GREEN PORT DEVELOPMENT IN HAI PHONG PORT

PHÁT TRIỂN CẢNG XANH TẠI CẢNG HẢI PHÒNG

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Abstract

The paper examines the current situation of green port development in Hai Phong port - what measures are being implemented - how they are benefiting the port and how the port is still lagging behind. The ports included are managed by Hai Phong port Joint Stock Company. The criteria applied are drawn from Vietnam National Green Port Criteria, which will be compulsory in 2030, and international sets of standards from ASEAN, Europe and America. Based on such reviews and practical analysis drawn from the compilation of secondary data, this thesis will identify the possible barriers and challenges, and then provide actionable recommendations suitable for Hai Phong port's future development plan.

Keywords: *Green port, green port development, Hai Phong port, green port criteria.*

Tóm tắt

Bài viết xét đến tình trạng hiện tại của việc phát triển cảng xanh tại cụm cảng Hải Phòng, cụ thể là những cảng thuộc sự quản lý của Công ty Cổ phần Cảng Hải Phòng, qua các hoạt động và các biện pháp đang được áp dụng được công bố. Bộ tiêu chí đánh giá được tổng hợp từ Tiêu chí Cảng Xanh của Việt Nam và các tiêu chí quốc tế của ASEAN, khu vực châu Âu và Mỹ. Qua đó, tác giả phân tích và nhận thấy mức độ phát triển hiện tại còn chưa đáp ứng các tiêu chí, đồng thời xác định các rào cản. Từ việc tổng hợp dữ liệu thứ cấp và áp dụng phương pháp nghiên cứu định tính nêu trên, tác giả đưa ra một số các đề xuất phù hợp với tình hình và kế hoạch phát triển trong tương lai của cụm cảng.

Từ khóa: *Cảnh xanh, phát triển cảng xanh, cảng Hải Phòng, tiêu chí cảng xanh.*

1. Introduction

Sea transportation is an indispensable part in international trade activities, and ports are the crucial connection points, serving as the catalyst for economic development. Along with generating profound economic benefits, serious impacts on the environment are also brought about by seaports. Waste and resource consumption are the result of a variety of activities, such as constructing and expanding infrastructure and unloading and loading operations (Oniszczuk-Jastrząbek, Pawlowska and Czermański, 2018). The operations of ships and supporting equipment and other dredging or maintenance activities also contribute to environmental problems (Nguyen et al, 2022) (VIMC, 2023).

The green port concept is broadly defined by Dinwoodie et al (2012) as "a product of a long-term strategy to develop sustainable and environmentally-friendly port infrastructure". As green ports are part of sustainable development, balancing between economic benefits and environmental impacts is a must (Inal, 2023) (Le & Nguyen, 2023) (Bucak & Kuleyin, 2016), with the most profound factor being the "harmony between man and nature" (Ying & Yijun, 2011).

On the national level, the Technical Regulation on Vietnam Green Port Criteria was published on 29th December, 2022 in Decision No. 1909/QĐ-CHHVN by Vietnam Maritime Administration. According to the roadmap set by the government, 2021 - 2022 is the period for drafting and publishing national criteria, while the next 3 years are for regulation adjustment and supplementation (Vietnam News, 2022). Further and more detailed technical regulations along with supporting policies would be established from 2025 - 2030 (Ministry of Industry and Trade of the Socialist Republic of Vietnam, 2021) after considering the results of voluntary application. In 2030, these criteria will be made compulsory. On the international level, some notable voluntary requirements are the GPAS Indicator System from APEC Port Services Network, which is largely similar to Vietnam's national criteria, and EcoPorts from Europe. A key environmental aspect acknowledged in international ports that has not been mentioned in the Vietnamese criteria is biodiversity (Vancouver Fraser Port Authority) (Port of Newcastle, 2021) (ESPO's Green Port Guide,

TẠP CHÍ ISSN: 1859-316X
KHOA HỌC CÔNG NGHỆ HÀNG HẢI
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Table 1. The compilation of green port criteria

Main criteria	Sub-criteria	Max points
Commitment and Readiness (1.5 point)	Awareness and Readiness (60%)	0.9
	Green Port Promotion (40%)	0.6
Action and Implementation (2.5 point)	Clean Energy (10%)	0.25
	Saving Energy (20%)	0.5
	Information Technology (IT) (25%)	0.625
	Resource Usage (10%)	0.25
	Environmental Protection (25%)	0.625
	Green Management (10%)	0.25
	Biodiversity Preservation (suggested)	-
Efficiency and Effectiveness (1 point)	Saving Energy (40%)	0.4
	Environmental Protection (60%)	0.6
Total		**5**

Source: Compiled by the author

2021), or biological system preservation (Chen & Pak, 2017). Hence, this paper applies the criteria from the national and APEC standards for score evaluation, with an additional criterion of Biodiversity Preservation. The final score is calculated based on individual scores ranging from 1 to 5 of each category of the criteria, and only ports with an overall score of 3.5 or more are certified as green ports by the Vietnamese government.

While extensive research is done on green ports globally, there is little literature focusing on the specific context of ports in Vietnam, particularly Hai Phong port, based on such criteria. Simultaneously, a lack of studies assessing the economic and environmental impacts of green measures in Vietnamese ports is clearly seen. Given such gaps, there are opportunities for further research to enhance understanding of green ports in Hai Phong, contributing to the broader knowledge base on sustainable development in the maritime industry.

2. Research methodology

In terms of data collection, secondary sources have been utilized. These include a comprehensive review of academic journals and relevant publications along with an analysis of related reports and assessments. After reviewing such journals and government publications, I established a solid understanding of the concept of "green ports", with clear definitions, key benefits and criteria. The data and statistics publicly available on Hai Phong port, including its cargo throughput, environmental performance and current policies are gathered. Subsequently, a comparative analysis is done between the port's performance and the green port criteria as well as their suggested measures.

In order to identify the key themes, patterns, strategies and challenges, thematic analysis is employed. I synthesized the findings from literature review and data analysis in order to develop a comprehensive understanding of Hai Phong port's current status and limitations. Given such criteria and identified limitations, specific recommendations are provided for accelerating green port development.

3. Research results

3.1. Overview of Hai Phong port

Hai Phong port is a port cluster located in the Northern Region of Vietnam, established in 1874 with a strategic position for international trade. It is located down the Red River Delta, in the center of the Gulf of Tonkin, about 120 km away from the capital city and approximately 200 km away from China. There are also several expressways connecting Hai Phong to other developing cities, facilitating Hai Phong port in becoming a major trading hub of the region. Multiple definitions of Hai Phong port are available, however, within this article, Hai Phong port consists of 3 main ports, according to the definition of Hai Phong port Joint Stock Company.

3.2. Green port development in Hai Phong port

Commitment and Readiness

The average score of awareness and readiness of 1.25 out of 5 is the result of the following individual scores: 2; 1; 1; 1. It is then converted to the final score of 0.225 by being divided by 5 and multiplied by 0.9.

The category of education and training programs should receive 1 point. Education for the port staff and employees simply promotes collective responsibility in protecting the environment (Hai Phong Port Joint Stock Company (b), 2024). Nevertheless, there are no training programs specifically designed for enhancing green port awareness.

Hai Phong port only held a few and should receive 2 points for such efforts. So, the average score green port promotion of 1.33 out of 5 is the result of the following individual scores: 1; 2; 1. It is then converted to the final score of 0.16 by being divided by 5 and multiplied by 0.6.

Action & Implementation

(i) Clean Energy

Hai Phong port should be given 1 point for the use of renewable energy. There are 6 substations in Chua Ve port, while Tan Vu port uses Dinh Vu station and Dinh Vu Port Investment and Development Joint Stock Co (Hai Phong Port Joint Stock Company (a), 2024). The amount of electricity used at Chua Ve port is roughly 200,000kWh/month, while that at Tan Vu port is approximately 1,000,000kWh/month (Hai Phong Port Joint Stock Company (a), 2024). Hai Phong port uses electricity provided by Vietnam Electricity. Even though renewable energy accounts for roughly 14% of electricity produced by this company, this does not count as the port's effort in using renewable energy sources. Similarly, the use of clean fuels should be given 1 point as the port does not incorporate the use of LNG, Hydrogen or Ammonia into its daily activities, especially in terms of transportation or for providing ships with such fuels. Infrastructure for cold ironing is not available, resulting in a score of 1 point. At the same time, related efforts regarding energy usage for lower emissions are only equivalent to level 1. So the average score of clean energy of 1 out of 5 is the result of the following individual scores: 1; 1; 1; 1; 1, turned into the final score of 0.05.

Table 2. Hai Phong port's proposed scores for green port development

Main criteria	Sub-criteria	Points	Maximum points
Commitment and Readiness	Awareness and Readiness	0.225	0.9
	Green Port Promotion	0.16	0.6
Action and Implementation	Clean Energy	0.05	0.25
	Saving Energy	0.225	0.5
	Information Technology (IT)	0.575	0.625
	Resource Usage	0.069	0.25
	Environmental Protection	0.563	0.625
	Green Management	0.09	0.25
	Biodiversity Preservation	-	-
Efficiency and Effectiveness	Saving Energy	0.16	0.4
	Environmental Protection	0.288	0.6
Total		**2.405**	**5**

TẠP CHÍ ISSN: 1859-316X
KHOA HỌC CÔNG NGHỆ HÀNG HẢI
JOURNAL OF MARINE SCIENCE AND TECHNOLOGY

(ii) Saving Energy

The first category for energy saving efforts should receive 4 points. For the optimization of the power supply system and the operational processes, Hai Phong port can receive 2 points for each category as the port does not disclose any further information, except for utilizing technology in minimizing wait-time that would be discussed in the next part. Such actions of these two categories can only be acknowledged as a few activities, equivalent to level 2 of the scale instead of level 1 (no activities), and level 3 (certain specific activities). There are no other related activities, meaning that the last category receives 1 point only. The average score of 2.25 out of 5 is the result of the following individual scores: 4; 2; 2; 1. It is then converted to the final score of 0.225 by being divided by 5 and multiplied by 0.5.

(iii) Information Technology

The average score of 4.6 out of 5 is the result of the following individual scores: 5; 5; 5; 4; 4. It is then converted to the final score of 0.575 by being divided by 5 and multiplied by 0.625. The port might receive 5 out of 5 for the three categories of online payments and electronic documentations, mobile apps and automated procedures. The port's efforts have exceeded the examples and the descriptions of the assessment form, with clear signs of creative methods and new technologies.

In addition, Hai Phong port should receive 4 points for the management system. They employ multiple online management systems to connect different departments, such as MIS (Management Information System), Cloud office, TOS (Terminal Operating System), PL - CEM (Customs Exchange Monitor) and so on that other ports have also been using (Port of Hai Phong, n.d.). This means Hai Phong port does use online means of connectivity for operational activities, which are similar to that of other ports. In terms of other activities, they can receive 4 points due to the following measures

(iv) Resource Usage

The average score of 1.375 out of 5 is the result of the following individual scores: 1; 1; 1; 1; 1; 1; 4; 1. It is then converted to the final score of 0.069 by being divided by 5 and multiplied by 0.25.

The six categories of environmentally-friendly materials, durable materials, recyclable materials, reusing and recycling, using materials that are locally available and avoiding single-use plastics should receive 1 point only. Concerning water usage, the measures match most of the listed examples of the assessment form, equivalent to level 4, which requires a system like the one Hai Phong port is implementing. There are no other measures, leaving the category Others with 1 point.

(v) Environmental Protection

The average score of 4.5 out of 5 is the result of the following individual scores: 5; 5; 5; 4. It is then converted to the final score of 0.563 by being divided by 5 and multiplied by 0.625.

Hai Phong port has been complying to the laws and regulations regarding environmental protection. Apart from the implementation of ePort and Smart gate, which has reduced the waiting time, thereby lowering the amount of emissions and noise from vehicles, other measures have been taken by Hai Phong port for environmental protection.

(vi) Green Management

The average score of 1.8 out of 5 is the result of the following individual scores: 5; 1; 1. It is then converted to the final score of 0.09 by being divided by 5 and multiplied by 0.25.

Hai Phong port might receive 5 points for the environmental management system. Hai Phong Port Joint Stock Company is certified to conform with the requirements of TCVN ISO 14001:2015 concerning stevedoring, haulage, tally, delivery, receiving and storage of cargo valid until 2020. Hai Phong port aims to continue to adopt and maintain this system in the following years.

However, the remaining 4 categories can only receive 1 point each. No other activities regarding this sub-criterion have been conducted, including the occupational health and safety system in accordance with ISO standards, green performance assessment and taking the efforts in protecting the environment into account when choosing suppliers.

(vii) Biodiversity Preservation

In accordance with Clause 1 and Clause 2, Article 78 of Decree No. 21/2012/ND-CP dated March 21, 2012, beside garbage and wastewater, the discharge of ballast water must comply with regulations and instructions of the port authority. Both Chua Ve and Tan Vu ports will coordinate with relevant authorities to prohibit such discharge, as well as bilge water containing oil from the engine rooms, and other types of wastewater from ships into the port waters and wharf areas (Hai Phong Port Joint Stock Company (a),

2024). This can be considered as an effort in preventing non-native marine pests that threaten the marine ecology in the region.

Still, Hai Phong port has not taken into consideration the life on land, and does not make commitments to protecting biodiversity or actually have initiatives to enhance biodiversity. This sub-criterion does not have scores, but rather to showcase the status quo of Hai Phong port.

Efficiency & Effectiveness

(i) Saving Energy

In terms of saving energy, Hai Phong port is likely to receive 4 points for the results achieved. The amount of electricity and other fuels consumed had a significant decline partly due to 7.8% decrease of the throughput. Concerning increasing the use of renewable energy and other related efforts, Hai Phong port does not have any measures, and no quantitative evidence for their implementation. Hence, these two categories should each receive 1 point.

(ii) Environmental Protection

4 points should be given to the results achieved and the absence of creative efforts. The indicators and environmental parameters concerning wastewater, surface water and air as well as noise are all under the permissible limits of the authority (Hai Phong Port Joint Stock Company, 2023) (Hai Phong Port Joint Stock Company, 2024). Both Chua Ve and Tan Vu ports are not subject to periodic monitoring in any aspect, so quantitative evidence for the effectiveness of the applied measures is not available. The author would like to suggest level 3 for the categories of improving air quality and managing pollution due to waste. Even though Hai Phong port implemented multiple measures, no measurements and assessments have been made to evaluate the results of such activities. However, for noise management, the noise levels comply with the national standards, which matches the requirements of this category. Similarly, the category Others should only receive 1 point as there are no related measures that have quantitative and visible results.

The total score for Hai Phong port would be 2.405, which is remarkably lower than 3.5, making it not eligible for being acknowledged as a “green port” in Vietnam. Most indicators are fairly low considering the port’s competitiveness. As there have not been constant and creative efforts in incorporating such practices into a management system at port with the utilization of new technologies and methods, Hai Phong port still has a lot to further improve.

Successes

Notable successes of Hai Phong port in green port development are in terms of Information Technology and measures for environmental protection along with saving resources. Electronic port services and automated operations have been leveraging the port’s efficiency, while simultaneously reducing resource consumption and environmental pollution. By reducing waiting times and the need for physical documentation and complicated procedures, negative effects on the environment are alleviated accordingly. Moreover, Hai Phong port applies an extensive range of measures for environmental protection, with strict regulations and suitable procedures in order to minimize pollutants. Most regulations are set for the origins, the quality and current conditions of the equipment and vehicles operating in Hai Phong port so that their influence would be under control. On the other hand, procedures are not only aimed at protecting the environment but also increasing effectiveness and reducing the usage of water and energy.

Still, the primary focus is to increase the efficiency of the port’s operations, rather than the harmonious growth between the port and the environment. More work, especially in tailoring a more well-rounded approach, needs to be done for acquiring a green port certification, and for meeting international standards in the future.

Remaining limitations

Hai Phong port has been neglecting plan and strategy formation with detailed instructions and steps for different units and departments, making it difficult for the staff to understand and act in accordance with the green port development roadmap.

Hai Phong port has not yet owned the suitable infrastructure, nor had the orientation of switching to renewable sources of energy. This would be a costly investment since they have to allocate money for construction, materials, and equipment

For a sustainable future, the lack of explicit strategies and actions for biodiversity preservation and climate change relief and adaptation represents a potential gap in the port's overall environmental stewardship. Dredging, land reclamation and increased vessel traffic are the reality at Hai Phong port, and they can all result in the degradation or loss of critical habitats, contamination and invasive

TẠP CHÍ ISSN: 1859-316X
KHOA HỌC CÔNG NGHỆ HÀNG HẢI
JOURNAL OF MARINE SCIENCE AND TECHNOLOGY

species introduction. For enhancing resilience against environmental challenges, healthy ecosystems are the prerequisite.

In essence, Chua Ve port and Tan Vu port are existing ports that are under operations, which means they have limited physical space to implement large-scale green infrastructure projects. Another intricacy is the limited budget, while investments in advanced systems and solutions would have an exorbitant up-front cost. Additionally, the rapid pace of technological change and priority change may result in the risk of investing in solutions that grow obsolete or incompatible quickly. Coordinating and aligning with various stakeholders would also be tricky, as they have diverse interests and priorities.

3.3. Recommendations for accelerating green port development

Developing a comprehensive strategy

First and foremost, Hai Phong port should develop a comprehensive green port strategy that aligns with the national and international goals. The port should conduct a thorough assessment of individual ports' strengths and weaknesses as well as the detailed current situation and the resources available. Along with this, Hai Phong port should establish a cross-functional team or committee in order to oversee the strategy development and implementation. Next, engaging with stakeholders and thoroughly understanding their priorities and concerns are a must to contemplate a well-rounded approach.

Developing suitable infrastructure

Secondly, Hai Phong port can focus on developing green port infrastructure. An assessment of the current infrastructure and remaining room for integrating green technology should be conducted. For green port practices, switching to renewable energy is an inevitable trend. A notable motivation is the periodic power cut which might interrupt the operational activities, especially in ports where this might severely damage their service quality and put them at risk of having to make exorbitant compensations.

Hence, Hai Phong port should focus primarily on solar energy due to its costs and feasibility, utilizing the space on rooftops and in ports, while simultaneously exploring chances for partnering with energy companies.

Capacity building and knowledge sharing

Capacity building and knowledge sharing are also an important aspect. The next step here is to have educational programs and promotional campaigns. The awareness regarding green ports and their activities are relatively low as only a few ports in Vietnam have been piloting green ports. This is compatible with the future direction of Hai Phong port, since frequent training programs would continue to improve the staff's competence. Developing human resources for building green ports is crucial due to the scarcity of high-quality workers at ports, hence, continuous training programs covering multiple aspects of port management instead of IT only should be put in place.

Enhancing resilience and adaptability

Another suggestion for Hai Phong port is to enhance its resilience and adaptability. Similar to the aforementioned recommendations, the port should conduct a risk assessment to identify the port's vulnerabilities to set priorities and suitable investments. In terms of climate change and rising sea levels, Hai Phong port can hardly change the design structures and locations to minimize the impacts instantaneously. However, apart from the aforementioned measures that minimize greenhouse gasses emissions, they can still protect the coastline against sea-level rise and storm surges, especially by developing mangrove forests and similar natural buffers

4. Conclusion

In this paper, Hai Phong port's current state of green port development has been examined. By thoroughly reviewing the concept of green ports, their defining criteria, and the benefits they can provide, this research has established a framework for evaluating Hai Phong's performance and identifying areas for improvement.

This would create a foundation for future green initiatives, with sufficient flexibility and adaptability thanks to constant reviews and updates. Developing green port infrastructure, taking into account the limitations mentioned is some challenging work. Thorough assessments should be done in order to identify optimal solutions concerning renewable energy, clean fuels and power supply systems. Capacity building and knowledge sharing are crucial for having high-quality human resources, as well as being able to make up-to-date, data-driven decisions. Moreover, biodiversity conservation and enhancing climate resilience would transform Hai Phong port into a more sustainable and future-proof port in the region and globally. Adopting these measures will be

crucial for the port's long-term success and its ability to thrive in an increasingly competitive and environmentally conscious global landscape.

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Received:	14 August 2024
Revised 01:	21 September 2024
Revised 02:	21 October 2024
Accepted:	22 October 2025