

An Overview of Green Ports and Sustainable Development Goals

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Abstract – Maritime transportation is an important link to world trade. The logistic chain has many factors and ports are one of the most substantial parts. However, there are increasing concerns about the environmental impact of the maritime industry. The International Maritime Organization, corps of the United Nations, is responsible for the maritime sector and they are limiting ship-sourced greenhouse gas emissions. When looking at maritime transportation from a common point of view, emissions and energy efficiency at ports seem as the second wave of environmentally friendly maritime, so ports and their emissions are covered and studied by many stakeholders as well as ships. On the other hand, the Sustainable Development Goals (SDGs) are a set of global goals adopted by the United Nations as part of sustainable development. The goals mainly aim to promote economic, social, and environmental sustainability around the world. This paper investigates the relevancy and connection of the green port ideal and sustainable development goals. Therefore, a SWOT analysis has been carried out for green ports compared to conventional ones, and related SDGs have been matched.

Keywords – Green Ports, Sustainable Development Goals, Port Emissions, SWOT Analysis, Maritime Transportation

I. INTRODUCTION

Global greenhouse gas emissions in the transportation sector have an important impact on climate change, and approximately a quarter of the total GHG emissions are sourced from this sector [1]. With this aim, the International Maritime Organization (IMO) set an emissions reduction strategy for maritime transportation for 2050 [2,3]. According to this strategy, IMO aims to reduce GHG emissions by 50% in 2050 compared to 2018 [4]. A part of the maritime industry is the ports, and more energy-efficient and less emission-emitting ports are called green ports, also known as sustainable ports, which prioritize environmental sustainability in their operations and development. These ports aim to minimize their environmental impact through a variety of measures such as reducing emissions, conserving energy and water, and promoting recycling and waste reduction. Port emissions are extremely important regarding human health due to their vicinity to the cities [5]. The green port concept has emerged within the scope of

sustainable and environmentally friendly basis based on volunteerism [6]. Green ports have many benefits such as emission reduction in port areas, sustainable energy management, and waste reduction [7].

The main policies of the green ports are as follows: Green ports reduce emissions through the use of electric or hybrid equipment. This includes using electric cranes, electric tractors, and hybrid vehicles for transportation within the port. This not only reduces emissions but also helps to reduce noise pollution within the port. Another important aspect of green ports is the conservation of energy and water. This can be achieved through the use of renewable energy sources such as solar or wind power, as well as through the implementation of energy-efficient technologies. The cleaner activities of the green ports are also very effective in the improvement of water quality around the sea sides of the port's location. Green ports also often have systems in place to collect and reuse rainwater, reducing the need for fresh water. In addition to

these measures, green ports also promote recycling and waste reduction. This can include recycling materials such as metal, plastic, and paper, as well as properly disposing of hazardous materials. Green ports also may have programs in place to reduce food waste and promote sustainable fishing practices. Green ports not only help to protect the environment and sustainable development but also improve the health and well-being of port communities. In addition, green ports can also help attract new businesses and investment, as companies increasingly prioritize sustainability when deciding where to locate their operations.

To sum up, green ports are an important part of the global effort to create a more sustainable future. By implementing measures to reduce emissions, conserve energy and water, and promote recycling and waste reduction, these ports are helping to protect the environment and improve the lives of those who live and work in the communities they serve.

Sustainable development is a popular term defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” by the World Commission on Environment and Development [8]. Figure 1 shows the main three pillars of sustainable development.

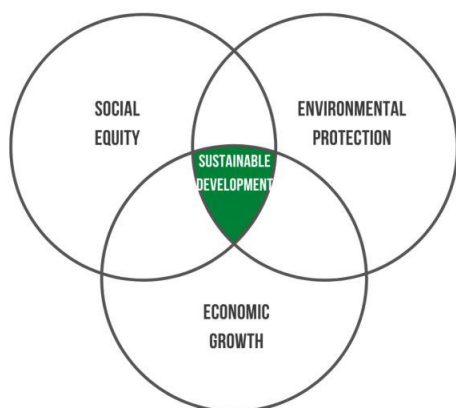


Figure 1. Three pillars of sustainable development [9].

To achieve sustainable development, the United Nations (UN) set an agenda with 17 SDGs and 169 targets for people, the planet, and prosperity in September 2015 [10]. Maritime transportation is highly related to the SDGs since the ruler of the maritime industry, International Maritime Organization (IMO) is one of the UN organizations and supports SDGs for sustainable shipping. As a part of the maritime industry, ports also have a

substantial role in the implementation of development goals at the maritime.

Therefore, the emission reduction strategy in maritime transportation shows parallelism with global sustainable development goals. This paper aims to show the connection between the green port vision and sustainable development goals. The second section indicates a SWOT analysis for green ports. Then, green ports related to sustainable development goals are revealed and matched with the green ports ideal. Lastly, the conclusion section concludes the paper by highlighting possible future studies.

II. SWOT ANALYSIS

SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis is a tool used to evaluate a particular venture or organization. It can be performed with the analysis of the current situation with its internal and external environment [11]. This analysis’s main goal is to reveal the current performance by identifying the continuous progress. Consequently, a SWOT analysis has been carried out for green ports, especially considering conventional ports.

Strengths:

- **Reduced environmental impact:** Green ports prioritize reducing their impact on the environment through measures such as reducing emissions and conserving energy and water.
- **Improved health and well-being of port communities:** Green ports can improve the health and well-being of port communities through initiatives such as reducing noise pollution and promoting sustainable fishing practices.
- **Attracting new businesses and investment:** Green ports can attract new businesses and investment as companies increasingly prioritize sustainability when making decisions about where to locate their operations.
- **Compliance with regulations and industry standards:** Green ports often comply with regulations and industry standards related to environmental sustainability, which helps them to avoid penalties and legal action.

Weaknesses:

- **Higher upfront costs:** Implementing green initiatives and investing in advanced

infrastructure and technology can be costly for ports.

- Limited availability of qualified staff: Some ports may have difficulty finding qualified staff with the necessary skills to operate and maintain green infrastructure and equipment.
- Limited availability of advanced technology: Some ports may have difficulty accessing advanced technology and equipment needed to reduce emissions and improve energy efficiency.
- Limited public awareness: Some ports may have limited public awareness of their green initiatives, which may make it difficult to attract new businesses and investment.

Opportunities:

- Government incentives: Governments around the world are increasingly offering incentives and funding to encourage ports to adopt green initiatives.
- Development of new technology: Advancements in technology will help ports to reduce emissions and improve energy efficiency.
- Increasing public demand for sustainability: As public awareness of environmental issues grows, so does the demand for sustainable products and services.
- Partnerships and collaborations: Green ports can work in partnership with other organizations to share resources and expertise, which can help to reduce costs and improve the effectiveness of their initiatives.

Threats:

- Economic downturns: Economic downturns can make it difficult for ports to secure the funding needed to implement green initiatives.
- Lack of regulations and industry standards: Without regulations and industry standards in place, it can be difficult for ports to know what is expected of them in terms of environmental sustainability.
- Competition from non-green ports: Conventional ports may have lower operating costs, which can make them more competitive in the marketplace.
- Resistance to change: Some ports may be resistant to changing their operations in

order to become more sustainable, which can make it difficult to implement green initiatives.

III. GREEN PORTS RELATED SUSTAINABLE DEVELOPMENT GOALS

Conventional (normal) ports and green (eco-friendly) ports differ in their approach to environmental sustainability. Normal ports typically operate with less attention on reducing their environmental impact, and may not have specific initiatives or policies in place to address environmental concerns. They may also have less advanced infrastructure and technology for energy efficiency and waste reduction. But then, green ports prioritize environmental sustainability in their operations and development. They have specific policies and initiatives in place to reduce their environmental impact and often invest in advanced infrastructure and technology to improve energy efficiency and reduce waste. There are several examples of green ports at the developed countries. For instance, the Port of Rotterdam one of the largest port operators in the world, aims to reduce CO₂ emissions to half of 1990 levels by 2025 respecting the Rotterdam Climate Initiative [12]. Some specific differences between normal and green ports are given as follows:

- Emissions: Green ports often use electric or hybrid equipment and vehicles to reduce emissions, while normal ports may not have such measures in place.
- Energy and water conservation: Green ports often use renewable energy sources and have systems in place to conserve energy and water, while normal ports may not prioritize these issues.
- Recycling and waste reduction: Green ports have policies in place to recycle materials and reduce waste, while normal ports may not have such initiatives.
- Community impact: This can have a positive impact on the health and well-being of port communities, while normal ports may not prioritize these issues.
- Sustainability certification: Some green ports are certified as sustainable by organizations such as the ISO or the Green Award, normal ports may not hold such certifications.

It is important to mark that the level of sustainability can differ among ports and some ports may be taking steps towards becoming more sustainable but have not yet fully implemented green initiatives. Green ports can play an important role in achieving Sustainable Development Goals (SDGs) set by the United Nations.



Figure 2. Sustainable Development Goals [13].

These goals aim to promote economic, social, and environmental sustainability around the world. Therefore, a possible list of in which green ports can contribute to achieving the SDGs:

- SDG 8: Decent Work and Economic Growth: Green ports can create jobs and promote economic growth through the use of advanced technology and infrastructure. They can also attract new businesses and investment to the communities they serve.
- SDG 9: Industry, Innovation, and Infrastructure: Green ports invest in advanced infrastructure and technology, which can help to promote innovation and sustainable industrial development.
- SDG 11: Sustainable Cities and Communities: Green ports can improve the health and well-being of port communities through initiatives such as reducing emissions and noise pollution.
- SDG 13: Climate Action: Green ports can help to reduce emissions and conserve energy and water, which can help to mitigate the effects of climate change.
- SDG 14: Life Below Water: Green ports can promote sustainable fishing practices, which can help to protect marine ecosystems and preserve biodiversity.
- SDG 15: Life on Land: Green ports can promote conservation and sustainable land use, which can help to protect terrestrial ecosystems and preserve biodiversity.

To sum up, green ports can play an important role in promoting sustainable development by reducing their environmental impact and promoting economic and social sustainability. Besides the numerous advantageous sides of the green ports, they can also help to attract new businesses and investment to the communities they serve and improve the health and well-being of those who live and work in the area.

IV. CONCLUSION

The SDGs are a global call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. Each goal has specific targets and indicators that are used to measure progress toward achieving the goal. The SDGs are also intended to be universal, meaning that they may valid to all countries and publics. The SDGs are intended to be achieved by 2030, and countries are expected to report on their progress toward achieving the goals each year.

Green ports are important approaches for and they can act a great role to ensure the SDGs from maritime perspective. IMO as a branch of UN responsible from the maritime activities, their policies and demands from the industry can be covered by the green ports. Therefore, it is irrefutable that there is an organic relation between the green ports and SDGs.

This paper is aimed to show the green port concept and its deep relation between the global SDGs. In the future studies, determination of possible zones for the countries to establish a green port, retrofitting of a port to a green port, emission or power demand analysis can be carried out.

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