The Role of Maritime Training in Algeria in Achieving the Sustainable Development Goals

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Received: 19/04/2025

Accepted: 29/05/2025

Published: 30/06/2025

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Citation:

Djennadi, L., Belimane, W., & Gardelle, L. (2025). The role of Maritime Training in Algeria in achieving the Sustainable Development Goals. *Dirassat Journal Economic Issue*, *16*(2). https://doi.org/10.34118/djei.v16i2.4310

Abstract

Algeria has officially adopted the United Nations' 2030 Agenda and is committed to achieving the 17 Sustainable Development Goals (SDGs), including SDG 14, "Life Below Water," which concerns the maritime sector, a strategic component of the national economy. In this regard, several measures have been implemented, notably the training of maritime professionals to reduce accidents affecting the marine environment and contribute to addressing maritime challenges. This paper aims to examine the regulatory frameworks and policy orientations governing this field and to evaluate the nature and content of maritime training programs in order to determine their role in advancing the SDGs. Data were collected through a qualitative approach combining document analysis and interviews.

The findings reveal that Algeria has established strategic orientations for the maritime sector to address environmental challenges and mitigate the stagnation observed in SDG 14 progress. A legislative and institutional framework has been developed, and maritime training and research have been integrated into the strategies of higher education institutions. Regarding training programs, ENSM designs and offers degree, qualification, and certification programs to meet the sector's needs. However, the study highlights a lack of international partnerships and the limited presence of social sciences and humanities courses in maritime training curricula. As for sustainable development concepts, the results show that they are integrated into certain modules of training programs, in addition to other seminars and study days organized to raise awareness of these issues.

Keywords: Sustainable Development Goals, Life Below Water, Algerian context, Maritime training, Engineering education.

JEL classification codes: I25, I28, Q01, Q22.

دور التكوين البحري في الجزائر في تحقيق أهداف التنمية المستدامة

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استلم في: 2025/04/19

قبل في: 2025/05/29

نشر في: 2025/06/30

*** المؤلف المرسل**

كيفية الإحالة:

Djennadi, L., Belimane, W., & Gardelle, L. (2025). The role of Maritime Training in Algeria in achieving the Sustainable Development Goals. *Dirassat Journal Economic Issue*, *16*(2). https://doi.org/10.34118/djei.v16i2.4310

الملخص:

لقد اعتمدت الجزائر رسميًا خطة الأمم المتحدة لعام 2030، وهي ملتزمة بتحقيق الأهداف السبعة عشر للتنمية المستدامة، بما في ذلك الهدف الرابع عشر « الحياة تحت الماء »، الذي يُعنى بالقطاع البحري باعتباره مكوّنًا استراتيجيًا من مكونات الاقتصاد الوطني. وفي هذا الإطار، تم تنفيذ عدة تدابير، من أبرزها تكوين المهنيين البحريين بهدف تقليل الحوادث التي تؤثر على البيئة البحرية والإسهام في مواجهة التحديات البحرية. يهدف هذا البحث إلى دراسة الأطر التنظيمية والتوجهات السياسية التي تحكم هذا المجال، وتقييم طبيعة ومحتوى برامج التكوين البحري من أجل تحديد دورها في تحقيق أهداف التنمية المستدامة .تم جمع البيانات وفق مقاربة نوعية جمعت بين تحليل الوثائق والمقابلات. وقد ارتكز تحليل الوثائق على المقالات العلمية والكتب والنصوص المؤسسية وبرامج التكوين البحري، في حين أُجريت المقابلات مع مسيرين أكاديميين بالمدرسة الوطنية العليا لعلوم البحر(ENSM) وقد خضعت البيانات المجمّعة للتثليث والتحليل باستخدام أسلوب التحليل الموضوعاتي للمحتوى .كشفت النتائج أن الجزائر وضعت توجهات استراتيجية للقطاع البحري لمواجهة التحديات البيئية والتخفيف من حالة الجمود المسجلة في تقدّم الهدف الرابع عشر وشهادات وتأهيل تستجيب لحاجيات القطاع. ومع ذلك، أبرزت الدراسة ضعف الشراكات الدولية ومحدودية إدماج مقررات العلوم الاجتماعية والإنسانية ضمن مناهج التكوين البحري. أما فيما يتعلق بمفاهيم التنمية المستدامة، فقد أظهرت النتائج أنها مدمجة ضمن بعض وحدات البرامج التدريبية، إضافة إلى تنظيم أيام دراسية وندوات لرفع مستوى الوعي بهذه القضايا.

الكلمات المفتاحية أهداف التنمية المستدامة، الحياة تحت الماء، السياق الجزائري، التكوين البحري، التعليم الهندسي.

تصنيف JEL: I25, I28, Q01, Q22

Introduction

Environmental problems can be divided into four categories: biosphere, atmosphere, lithosphere and hydrosphere (Mulder et al., 2009). The latter concerns matters related to oceans, lakes, rivers, and groundwater. The oceans and seas are so vital to human life and provide such significant natural marine resources that the United Nations has dedicated a specific Goal to them as part of the 2030 Agenda for Sustainable Development: "SDG 14: Life Below Water." This goal focuses on the conservation and sustainable use of oceans, seas, and marine resources. Among these major maritime environmental problems are rising sea levels due to global warming, water pollution caused by agriculture and industry, and oil spills. The sinking of the Amoco Cadiz in 1978 off the coast of Brittany, the Exxon Valdez oil tanker in 1989 in Alaska's Prince William Sound, and the Baltic Ace in 2012 in the North Sea did not result in significant direct human casualties but had severe negative impacts on biodiversity. The shipping industry and the exploitation of marine and offshore resources are singled out as the primary responsible for marine pollution (Flipo, 2007; Mancebo, 2013).

In Algeria, the maritime sector, which is considered a strategic sector for the economy, has undergone rapid development from both industrial and commercial perspectives. Alongside this growth, accidents with environmental impacts on the marine ecosystem have also increased (Haddoum, 2016). In addition to marine water pollution caused by the dumping of waste (Khaled Khodja, 2012), the sinking of fishing boats, industrial vessels, or commercial ships has had detrimental consequences on the waters of the Algerian coastline. Examples include the sinking of a fishing boat off the coast of Mostaganem in 2017 and the sinking of a vessel belonging to the "Fouka 2" seawater desalination plant project in the Tipaza region in 2024.

Faced with these environmental challenges, Algeria, which has officially adopted the United Nations' 2030 Agenda and is thus committed to achieving the 17 SDGs, has pledged to place particular emphasis on "SDG 14: Life Below Water". In this regard, several measures have been implemented to preserve marine ecosystems and combat marine pollution, in line with this commitment.

Voluntary National Report (2019) highlights the actions undertaken to achieve the SDGs, particularly SDG 14, as well as the National Strategy for the Blue Economy - 2030, adopted by Algeria, which provides a detailed roadmap for the sustainable management of oceans and seas. Among the key actions outlined in this roadmap are maritime training programs, which play a significant role in achieving SDG 14 and contribute to addressing maritime challenges.

In various countries such as France and Canada, maritime-focused training programs are addressing these environmental challenges by integrating courses into their curricula that contribute to raising awareness or training future professionals in the sector who are more conscious of the issues and more responsible. Our research stems from this observation and aims to explore the case of Algeria. It focuses on maritime training programs and seeks to understand the ongoing transformations in the educational sector and the dynamics at play. The research questions were formulated as follows: ***What are the internal and external pressures driving the development and enhancement of programs to address environmental challenges, and where do they originate?*** To address these questions, the study relies on data derived from the analysis of training programs and institutional documents, as well as interviews conducted with educational managers at a public maritime training institution. As such, the research adopted is purely qualitative.

The first part of the paper explores national orientations in the maritime field. Following the presentation of our methodology, the second part analyzes the findings by examining the implementation of training programs and the challenges encountered in practice through semi-structured interviews.

This approach aims to cross-reference documentary data with insights from field actors to provide a more comprehensive understanding of the current situation.

Environmental Challenges: Theoretical & Contextual Framework

Currently, Algeria is facing major environmental challenges in its maritime areas, notably due to pollution caused by the discharge of untreated industrial wastewater, emissions of harmful gases, the generation of hazardous waste, and the degradation of marine ecosystems (Boulahdid et al., 2003; Ramdane, 2011; Chaoui et al., 2013; Lakahal & Salem, 2016). The Algerian Ministry of Environment and Renewable Energy highlights the scale of this problem on its official website[1].

Water pollution is a commonly observed phenomenon in Algeria, resulting from the country's socio-economic development and the presence of 17 watersheds, fed by both surface water and groundwater whether renewable or non-renewable (Chaoui et al., 2013), which are highly vulnerable to pollution.

The Algerian coastline, with the majority of its Mediterranean coastal zones, serves as a regular discharge point for significant amounts of industrial and domestic wastewater containing various polluting substances (Boulahdid et al., 2003; Lakahal & Salem, 2016). This situation stems from the high population density along the coast, the diversity of industrial activities, as well as the heavy land and maritime traffic in these areas (Boulahdid et al., 2003). Consequently, maritime transport and shipping accidents are among the major causes of marine pollution (Haouari, 2009). The Algerian Ministry of Environment and Renewable Energy emphasizes that the primary source of maritime pollution remains the intensification of maritime transport and the increase in synthetic materials related to the petroleum sector. The Ministry also notes that the Mediterranean Sea, being a major route for the transport of large quantities of oil, is particularly vulnerable to this threat.

Haddoum (2015), in an article on pollution in Algerian commercial ports, highlighted three definitions of maritime pollution: an international definition from the United Nations Convention on the Law of the Sea, a national definition from the Algerian Maritime Code, and another national definition from Law 03-10 of July 19, 2003, concerning environmental protection within the framework of sustainable development.

The first defines it as "*The direct or indirect introduction, by humans, of substances or energy into the marine environment, including estuaries, when it has or is likely to have harmful effects such as damage to biological resources and marine flora and fauna, risks to human health, hindrance to maritime activities, including fishing and other legitimate uses of the sea, impairment of seawater quality from the perspective of its use, and degradation of recreational values*"

The Algerian Maritime Code prohibits "*the discharge, dumping, and incineration at sea of materials of any nature likely to harm public health and biological resources; to hinder maritime activities, including navigation and fishing; to impair the quality of seawater from the perspective of its use; and to degrade the recreational values of the sea*"

As for Law 03-10 concerning environmental protection within the framework of sustainable development, it specifies that maritime pollution consists of "*the introduction into the aquatic environment of any substance likely to alter the physical and/or biological characteristics of the water and to create risks to human health, harm terrestrial and aquatic flora and fauna, impair the appeal of sites, or interfere with any other normal use of water*." Thus, the Maritime Code and the United Nations Convention on the Law of the Sea emphasize the hindrance of maritime activities, particularly fishing, as well as the impairment of seawater quality and the degradation of recreational values.

Law 03-10 is one of the texts enacted by the Algerian government concerning

[1] https://www.me.gov.dz

environmental legislation related to environmental protection within the framework of sustainable development. Among its objectives are to "*establish the fundamental principles and rules for environmental management; to promote sustainable national development by improving living conditions and striving to ensure a healthy living environment; to prevent any form of pollution or harm caused to the environment by safeguarding its components; to restore damaged ecosystems; and to promote the ecologically rational use of available natural resources*." This law defines water pollution as "*the introduction into the aquatic environment of any substance likely to alter the physical, chemical, and/or biological characteristics of the water and to create risks to human health, harm terrestrial and aquatic flora and fauna, impair the appeal of sites, or interfere with any other normal use of water*."

Faced with Algeria's critical environmental situation, stakeholders in environmental protection, such as the Ministry of Environment, the National Waste Agency, the National Coastal Commission, local authorities, and associations, recognize the urgent need to intervene by implementing a comprehensive environmental policy, strictly adhering to existing legislation, and actively engaging civil society organizations to ensure effective environmental protection. They advocate for the adoption of a new approach based on consultation, communication, and the participation of all sectors and institutional, private, and associative actors at all levels to ensure the effective protection of the marine environment in Algeria (Ramdane, 2010). For these stakeholders, the entire ecosystem must be set in motion.

Haddoum (2015) demonstrated that Algerian commercial ports are the main sources of pollution and waste, originating from ships or port activities. In his research, he cited the main port pollution incidents in Algeria from 1976 to 2006, ranging from the grounding of the ship *Ellen Conway* at the Port of Arzew with a cargo of thirty-two thousand (32,000) tons of crude oil on board, causing a major spill along the Algerian coast, to the spill of 63 tons of crude oil during the loading of the ship *Iran Abadeh* at the port of Skikda. He added that despite multiple modernization initiatives, the majority of Algerian commercial, recreational, and fishing ports remain insufficiently prepared to address pollution. Other sources of pollution have been cited by other authors (Lakahal & Salem, 2016), who worked on the issue of the marine environment along the western Algerian coast, such as industrial pollution, liquid domestic waste discharges, coastalization, socio-economic development, overexploitation of fishery resources, urbanization and infrastructure development, tourism activities, industrial fishing, wastewater treatment deficits, …

Haddoum (2015) described the legislative and regulatory framework governing port pollution in Algeria at the international level through maritime safety conventions, such as the *Barcelona Convention* of February 16, 1976, concerning the protection of the Mediterranean Sea against pollution. At the national level, he referenced laws such as the aforementioned Law 03-10 and Law 02-02 of February 5, 2002, regarding the protection and enhancement of the coastline. He highlighted a lack of international conventions specifically addressing ports. According to Boukhatmi (2021), maritime safety involves "*the prevention of accidents caused by natural phenomena or improper navigation operations, as well as the prevention of maritime pollution risks (from hydrocarbons, etc.).*" Thus, combating pollution is a crucial aspect of maritime safety, and the European Union has consistently prioritized this issue, especially following recent accidents that led to devastating economic and ecological consequences in Europe. Since then, all states have sought to enforce international rules more strictly and uniformly, particularly in ports.

Beyond identifying the problems, some authors, such as Lakahal & Salem (2016), have proposed measures to mitigate marine pollution and its environmental impacts. These include strengthening legislative and regulatory frameworks, as well as implementing effective

monitoring systems and sanctions. Bouzaher (2016) also sought to contribute to solutions by proposing the development of a methodology for assessing risks related to port operations in Algeria. In his doctoral research, he also discussed the regulatory bodies responsible for maritime safety. Among these are the International Maritime Organization (IMO) and the Oil Companies International Maritime Forum (OCIMF):

- The International Maritime Organization (IMO) regulates and enhances maritime safety and operations. Its objective is to facilitate international maritime transport by establishing and adopting standards, codes, recommendations, and conventions in the areas of maritime safety and security (human life and ships), as well as the prevention and control of pollution, among others. Among the conventions adopted by the IMO for the prevention of pollution from ships is the MARPOL Convention (International Convention for the Prevention of Pollution from Ships). This convention is considered the primary international agreement addressing the prevention of marine pollution, whether caused by operational human activities or accidents. It includes six (06) annexes that address the prevention of pollution;

The Oil Companies International Marine Forum (OCIMF) is an association that operates in the sector of transportation and handling at terminals for crude oil, petroleum products, petrochemicals, and gas. Its aim to prevent all human and environmental damage related primarily and significantly to ship activities and maritime transport.

Methodology & Research Field

The present research employs two qualitative methods, namely documentary analysis and semi-structured interviews.

Documentary Analysis :

Document analysis, as a qualitative research method, is "*a systematic procedure for reviewing or evaluating documents related to the subject under study*" (Bowen, 2009). It requires that data be examined and interpreted to derive meaning, gain understanding, and develop empirical knowledge (Corbin & Strauss, 2008).

The documentary analysis was conducted in three main parts. Firstly, the analysis of scientific articles and books aimed to describe the context of the maritime domain and maritime training in Algeria through a bibliographic search using academic databases such as SNDL, Google Scholar, ResearchGate, and others. The selected articles were chosen based on their relevance to the objectives of our study. It is worth noting that after an extensive literature review across various databases, no studies were found addressing maritime training in Algeria and its contribution to achieving sustainable development goals. No prior studies addressing this specific theme were identified, highlighting the relevance and originality of our work. Our research thus fills a significant gap in the literature.

Secondly, we analyzed institutional texts related to the maritime domain. This analysis formed a crucial component of the study, as it allowed us to understand the regulatory frameworks and policy directions governing this field. Institutional texts, such as official reports, national strategies, and others, provided a solid foundation for examining the strategic objectives and priorities of public institutions in terms of regulation and training. These texts were downloaded or consulted online.

Thirdly, we conducted an analysis of the training programs offered by the National Higher Maritime School (ENSM), which are available on their official website[2]. We examined all their specialties and training programs to understand the content and objectives of the courses provided by the institution.

[2] https://www.ensm.edu.dz/

Semi-structured interviews :

We conducted semi-structured interviews with three (3) academic managers at the National Higher Maritime School (ENSM) who are involved in maritime training. The interviewees were selected based on a convenience sampling approach, with their selection informed by the information available on the institution's official website. After identifying the contact details of the academic managers, they were contacted to schedule an interview. This approach allowed us to engage key stakeholders with in-depth knowledge of the subject, embedded within a higher education institution specializing in maritime training in Algeria.

The interviews were structured around several main themes: the nature and content of the maritime training provided by the institution; the educational goals and objectives of this training; the national and international directives influencing its development; as well as the role of the SDGs and their integration into the curriculum.

The interviews, lasting between 45 minutes and 1 hour 30 minutes, were conducted in French -the language used at the school- and relied on a pre-prepared interview guide. This guide ensured consistency and rigor in conducting the interviews while allowing the necessary flexibility to capture relevant information. The interviews took place in the offices of the interviewees, in a professional setting conducive to discussion, and were meticulously transcribed afterward to ensure the integrity of the information gathered.

To analyze the data from these interviews, a thematic content analysis was conducted manually. This analysis enabled the identification and extraction of recurring themes, as well as the perceptions and viewpoints of the academic managers regarding maritime training and its alignment with global requirements and objectives, particularly the SDGs.

Research Field :

Maritime training in Algeria is provided by three institutions: the National Higher Maritime School (ENSM), the National Higher School of Marine Sciences and Coastal Planning (ENSSMAL), and the Naval Higher School. The first school trains officers for the merchant navy. The second offers programs in oceanography, coastal planning, and management, while the third provides maritime training but with a military focus, specifically for the navy.

The National Higher Maritime School (ENSM) was chosen as the research field for this study. the school is under the supervision of the Ministry of Higher Education and Scientific Research and the Ministry of Transport, and is responsible for degree programs, continuous training, experimental research, and scientific and technological research in collaboration with relevant organizations, as well as expert missions. It offers state engineering degrees and master's programs (in navigation sciences and naval mechanics), as well as training for port officers.

According to its website, ENSM is certified under the international standard ISO 9001:2015 for Quality Management System (QMS), ensuring compliance with and satisfaction of the requirements of the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW). Adopted in 1978, entered into force in 1984, and fully revised in 1995 and 2010, the STCW Convention is the first international convention to establish basic requirements for the training, certification, and watchkeeping of seafarers. It unified procedures and practices that previously varied from country to country.

According to its quality policy, the convention encourages the establishment of quality standards for the training, assessment, and control of seafarers' competencies. In this spirit, the school's management has set objectives and committed to mobilizing and allocating resources to achieve them. Through this policy, the school outlines the following aims:

- Comply with the requirements of the STCW convention regarding maritime training;
- Train Master's graduates and State Engineers to operate on board ships with the goal of obtaining merchant navy certificates;
- Ensure that the number of training programs aligns with the sector's needs;
- Guarantee continuous and mandatory training, as well as regulatory certification for active merchant navy officers;
- Meet the requirements and needs of relevant stakeholders;
- Comply with standard requirements and ensure continuous improvement of the QMS;
- Develop the skills and expertise of personnel in relation to their tasks.

The school has a research laboratory whose objectives include, among others, studying maritime safety conditions and their environmental impact, as well as combating various forms of pollution: hydrocarbons, bulk chemical products, wastewater, solid waste, atmospheric, and noise pollution.

The teaching staff consists of both academic and professional profiles, ensuring a training approach that combines theory and practice.

Results & Discussion

Implementation of SDG 14 in Algeria: Life Below Water

As part of the adoption and implementation of the 2030 Agenda for Sustainable Development, Algeria has achieved positive results in certain areas, such as health (SDG 3), but faces challenges in others, such as reducing inequalities (SDG 10).

The Voluntary National Report (2019) highlights that Algeria has signed all international conventions related to sustainable development and has taken legislative measures in areas such as environmental protection and renewable energy. Institutions like the National Observatory for the Environment (ONEDD), and funds such as the National Environment Fund (IRNEF) have been established to support these initiatives. However, the report indicates that statistical data are insufficient to cover all the indicators of the SDGs, a problem shared by many countries. To successfully implement the 2030 Agenda, Algeria must strengthen its institutional framework, harmonize efforts among ministries, involve researchers and experts, and improve its statistical system to better track progress.

Another report, prepared by international experts and published by Cambridge University Press in 2022, ranked Algeria first in terms of achieving the SDGs in the MENA region and Africa for the year 2022. Globally, it ranked 64th among the 163 countries evaluated in this ranking. For the second consecutive year, Algeria positioned itself at the top of the African continent and the MENA region. The report shows that Algeria is on track to achieve SDG4 (education), SDG12 (sustainable consumption and production), and SDG17 (partnerships for achieving the SDGs), and has improved on SDG9 (industry, innovation, and infrastructure), SDG13 (climate action), SDG15 (life on land), and SDG16 (peace, justice, and strong institutions). Meanwhile, it has recorded stagnation for SDG8 (decent work and economic growth), SDG3 (health and well-being), SDG5 (gender equality), SDG6 (clean water and sanitation), and SDG14 (life below water). It has recorded a declining result for SDG11 (sustainable cities and communities).

With its 1,622 km of coastline bordering the Mediterranean Sea, Algeria is directly concerned by SDG 14, which aims to combat marine pollution, preserve marine and coastal ecosystems, and ensure the sustainable exploitation of their resources. Thus, SDG 14 focuses on the conservation and sustainable use of oceans, seas, and marine resources for sustainable development. According to the Voluntary National Report (2019) on the Progress of SDG implementation, Algeria, to address the aforementioned challenges, "has set strategic directions based particularly on: combating marine pollution; preserving marine and coastal ecosystems and environmental standards; the sustainable exploitation of

fishery resources (fishing, aquaculture); and the preservation of marine and aquatic heritage and its biodiversity."

To achieve this, laws have been enacted, such as Law 11-02 of 2011 on protected areas within the framework of sustainable development; Law 02-02 of 2002 on the protection and enhancement of the coastline, specifically regarding coastal zones; Law 14-07 of 2014 on biological resources; and Law 15-08 of 2015 on fisheries and aquaculture.

Organizations have also been established to implement these regulations. Among them are the National Coastal Commission (CNL), responsible for enforcing the national policy on coastal protection and enhancement; the High Council for the Sea, which sets measures for the sustainable management of coastal and maritime areas under national jurisdiction; the Coastal Coordination Council, tasked with mobilizing the necessary resources for the protection of coastal and shoreline areas; and the National Environmental and Coastal Fund, which was created to support the achievement of set objectives.

Various measures and actions have been undertaken to reduce and combat pollution. These include seabed cleanup campaigns in collaboration with the Environmental Directorates of wilayas, diving clubs, and environmental associations; the cleaning of three ports in 2019; a training session on marine waste management followed by four (04) campaigns to characterize marine waste at 27 beaches along the Algerian coastline; participation in a participatory process aimed at proposing solutions to eliminate all untreated discharges into the sea; involvement in international cooperation projects to prepare for marine pollution response in the Mediterranean; and the signing of an agreement between Algeria, Morocco, and Tunisia on the Sub-Regional Emergency Plan for preparedness and response to accidental marine pollution in the southwestern Mediterranean. In continuation of the present article, it would be relevant to conduct research on the tangible outcomes of these stated efforts.

In terms of education and research, the government relies on higher education institutions, universities, the National Center for Research and Development in Fisheries and Aquaculture (CNRDPA), their observation networks, and the National Laboratory for Fisheries and Aquaculture Product Inspection and Environmental Sanitation (LNCAPPSM). These institutions integrate training, capacity building, and scientific research into their strategies. They implement research programs at national, regional, and international levels, addressing marine ecosystem conservation, fisheries resource preservation, and sustainable fishing, while considering challenges related to climate change, ocean acidification, and eutrophication.

The SDGs in Maritime Training in Algeria: The Case of ENSM

- Programs Offered:

ENSM offers both degree programs and vocational training. Degree programs include academic courses such as engineering and master's degrees, while vocational training includes professional courses like port officer training. Admission to these programs is through a national competitive examination.

Based on the training programs offered, the specializations are related to the field of maritime engineering, including "navigation sciences" and "naval mechanics." An interviewee mentioned that "*graduates of engineering and master's programs are certified by the two aforementioned ministries*".

According to another manager, "*positions are opened based on expressed needs, for example, 60 for a master's program, so: 30 for one master's and 30 for the other master's, following a meeting with the participation of representatives from the MESRS, the Ministry of Transport, and maritime companies*." Thus, the number of teaching positions allocated to each program and each specialization is determined according to the needs of the maritime sector. The determination of the number of vacancies in the maritime sector is based on the needs expressed by national maritime companies at the end of the academic

year. These needs are discussed during meetings involving representatives from the two concerned ministries and national maritime companies. However, despite this anticipation and planning with the participation of all stakeholders involved in these programs, not all graduates of ENSM are automatically recruited at the end of their studies. But it happens, according to an official, that all graduates of the same class are recruited at the end of their training.

Other programs are also offered by ENSM, which an interviewee referred to as "*regulated programs*." These are certification programs required by the STCW convention. According to the school's website, "these programs are organized based on the needs of the maritime and port sector according to the annual academic calendar." Among the 27 programs offered and mentioned on the website are: "*Basic Safety Training (BST),*" "*Security Awareness (SA),*" "*Advanced Training for Ships Operating in Polar Waters (SOPW-A),*" ...

The school follows the recommendations of the IMO and is subject to evaluation by IMO auditors to ensure its compliance with the STCW convention in maritime training. According to a manager, "*following this convention is a national and international requirement, and we have no choice but to comply*." He added, "*this convention recommends the implementation of a quality management system compliant with the ISO 9001 standard*." This observation confirms what has already been mentioned in the presentation of the school and its quality policy on the school's website. The same interviewee revealed that this convention is regularly revised, and the school's regulatory monitoring service is responsible for downloading the new versions. He expressed regret that this task is handled by someone within the school, stating, "*there is one person who manages this monitoring aspect. Normally, it is the Ministry of Transport that sends the new changes and updates, but they are overwhelmed, so we handle this part ourselves*." He added, "*The amendments should be disseminated to the school, maritime companies, and ports, but currently, it is being done at our level*."

- Design of New Training Programs:

Regarding the design of new training programs and their review, according to a manager, "*Every year in July, companies express their needs—it could be in June, July, or August, but it must be before the start of the academic year and for all types of programs, whether vocational, higher education, or continuing education. If the program exists and is adequate, we keep it; otherwise, we update it, especially if it is 6 or 7 years old, or we propose a program through the pedagogical committees for improvement or a new design, meaning a new program*." He added, "*The faculty involved includes academics and professionals, with the latter, such as former captains, participating mainly in continuing education*." It is worth noting that training programs are developed or modified based on the competencies defined in the STCW convention, and these competencies are directly integrated into the programs as soon as they emerge.

Group meetings to review new programs are automatically organized after each revision of the convention. Finally, compliance with this convention is a requirement both at the national and international levels. Subsequently, the programs are validated by the two concerned ministries.

The training programs include scientific and technical courses, with limited coverage of human and social sciences courses such as "maritime law", "economics", "management engineering", and "maritime regulations" as well as essential transversal courses like "research methodology" and "English".

- Objectives of Maritime Training:

According to the interviewed managers, maritime training aims to meet the needs of the sector and produce highly qualified officers and graduates. One manager emphasizes the notion of quality. He states that the objective of the offered training programs is to "*cover and meet the sector's needs in terms of quality and to train high-quality officers*." He asserts that

"*students trained at the National Higher Maritime School are in high demand, even internationally*." Other collected statements confirm that the school's graduates are highly sought after, including on an international scale.

- Partnerships/Collaborations:

In terms of partnerships, agreements and conventions have been established with maritime companies, maritime service providers, and ports. However, there are currently no collaborations in place with international maritime schools. One manager laments the obsolescence of previously existing agreements with these schools. He states that "*there are no longer any partnerships with international maritime schools.*" He adds that *"there used to be a partnership with the ENSM (National Higher Maritime School) in Marseille and a partnership with a maritime school in Sweden, but these no longer exist within this framework, there were international exchanges in both directions, and most of the former instructors were trained there, particularly as part of their PGS (Professional Graduate Studies)."*

This leads us to believe that the past collaborations were highly beneficial for both the academics and students of the ENSM.

- Integration of Sustainable Development concepts into Training Programs

The concept of sustainable development, particularly environmental preservation and the associated penalties for violations, is integrated into certain modules such as "*maritime regulations*." Indeed, one interviewee states that "*the IMO (International Maritime Organization) has issued an agreement called MARPOL, which contains six annexes that are incorporated into the training programs. These annexes can be integrated into modules that address regulations*." According to him, "*seafarers will be penalized if they pollute the environment.*" This convention was mentioned in the first part of this article. In fact, this convention was developed by the IMO and is considered a major convention addressing the prevention of marine pollution by ships.

Severe penalties are imposed in cases of high pollution, waste discharge, or exceeding carbon thresholds. One of the interviewed managers explained that it is crucial to teach this topic due to the significance of the issue: "*Ships are inspected even in the middle of the sea. Inspectors take samples to check pollution levels, and the penalties are very severe. Even ship waste is monitored. Inspectors measure how much waste has been discharged by ships. Additionally, there are inspectors in every port. It is highly regulated.*"

According to the interviews, seminars and study days on water pollution are organized within the school to raise awareness among students about these critical issues. One manager believes that to achieve SDG 14, which focuses on the conservation and sustainable use of oceans, seas, and marine resources for sustainable development, it is imperative to comply with regulations that promote these actions and to educate students.

Conclusion

Maritime training in Algeria plays a strategic role in achieving the SDGs, particularly the one related to the preservation of oceans and marine resources (SDG 14). As a coastal country, Algeria is directly affected by maritime pollution issues, including pollution from hydrocarbons, plastic waste, and untreated wastewater discharges. These challenges threaten not only the balance of marine ecosystems but also economic activities related to fishing, tourism, and maritime transport. Therefore, integrating sustainable development principles into maritime training is essential to raising awareness among future professionals about best practices in environmental management and pollution impact reduction.

By aligning training programs with the SDGs, maritime schools can become drivers of change toward a more inclusive, equitable, and environmentally friendly maritime future. Strengthening training mechanisms and adopting educational policies aligned with sustainable development requirements are thus

essential levers to ensure a responsible and sustainable maritime transition. By fully engaging its maritime sector in this dynamic, Algeria will be better equipped to address environmental and economic challenges while actively contributing to global SDG.

This study was conducted in one Algerian maritime school and is not representative of all training institutions in the country. Since institutional, pedagogical, and organizational specificities may vary from one school to another, expanding this research to a larger sample of institutions would be beneficial in gaining a more comprehensive understanding of maritime training dynamics in Algeria. Furthermore, a key finding of this study is the lack of scientific literature on the role of maritime training in achieving the SDGs. This gap limited the ability to conduct a comprehensive and exhaustive literature review, highlighting the need for further research on this topic.

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