

SUSTAINABILITY PRACTICES: A VIEW IN THE MAGHREB SEAPORTS

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Abstract

Maritime transport and seaports are a key factors for the economic growth of regions, and the main mode of freight among all transport modes in the world. The aim of this paper is to propose a theoretical framework for seaport sustainability practices. Subsequently, this paper will review the scholars and related case studies in field of ports sustainability practices, including analysis of the sustainable practices that realized in the international ports and improved the performance of the container ports as Shanghai, Singapore, etc. Also, the paper examines the challenges of sustainability in the Maghreb sea ports and try out some outlooks that can be applied in the Maghreb region. However, the analysis showed that the technology innovation, the integration system, the infrastructure and the environment pollution are the main factors that can affect seaport sustainability.

Keywords Sustainability Practices; Maghreb Seaports

1.0 INTRODUCTION

The maritime industry characterized by a heterogeneous system arranged by a variety of cargoes, several functions of ships, dissimilar production methods and distinct modes of regulation. In addition, the maritime industry has undergone distinct development phases and its evolution over time marks its history. In addition, maritime transport, which transports more than three quarters of international trade by volume appears compared to land transport modes as a more eco-friendly. However, the environmental impacts linked to ships as well as those linked to port activity remain two major sources of pollution for the environment. The ports are indeed places with very significant risks in terms of pollution and generating significant environment. Global awareness of the impacts of environmental degradation, and particularly considering climate change, has led to the emergence of protection against the risks of pollution in the context of port activities and the introduction of good environmental practice initiatives. The realization of these environmental

practices is also taking an increasing place in governances. More than any other, port cities must indeed have an in-depth reflection on environmental practices implemented in their territory, which often contains fragile ecosystems.

In addition, sea ports are the major nodes in the construction of global networks related to the maritime transport. Furthermore, the seaport become a key factor for economic development and occupied a central position in the international maritime industries. With the environmental awareness growth, ports need to improve their sustainability within the limits of environmental rules and the potentials of stakeholders [1], [2]. Added to this, seaports should slowdown an equilibrium between precious land, labor and technology, as well as, its function as a multifunctional business center that can produce added values through achievement of their host cities of freight growth [3], [4]. So, in order to coincidence the current and future needs of the port and its stakeholders, strategic and business activities are important factors to the sustainable development in port operations, parallel to protecting and preserving human and natural resources

[5]. Although, a port is multi-functional and complex system which needs to be evaluated over time, sustainability practices such as; economic, environmental and social aspects can create a new light on the port theory and its practical activities. These opportunities supposed to increase their competitive advantage, in spite it considered as a critical step for seaport sustainability.

In this context, the Maghreb region is also influenced by the revolution in the maritime industry, so the link between the development of the economy and sustainability required a faithful plan in the region. The maritime transport can be considered a strategic sector for the development of the national economy within a sustainable system. Therefore, the management of ports and the services affiliated with port activities are confined to the state. The Maghreb (Libya, Morocco, Algeria and Tunisia) ports have significant importance in traffic of containerization, international trade and operation efficiently even they suffer from some challenges [6]. Table 1 illustrates container numbers and general cargo handled in the main Maghreb ports in 2018.

Table 1. container number and general cargo in the main Maghreb ports in 2018

Country	Port	container number (TEUs)	General cargo (tons)
Algeria	Djen Djen	54163	4725123
	Skikda	190186	3038920
Morocco	Tanger Med	3472451	52243018
	Casablanca	1035668	30100184
	Agadir	207608	5257435
Tunisia	Rades	286005	2497221
	Sfax	85704	1073647
	Sousse	40097	417444
Libya	Benghazi	15 096	20 501 630
	Misrata	106 736	71 566 978
	Tripoli	45000	74 500 000

Source: Annual reports and ports authorities

Ports of the Maghreb countries are considered as ports in the developing countries, and located in asymmetrical links and dependence with the other ports in the Mediterranean basin. Although, Maghreb ports with their exceptional position constitutes an interface between their countries and the rest of the world, it privileged relays for cargo flows between member states. Thus, the port sustainability concept became as a worthy proposal solution for these ports to gain better performance, and to improve its competitive position level in the international context. Accordingly, in order to achieve study aims and objectives, this paper consists of six sections that are well organized in a coherent manner. Section Two is devoted the literature review on seaport sustainability, while Section Three presents the sustainability practices realized in the international container ports domain. Section Four illustrates challenges to the sustainability in the Maghreb sea ports. The fifth section proposes some outlooks in order to achieve sustainability practices in the Maghreb seaports and the sixth section represent the conclusion.

2.0 LITERATURE REVIEW

The interest in sustainability and green ports aspects increased in the last century, which attracted the attention of a number of researchers through increased number of studies. In this context, some studies were focused on the global dimension of sustainability in the seaports sector [7], [8], [9] [10], [11]. While, other studies are centered on analyzing the environmental sustainability in the seaports context [12], [13], [14], and a limited number of them were focused on the vessel emissions and the fuel efficiency as the studies of [15], [16].

As mentioned above, some researchers proposed a framework for sustainability measurement in port sector that include economic, environmental and social aspects. Thus, for the purpose of this study, the authors in this paper reviews a limited number of contemporary case studies related to sustainability in seaports from different dimensions and forms, and as shown in the Table 2. Furthermore, the role of ports taken different forms in terms of the connectivity. IN The study of [17], authors explained the different characteristics of gateway and hub ports. They defined gateway port as a location that typically have accessibility to transport links in a region. It could be an origin, a destination and a point of transit based on its function, or an intermodal between different modes. While a hub port is a central location for transshipment and distribution in a transport system that deploy several connections under the same mode. The criteria set or framework selection is very important to evaluate the sustainable development performance in sea ports [18]. Table 2 presents a review of literature of some case studies in seaports sustainability.

Table 2. literature review on case studies in seaports sustainability

Author	Study Location	Subject
[10]	Greece	
[19]	New Zealand	Focused in Greenhouse and gas emission reduction
[20]	Barcelona	
[11]	UK	
[14]	Hutchison Port	Treated the environmental sustainability development
[12]	Vietnam, Cambodia	
[21]	Asia and Europe	Focused on green ports
[22]	UK	
[23]	Singapore	Studied the sustainability assessment
[24]	Singapore	
[25]	South Korea	
[26]	China	
[27]	Canada	Illustrated the environmental sustainability in Canada ports
[28]	Norway	Analyzed the air pollution in seaport

Source: Authors elaboration derived from various sources

Hence, the literature review revealed that there is an absence of the Maghreb port in the studies of theoretical and empirical cases in the seaport sustainability field. Accordingly, this paper is original and considered as an attempt to develop a theoretical framework for Maghreb sea ports from a sustainability point of view.

3.0 SUSTAINABILITY PRACTICES IN INTERNATIONAL CONTAINER PORTS

The sustainability practices started in the port planning step and include different actors, also refer to the decision making process [29], a sustainable port itself needed a strategic decision to be accomplished. In this regard, some countries applied a sustainable system to their maritime industry. The developed countries, for example, are following different kinds of a sustainable practices in ports by implementing environment factors, or by economic and or social factors.

The sustainable development approach, through which many regions as China, Singapore, Netherlands, Antwerp, Slovenia, Spain, etc. has been committed for many years, makes it possible to combine economic development, well-being of inhabitants, preservation of resources and the environment. Also, the citizen participation is a key element of collective success. In order to promote the sustainable development of the maritime industry, the public authorities have set up incentive programs and mechanisms for the benefit of ports, enabling them to sustain their economic activities and ensure the social and environmental sustainability of their long-term development. It is in this sense that the analysis of these different programs and mechanisms will be analyzed: according to their contribution to economic, social and environmental sustainability.

Table 3 summarized the port sustainability practices identified in international ports. Starting by the port of Shanghai as one of the most efficient port in the world, and classified as the first container ports globally in terms of TEUs handled since 2010, followed by port of Singapore. These ports have achieved their roles as hub ports where millions of containers transferred through different stages from one-line service to the final destination efficiently. Also, in these ports, the handling combined with high productivity, as the main factors used for the strategic decision making and sustainability practices for the stated ports. In other words, there is a need to a large storage and handling spaces, in order to handle vast quantities of cargoes that can guarantee the optimization of port operations and guarantee an efficient of movement of goods from and to the ships.

Table 3. Port sustainability practices in international ports

Port	Country	Variable	Strategy
Shanghai	China	Capacity, Productivity	-Optimum use of space; - improvement of Facilities and equipment
Singapore	Singapore		-Efficient production system.
Rotterdam	Netherlands	System integration, Technology Environment innovations, Prices, Cooperation System integration	-Improve the Infrastructure to minimize congestion
Antwerp	Antwerp		
Koper	Slovenia		
Honk Hong	China	Technological innovation	-Pre-custom clearance of international freight
Amsterdam	Netherlands	Environment innovations, Prices, Cooperation, Requalification	-Reducing the number of trips performed by gasoline vessels - production of renewable energy
Barcelona	Spain		Integrated planning
Malaga	Spain	Infrastructure	- give priority and Safety for the no motorized transport
Alicante	Spain		

Source: Authors elaboration derived from [29] and other sources

4.0 MAGHREB PORTS SUSTAINABILITY CHALLENGES

The Maghreb ports suffer from several challenges that linked directly to the technology and trade globalization. This leads to a strong need for expansion port areas and specialization. Broadly, port areas become public spaces as it shared by citizens. Despite this, the Maghreb ports infrastructure is weak, which had a negative impact on their efficiency, as well as, the hinterland connectivity is another problem for developing of Maghreb ports [30]. As shown in the Table 4 the hinterland richness is the key determinant of port performance because hinterland connectivity with seaport needs a high transport infrastructure quality in their region. In the context of shipping development, the modern ships became bigger and larger which need deep ports to accommodate them.

Table 4. Port Sustainability challenges

Sustainability dimension		
Economic	Environmental	Social
-logistics system -technology innovation	- Freight accessibility - manager the environmental systems	- the engagement of the Investor in the initial planning processes - port and cities integration

Source: Authors elaboration derived from various source.

Nevertheless, the majority of the Maghreb ports operated under a weak connectivity and infrastructure and complain of lack of industrial activities. Thus, a sustainability practices for these ports are urgently needed through a strategic planning and investments in infrastructure and superstructure.

5.0 outlook for sustainability practices in the Maghreb ports

To manage the activities of sustainability, the port infrastructure in the Maghreb countries presents relatively modest and poor operating conditions. In each country there are only one or two main ports in which all goods and transport activities are concentrated. Therefore, to carry out all port operations, the ports have handling and loading / unloading equipment for vessels and handling equipment's. This equipment, as well as, the handling port experience low competitiveness and modest performance in the processing of goods. Also, there is a problem in the storage areas. The analysis of the aspects of maritime transport makes it possible to identify several sustainable development incentive measures and business improvement proposals will improve the ports operating conditions such as:

- Increasing drafts in ports in order to increase capacity to accommodate large ships, in particular through the construction of a water port deep.
- The diversification of ports and management autonomy to stimulate productivity and improve the level of service.
- The improvement of port facilities, whose current capacities are limited.
- Adaptation of handling equipment to improve the performance of operators and expanding the capacity of storage areas.
- The construction of real routes connecting ports to expressways.
- The densification of national cabotage activities in the transport system interiors.

As explained above, and based on the literature review, sustainability practices dimensions and aspects and case studies analysis, some grouped practices based on the sustainability dimensions are identified in order to improve Maghreb ports sustainability as proposed in the Table 5.

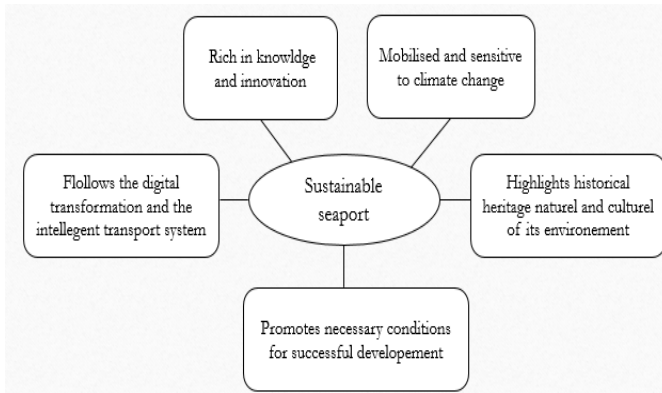
Table 5. proposal for the Maghreb ports sustainability practices

proposal for the Maghreb ports sustainability practices
ECONOMIC -Apply the principles of sustainable development in all the Ports economic projects -Develop the green ship industry -Develop a sustainable management plan that promotes their economic and environmental assessment
Social improve the employers offer and the management system deployment process for occupational health and safety - Promote the deployment of a green framework - Establish a deployment structure for a Port Center to be recommended between a port and citizens - develop a team work to establish innovation in seaport and shipping industries
Environment -assess the impact of port operations on the noise level at the limits of the facilities - Ensure and maintain a reliable and efficient air quality monitoring network that allows operations to be monitored and mitigation measures to be adjusted as needed - Reduce the emission of the shipping industry -reduce air pollution -make a strategic plan to develop the ecosystem and the smart technology in seaport sector.

Source: Authors elaboration derived from various sources

The main elements of the proposal include the integration of sustainable development in all projects, economic aspects of the port, and land management in terms of liabilities and profitability per square meter rather than the development of environmental incentives for ship owners. In this favor, ports are key players in the supply of energy and industrial production in the regions, while port areas must evolve and partly rebalance their missions to better integrate the functions of an industrial space manager in close relationship with the territories in which they are inserted. They will be even more so tomorrow to enhance their relationships with industrialists, manufacturers and metropolises in urban areas. The Figure (1) illustrates the characteristics of a sustainable seaport within the different aspects.

Figure 1. Port Sustainable Characteristics



Source: Authors elaboration derived from various sources

6.0 CONCLUSION

Sustainable development attempts to address the needs of current and future generations, using natural resources and ecosystems in order to preserve and maintain them, in order to guarantee equitable access in the present and the future. It establishes the framework for securing sustainable development and sustainable and a decent existence for all, which is particularly important for the socioeconomic context in the Maghreb region. This paper analyzed the sustainability practices in seaport sector, and it founded that the sustainability was in the core of maritime transport and seaport sector studies. Therefore, a theoretical framework through clarifies the importance of this subject and the relationship between maritime transport and sustainability. Another important outcome of this study is, even the maritime transport is an essential mode of freight transport that can be friendship with sustainability, seaport need to be updated in front of the international changes. Finally, this paper recommends that new technologies for Maghreb ports industry should be adopted and implemented, such the digitalization and new technologies as a vital key for maritime exchanges to attain the sustainability, added to this, these days a smart port, smart ship and smart technology applications are realistic. This paper recommends also that the Maghreb seaports require updates in the sustainability context, infra-structure especially in legal and technological levels to enhance their competitiveness/efficiencies levels as same as the global pioneer ports.

Further, the implications for the sustainable development of maritime transport plays a driving role in socio-economic development. It contributes to the development of international trade and constitutes a stimulus for the growth of export activities. The liberalization of port services and the privatization of the maritime sector will help strengthen the capacity of transport companies and create jobs in the Maghreb countries.

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