that do not generate factors affecting the environment negatively, including projects of large corporations such as: Canon, Samsung Electronics, Samsung Display, Fushan Technology Co., Ltd... (Bac Ninh Provincial Statistical Office, 2019). This is an important factor promoting technology value of products, improving competitiveness and thereby improving the value of industrial production and export turnover in the province's industrial parks.

Table 1: Results of attracting investment into industrial parks in Bac Ninh province in the period from 2010 to 2020

Year	Total of industrial zones	Businesses in operation	Projects with new certificates of investment in the year	Total of new and adjusted capital in the year (Million USD)	Total of projects granted certificates of cumulative investment	Total of capital newly granted and cumulatively adjusted (Million USD)
2010	13	209	62	461,40	447	3.442,00
2011	13	263	68	558,68	527	4.100,00
2012	13	285	39	334,37	564	4.400,00
2013	13	353	77	1.420,00	645	6.660,00
2014	13	420	67	820,31	774	8.364,21
2015	15	555	137	989,23	892	9.572,13
2016	16	715	135	794,45	1.050	13.099,51
2017	16	827	135	3.422,75	1.024	16.619,52
2018	16	901	125	1.210,51	1.329	17.830,03
2019	16	1.007	134	1.390,46	1.463	19.220,49
2020	16	1.100	97	854,38	1.584	20.317,80

Source: Industrial Park Management Board of Bac Ninh.

Secondly, the contribution of industrial parks to Bac Ninh's socio-economic development.

Industrial production value: In 2005, industrial parks in Bac Ninh only contributed 13.5% of the total industrial production value of the province, but by 2011, the number reached 142,704 billion VND, accounting for 58.6%. In 2012, the figure was 273,065 billion VND, which accounted for 65.4% of the province's total industrial production value. Industrial production value of the industrial parks increased sharply after 2012. In 2013 Bac Ninh saw a growth of 510,000 billion VND, an increase of 86.76% compared to 2012. In a period of four years, between 2013 and 2016, the value of industrial production of industrial parks in the province increased insignificantly, remaining at a stable level of more than

500,000 billion VND per year. In 2017, this increased 28.20% compared to 2016, reaching 664,674 billion VND. From 2018 to 2020, the production value of industrial parks in Bac Ninh province reached over 1.5 million billion VND. In 2020, due to the impact of the Covid-19 pandemic, the industrial production value reached 1,162,394 billion VND, 4,178 billion VND lower than that in 2018, which is 1,166,572 billion VND.

Exports: In 2005, when enterprises in Bac Ninh's industrial zones initially stabilized their production with the contribution of foreign-invested enterprises, export turnover reached 12.278 million USD, accounting for 24% of the province's export value. In 2007, the number was 346.82 million USD. Especially, in 2009, with the operation of the project by Samsung Electronics Vietnam Company in Yen Phong Industrial Park, Bac Ninh's export turnover had a remarkable growth, making Bac Ninh gain trade surplus in 2009. By 2012, industrial parks had become a major contributor to Bac Ninh's export value with 13,620 million USD, accounting for 99.1%. From 2013 to 2017, the export value of industrial parks in the province reached over 20 billion USD (in 2017 the figure was 28,428 million USD). In the period between 2010 and 2020, the industrial parks reported the highest export value, reaching 37,392 million USD in 2019. In 2020, their export turnover reached 35,056 million USD, accounting for 97.22% of the export value of the whole province (lower than that in 2019 due to the impact of the covid-19 pandemic).

Payment to the state budget: From 2010 to 2020, the rate of payment to the state budget of industrial parks in Bac Ninh continuously increased. In 2011, enterprises in the industrial zones paid the budget of 2,653 billion VND, that accounts for 36.8% of the total budget revenue of the province. In 2012, the number reached 3,980 billion VND, which was 43.9% of total budget revenue of Bac Ninh. From 2013 to 2017 (except 2015), industrial parks' contribution to the state budget, on average, increased by about 1,000 billion VND per year. In 2018 there was a sharp increase in state budget payments compared to 2017, increasing from VND 8,700 billion in 2017 to VND 11,268 billion in 2018. Between 2018 and 2020, these industrial parks paid over VND 11 trillion to the state budget every single year. In 2020, the number paid to the budget was 11,342 billion VND, accounting for 37.10% of the budget revenue of the whole province (125 billion VND lower than in 2019 because the covid-19 pandemic affects the production and business results of enterprises in the province) (Management Board of Bac Ninh's Industrial Parks, December 2018, January 2020, December 2020; Table 2).

Industrial zones in Bac Ninh have become an important economic entity, promoting the transformation of the province's economic structure and labor structure towards modern industry, contributing to increase local budget revenue, turning Bac Ninh into a province with surplus value and promoting its sustainable socio-economic development.

**Table 2: Production and business results of industrial parks in Bac Ninh
between 2010 and 2020**

Year	Value of the industry production (Billion VND)	Export (Million dollars)	Import (Million dollars)	Payment to national budget (Billion VND)
2010	48.350	3.458	2.837	2.146
2011	142.704	7.630	5.995	2.653
2012	273.065	13.620	12.200	3.980
2013	510.000	25.000	21.000	4.500
2014	500.600	23.600	19.700	6.500
2015	511.500	23.300	18.500	6.000
2016	518.446	25.432	17.095	7.414
2017	664.674	28.428	23.462	8.700
2018	1.166.572	35.873	24.540	11.268
2019	1.151.265	37.392	22.686	11.467
2020	1.162.394	35.056	23.468	11.342

Source: Industrial Park Management Board of Bac Ninh

b) Environmental protection in Bac Ninh's industrial parks over the past time

Along with the process of socio-economic development, Bac Ninh always pays attention to and focuses on environmental protection, determining that industrial development associated with environmental protection is one of important tasks and conditions to promote its socio-economy to develop sustainably in the coming years. The Provincial Party Standing Committee of Bac Ninh issued Action Program No. 80-CTr/TU on May 27th, 2005 to implement resolution No. 41-NQ/TW dated November 15, 2004 of the Politburo (the IX term) on “Environmental protection in the period of accelerating industrialization and modernization of the country”. On November 11th, 2005, the Provincial People's Committee of Bac Ninh approved the “Project on environmental planning of Bac Ninh for the period from 2006 and 2020, the environmental protection plan for the period from 2006 and 2010”. On November 8th, 2016, the Provincial Party Standing Committee of Bac Ninh issued Resolution No. 05-NQ/TU on “Strengthening the Party's leadership in environmental protection” with the view: Protecting environment is the foundation to ensure the socio-economic development of Bac Ninh sustainably;

Environmental protection is the responsibility and obligation of each organization, enterprise, household and individual; For environmental protection, prevention is consider the main measure, combined with pollution treatment; Avoid focusing on economic development and neglecting environmental protection. Understanding and implementing the policy of the province, the development of industrial parks must always be closely associated with environmental protection. In recent years, the environmental management of industrial zones in Bac Ninh has basically come into order.

Firstly, on environmental management in industrial parks.

The Management Board of Bac Ninh Industrial Parks has developed and implemented the Regulation on coordination in environmental management and protection in industrial zones with the Department of Natural Resources and Environment, the Bac Ninh Provincial Police and the People's Committees of the districts, city and towns. Carrying out overall environmental monitoring of industrial parks and enterprises in industrial zones in Bac Ninh, guiding and appraising new investment reports and environmental protection commitments of enterprises in these industrial zones. Since June 2012, the Management Board of Bac Ninh Industrial Parks has joined the new investment appraisal council for investment projects in industrial parks, coordinating with relevant departments and agencies in the province and with industrial park infrastructure development investment companies to propagate the law on environment in industrial parks, solve problems about waste discharge, wastewater treatment of enterprises in industrial zones and chairing, inspecting and supervising the environment in Bac Ninh's industrial parks (Management Board of Bac Ninh's Industrial Parks, December 2018).

Secondly, on the proportion of industrial parks with infrastructure for environmental treatment.

By the end of 2007, Bac Ninh province had had only 10 industrial parks approved, 04 industrial parks starting their operation, 02 new industrial parks established and finishing ground clearance and 04 industrial parks in the process process of completing the establishment dossier and attracting investors to build infrastructure. Among them, there were 03 industrial parks (Tien Son, Que Vo I, Yen Phong I) investing in building environmental treatment infrastructure, while Dai Dong - Hoan Son industrial park had not been built yet. Up to now, Bac Ninh has had 16 industrial parks approved to be planned by the Prime Minister, 10 industrial parks being in operation with synchronous transport infrastructure and basic installation of the infrastructure system for environmental treatment in industrial parks; seven out of ten operating industrial parks have a complete clean water supply plant with a total design capacity of 52,300 cubic meters per day. The total amount of water actually being used is 48,565 cubic meters per day. The water supply stations of the industrial zones take into account the amount of clean water supplied to the communes

adjacent to the industrial park and the urban centers and social houses around it. In 2020, industrial parks in Bac Ninh will use about 100,000 cubic meters per day. Up to now, ten out of ten industrial parks have basically implemented the regulations on environmental protection in general and wastewater treatment in particular, 100% of industrial parks have operated with concentrated wastewater treatment systems. The investors of the industrial parks' infrastructure has synchronously deployed technical infrastructure for environmental protection such as the collection and drainage system of rain water and wastewater, and a centralized wastewater treatment plant. All 10 industrial parks, that have been operating, have installed automatic environmental monitoring systems to regularly and continuously monitor the quality of wastewater before being discharged into the environment (Department of Natural Resources and Environment of Bac Ninh province, April 2019).

Thirdly, on the proportion of enterprises with infrastructure for environmental treatment.

Along with the process of investing in building factories, businesses in industrial parks in Bac Ninh have built a system of environmental treatment infrastructure at their factories. All of them are invested with wastewater collection systems, rainwater drainage, and shallow tanks to collect solid waste. Domestic wastewater is filtered through the tank to treat sediment and garbage; Wastewater from the process of production is collected to the tank, filtered through a foam system, and then treated to ensure level B in accordance with regulations on industrial wastewater before being discharged into the general wastewater drainage system of the industrial parks. Domestic waste, production scrap, and toxic waste are collected in shallow tanks and classified before being transported to the garbage collection place for treatment by Environmental Company. Secondary enterprises have invested in preliminary wastewater treatment systems that meet the discharge standards of the industrial parks, connected to the centralized wastewater treatment system to treat it up to Vietnamese standards before being released into the environment. The system of environmental treatment infrastructure at enterprises has been tested and put into operation together with the enterprises' operation, so 100% of enterprises in industrial parks in Bac Ninh have been operating. The general environmental treatment infrastructure system of the whole industrial zones has handled well the factors affecting the environment arising from the operation of the industrial park. Therefore, the operation does not create a huge impact on the living environment of the population around the industrial parks.

3.2. Drawbacks in environmental protection in Bac Ninh's industrial parks

Wastewater: Industrial parks in Bac Ninh all develop multi-sectoral and multi-field production, so they release many different types of wastewater. Collecting and general treatment is very difficult. Although the number of centralized wastewater treatment plants has increased, according to the report of the Management Board of Industrial Parks, in the

surrounding area of some industrial zones, some wastewater standards exceeds the permissible limit.

Emissions: Although companies have consciously implemented regulations on emissions, the equipment for this is still sketchy, simple, and has not thoroughly minimized the impact of emissions on surrounding environment. Air quality in industrial parks has had a significant impact on workers' health.

Hazardous waste and solid waste: Some enterprises in industrial parks do not register for waste sources as prescribed, some even store their own wastes, that causes local pollution. There are no company which collect and treat hazardous waste for secondary enterprises in industrial parks, so those are not preserved and treated according to regulations, creating a risk of pollution. In some industrial zones, it is difficult to collect solid waste for treatment because of lack of locations for this.

3.3. Causes of drawbacks in environmental protection in Bac Ninh's industrial parks

The first, industrial parks still attract a number of projects with low investment capital, limited financial capacity, leading to limited investment in infrastructure construction. They have not given priority to building waste treatment systems, and some do not even have waste treatment systems and their waste is released directly into the environment.

The second, investors in the construction of industrial park infrastructure are not fully aware of their responsibilities for environmental protection as prescribed by law. Awareness of environmental protection of companies in industrial parks is still limited, many owners do not understand clearly or accurately and do not even update the regulations of the current law of environmental protection.

The third, many businesses have built a waste treatment system, committing to environmental protection, but failed to fulfill their promises, leading to more serious pollution. The investment in environmental protection increases the enterprises' operating costs, directly affecting the profits achieved, so environmental protection has not been voluntarily implemented by them. The inspection and supervision is still not effective and the authorities are still slow in controlling and urging enterprises to protect the environment.

4. Discussion and Conclusion

Since its establishment, industrial parks in Bac Ninh have been constantly developing, making great contributions to the province's socio-economic development. Along with the development of industrial parks, environmental protection has always been concerned and has achieved good results. In order to ensure the effectiveness of environmental protection in industrial zones in the coming time, Bac Ninh needs to well implement the following solutions:

Planning: The province needs to review and adjust the planning of industrial parks to ensure that it is synchronous and consistent with Bac Ninh's socio-economic development plan. The planning process must immediately take into account the factors causing environmental pollution and propose solutions to reduce pollution and protect the environment. The establishment and development of industrial parks must ensure compliance with the approved planning.

Investment attraction: Attracting investment in industrial parks in the direction of prioritizing clean, low-pollution industries, ensuring the industry structure is suitable to the ability and reality of Bac Ninh's pollution solving. The province needs to attract key investments to develop key economic sectors as well as create favorable conditions for factory layout and environmental protection plans.

Mechanisms and policies: Bac Ninh should review and continue to adjust and amend legal documents related to the decentralization of environmental management in the direction of promoting decentralization and give direct rights and responsibilities for environmental protection to the Management Board of Bac Ninh's Industrial Parks. In addition, the documents also need to clearly define the responsibilities of the industrial parks' investors for the secondary enterprises investing in the industrial park in terms of environmental protection. Besides, there is a need of developing mechanisms and policies to encourage enterprises to carry out cleaner production and save energy in industrial parks.

Decentralization and assignment of centralized management responsibilities: The Management Board of Bac Ninh's industrial parks must have full authority and responsibility for environmental management in the industrial parks and implementation of relevant environmental protection regulations. Measures should be taken to improve the environmental management capacity for the Management Board of Bac Ninh's Industrial Parks in terms of both human resources and equipment, enabling them to be more proactive in performing their duties on environmental protection in industrial parks. The investors are responsible for fully implementing the commitments according to the industrial parks' environmental impact assessment report; building and completing centralized wastewater treatment systems which need to be properly designed, suitable to actual conditions, constructed and installed according to the design, maintaining stability and effectiveness during the operation process of the industrial parks; participating in responding to environmental incidents in industrial parks. Investors also need to arrange locations for construction of temporary storage and transit areas for solid and hazardous wastes from enterprises in the industrial parks. All companies in the industrial parks having wastewater must preliminarily treat it up to the input standards of the centralized wastewater treatment system before discharging it into the wastewater collection system of the industrial parks. Enterprises that generate emissions must have an exhaust gas treatment system that meets

Vietnamese standards before discharging. If hazardous waste is generated, they must have a contract with a competent and capable agencies to collected and disposed of properly.

Supervision of enterprises' dealing with environmental pollution: Periodically monitoring the environment to take timely measures to deal with arising pollution. Proactively propagating and disseminating environmental legislation for industrial park infrastructure development enterprises as well as secondary enterprises to help companies clearly and fully realize their responsibilities for environmental protection inside and outside the industrial parks.

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