



Research Paper

# The Current Situation of Environmental Reporting and Environmental Management in Electronics Manufacturing Enterprises in Industrial Parks of Bac Ninh Province: An Overview Study

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## Abstract

Bac Ninh Province has become a pivotal center for electronics manufacturing in Vietnam, hosting numerous major technology firms and extensive supply chains for electronic components. While the rapid expansion of this industry has significantly contributed to economic growth, it has also introduced considerable challenges related to environmental sustainability. This study explores the current state of environmental reporting and management practices among electronics manufacturers in Bac Ninh's industrial parks. The research reveals that, although many companies have adopted sophisticated environmental management systems, persistent issues remain regarding the transparency of environmental data and the integration of ESG (Environmental, Social, and Governance) principles into operational frameworks.

**Keywords:** environmental reporting, environmental management, electronics industry, industrial parks, Bac Ninh.

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## I. Introduction

Vietnam's electronics sector has risen as a key driver of the country's economic growth in recent years. By capitalizing on its strategic location, rich labor resources, and investment-friendly policies, several northern provinces have become major centers for electronics manufacturing. Bac Ninh Province stands as a notable example of this industrial breakthrough, achieving substantial progress in its electronics production capabilities. The province is supported by a well-structured network of industrial zones and a business-friendly environment, attracting leading global technology companies. Industrial parks like Yen Phong, Que Vo, Tien Son, and VSIP Bac Ninh house hundreds of manufacturers producing electronic components, devices, and cutting-edge technologies. This sector's growth has significantly boosted Bac Ninh's economy, driving export revenues and creating jobs for hundreds of thousands of locals. However, this rapid industrial development has brought with it environmental concerns that stem from the operations of electronics manufacturing. The production of electronic parts typically involves handling a wide variety of chemicals, solvents, metals, and specialized materials. These processes can generate considerable amounts of wastewater, air pollutants, hazardous waste, and greenhouse gases. If these by-products are poorly managed or improperly disposed of, they pose risks to the local environment and human health. To address such environmental challenges, robust systems for monitoring and mitigating the impacts of industrial activities are essential. Businesses operating in Bac Ninh's industrial zones are required to adhere to regulatory standards that mandate the preparation of environmental documents such as impact assessments, periodic environmental monitoring reports, and hazardous waste management strategies. Moreover, with global pressure for sustainable development increasing, many firms in the electronics industry have voluntarily adopted international environmental management standards and issued sustainability reports. Certifications like ISO 14001 and frameworks based on ESG principles or cleaner production programs have become integral to improving corporate environmental practices. Despite these efforts, evaluations of current practices highlight inconsistencies in how manufacturers approach environmental reporting. Some reports fail to thoroughly assess the ecological impact of their operations, while others lack integration of sustainability principles into their broader corporate governance frameworks. Recognizing these issues underscores the need for an in-depth analysis of environmental reporting practices by electronics manufacturers in Bac Ninh Province. Such research is crucial for identifying both strengths and shortcomings, paving the way for strategies that enhance environmental accountability and promote sustainable industrial growth.

## **II. Research Objectives**

This study was conducted to achieve the following objectives:

- Provide an overview of the environmental reporting system in the electronics manufacturing industry.
- Assess the current situation of environmental reporting preparation among electronics enterprises in the industrial parks of Bac Ninh Province.
- Analyze the level of compliance with environmental legal regulations by enterprises.
- Propose several solutions to improve the effectiveness of environmental management in the electronics industry.

## **III. Research Content**

### **3.1. Overview of the Electronics Industry in Bac Ninh**

In recent years, Bac Ninh Province has emerged as one of Vietnam's and Southeast Asia's most prominent electronics manufacturing hubs. This growth is attributed to effective foreign investment policies and a robust industrial infrastructure. Bac Ninh has successfully attracted numerous leading technology corporations and companies involved in the electronics component supply chain. Industrial zones such as Yen Phong, Que Vo, Tien Son, and VSIP Bac Ninh now host hundreds of businesses specializing in the production of electronic devices, circuit boards, semiconductors, and other advanced technology products. The remarkable growth of the electronics industry has significantly contributed to the economic development of Bac Ninh Province. It generates substantial export revenues and creates jobs for hundreds of thousands of local workers. However, despite these economic advantages, the rapid expansion of the industry presents considerable challenges related to environmental protection. The manufacturing processes frequently involve the use of chemicals, solvents, and metals, resulting in industrial waste such as heavy-metal-laden wastewater, industrial emissions, and hazardous byproducts. Furthermore, electronics manufacturing facilities consume large amounts of energy to operate precision machinery and maintain controlled environmental conditions within production spaces. These high energy demands contribute to increased greenhouse gas emissions and place additional strain on the energy grid. As a result, managing and monitoring the environmental impacts of this growing industry has become a crucial responsibility for both regulatory authorities and the enterprises involved.

### **3.2. Environmental Reporting System of Enterprises**

To mitigate the environmental impact of industrial production, Vietnamese law mandates that enterprises produce various environmental reports throughout a project's lifecycle. For electronics manufacturers operating in industrial zones, a comprehensive environmental reporting system is key to monitoring, assessing, and managing pollution sources. In the initial stages of an electronics manufacturing project, investors must prepare an Environmental Impact Assessment (EIA) report before commencing operations. The EIA identifies potential pollution risks during both construction and operational phases and lays out strategies to minimize these impacts. This evaluation enables regulatory bodies to verify compliance with environmental protection standards during planning and approval stages. Once operational, enterprises are required to undertake regular environmental monitoring programs. Such activities assess environmental conditions in production areas by measuring metrics such as wastewater quality, emission levels, noise pollution, and workplace conditions. Additionally, businesses need to produce hazardous waste management reports that address the generation, storage, transportation, and disposal of hazardous materials generated during production. Furthermore, larger enterprises or those integrated within global supply chains are increasingly expected to conduct greenhouse gas inventories to align with climate change policies and fulfill sustainable development objectives. This comprehensive reporting framework not only allows regulatory agencies to oversee corporate activities but also serves as a critical resource for formulating industrial park environmental management policies.

### **3.3. Current Environmental Reporting Practices**

An analysis of research data, environmental reports, and publicly available company disclosures indicates notable progress in environmental management practices within Bac Ninh's electronics industry over recent years. One significant improvement is the widespread adoption of international environmental management systems such as ISO 14001. By implementing this standard, companies can create systematic processes to identify environmental factors, assess risks, establish performance improvement goals, and monitor progress. These measures enable businesses to minimize emissions effectively and reduce their overall ecological footprint. Moreover, many enterprises have invested in state-of-the-art wastewater and emission treatment technologies to ensure compliance with prescribed environmental thresholds before discharging waste. Leading corporations have also begun issuing sustainability reports that transparently outline their efforts surrounding environmental stewardship and corporate social responsibility.

Despite significant advances in environmental reporting, electronics enterprises continue to encounter certain limitations. In some instances, environmental data presented in reports remain incomplete or fail to

accurately represent the actual environmental impacts. Furthermore, a considerable portion of current environmental reports appears to be primarily designed to satisfy legal compliance requirements, rather than serving as instruments closely aligned with an enterprise's strategic approach to sustainable governance. An additional shortcoming pertains to the limited integration of life cycle assessment (LCA) methodologies into environmental reporting. LCA facilitates a comprehensive appraisal of a product's environmental impacts along its entire value chain, encompassing raw material extraction, production, usage, and eventual disposal at the end-of-life stage. The absence of this analytical approach renders the evaluation of environmental impacts within the electronics sector less comprehensive and fails to capture a truly holistic perspective.

### **3.4. Emerging Trends in Environmental Management**

In response to global calls for sustainable development and the reduction of carbon emissions, the electronics industry is increasingly embracing innovative trends in environmental management. A salient trend involves the paradigm shift toward green production practices, wherein enterprises prioritize reducing energy consumption, conserving resources, and minimizing waste generation during production processes. A parallel trend is the adoption of circular economy principles by numerous enterprises. This model emphasizes material reuse, component recycling, and waste minimization to foster sustainable production cycles. Likewise, environmental, social, and governance (ESG) frameworks are gaining prominence as essential standards for entities involved in international supply chains. Prominent technology firms increasingly mandate their suppliers to adhere to stringent environmental requirements to ensure overall supply chain sustainability. These evolutionary trends provide compelling incentives for enterprises located in Bac Ninh Province to refine their environmental management frameworks, enhance environmental reporting quality, and strengthen the transparency of disclosed environmental information.

### **3.5. Significance of the Study**

The current study contributes valuable insights with both theoretical and applied implications. Foremost, it provides a comprehensive overview of the prevailing state of environmental reporting and management practices within the electronics manufacturing sector located in the industrial zones of Bac Ninh Province. By identifying strengths as well as existing gaps in current practices, the research sheds light on the performance of enterprises in implementing environmental reporting. Secondly, the study offers a scientific foundation for governmental regulatory bodies seeking to evaluate the effectiveness of the existing environmental reporting mechanisms. Through systematic examination of reported deficiencies, policymakers may consider further refinement of legislation and institutional frameworks aimed at enhancing environmental management efficacy within industrial zones. For electronics manufacturing enterprises, the study provides critical insights into contemporary trends and innovative practices in environmental governance. Enhanced environmental reporting quality combined with the adoption of advanced management models can be instrumental in boosting resource-use efficiency, curtailing environmental detriments, and improving organizational reputation within global supply chains. Lastly, integrating findings from comparable studies conducted in neighboring provinces such as Thai Nguyen or Bac Giang with this research fosters a holistic understanding of environmental management strategies within Vietnam's electronics industry. Such consolidated insights are pivotal for steering the sector toward sustained and environmentally responsible growth trajectories.

## **IV. Conclusion**

The study concludes by shedding light on environmental practices within Bac Ninh's electronics manufacturing sector. Several businesses have made progress by investing in advanced environmental systems and waste treatment technologies to reduce ecological impacts. Yet, challenges such as insufficient transparency in environmental disclosures and weak alignment with ESG governance standards continue to hinder overall effectiveness. To address these issues, efforts should focus on improving access to transparent data, utilizing more advanced assessment methods, and fostering the transition to sustainable production models across the industry.

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