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Multicriteria Analysis of the Sustainability Performance of The Maritime Activity of Egypt and Romania

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11 Marlog 2022

Towards a SUSTAINABLE BLUE ECONOMY

20 - 22 March, 2022
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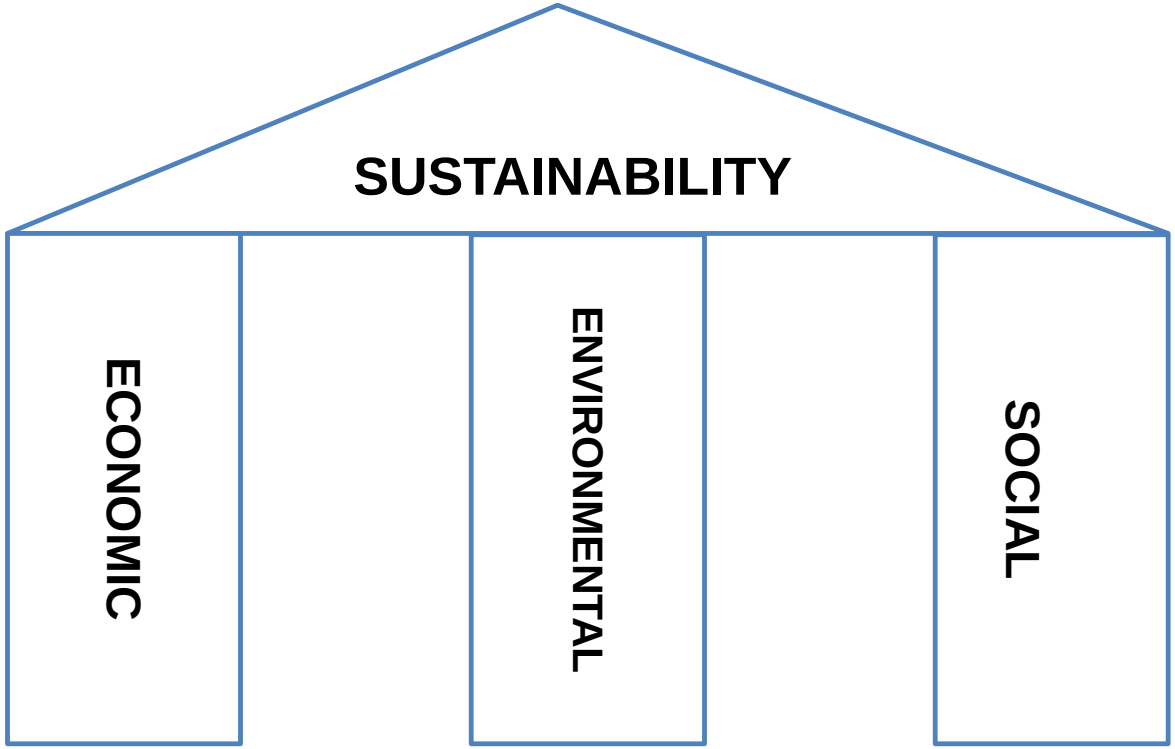
SUSTENABILITY

Sustainable Development: *"The development that meets the needs of the present without compromising the ability of future generations to meet their own needs".*

Report of the World Commission on Environment and Development – Our Common Future, 1987

THE THREE PILLARS OF SUSTAINABILITY



THE THREE PILLARS OF SUSTAINABILITY

Environmental sustainability: the ecological component that must be found in every initiative aimed at protecting biodiversity; sustainable organizations aim to reduce their environmental footprint as much as possible;

Economic sustainability: ensuring the longevity of the company is a responsibility, regardless of market developments; financial profitability is one component of the business, not the only or the most important one.

Social sustainability: companies act for their own interests, but at the same time, they serve the interests of their employees and of society as a whole. It involves the concern for the welfare of employees and the investment of a part of the company's profit for charitable causes in the community in which it operates.

GRI SUSTAINABILITY STANDARDS - Global Reporting Initiative

- The first and most adopted global standards for sustainability reporting;

- They allow organizations around the world to report on their economic, environmental, and social impact;

- They help organizations contribute to the 17 United Nations (UN) Sustainable Development Goals (SDGs).

RESEARCH METHODOLOGY

The research method: Multicriteria Decision Analysis (MCDA)

The 5 stages of MCDA:

- **Step 1:** Formulating the problem to be solved and determining the decision criteria;
- **Step 2:** Determining the performance values for each criterion;
- **Step 3:** Normalizing the analyzed criteria;
- **Step 4:** Assigning weights to the decision criteria;
- **Step 5:** Hierarchy of variants. Calculating the performance score and choosing the best option.

RESEARCH METHODOLOGY

The research method: Multicriteria Decision Analysis (MCDA)

- The objective of the MCDA method applied in the paper: to determine the sustainability performance of the maritime activity of 5 countries of interest: China, The Netherlands, Morocco, Romania and Egypt.

- **The problem to be solved:** multicriteria decision in conditions of certainty, using criteria of equal importance.

APPLICATION OF THE MULTICRITERIA DECISION ANALYSIS

Step 1: Formulating the problem to be solved and determining the decision criteria

- The authors chose **Romania** and **Egypt** as countries of interest;
- Another 3 countries were selected for the comparison:
  - **China:** the world's leading country for maritime trade;
  - **Netherlands:** Europe's leading country for maritime trade;
  - **Morocco:** Africa's leading country in maritime trade.

APPLICATION OF THE MULTICRITERIA DECISION ANALYSIS

Table 1. Sustainability indicators analyzed (year 2020)

No.	Sustainability pillar	Criteria (Sustainability indicators)
1	Economic sustainability	Container port throughput (TEU) Fleet growth rate in 2020 (%) Number of port calls Ship building (GT)
2	Social sustainability	Seafarer supply (Officers)
3	Environmental sustainability	Ship recycling (GT)

APPLICATION OF THE MULTICRITERIA DECISION ANALYSIS
Step 2: Determining the performance values for each criterion

Decision matrix for the analyzed criteria

Crt no.	Country (ports taken into consideration)	Performance values for selected criteria					
		Container port throughput (TEU)	Number of port calls	Ship building (GT)	Ship recycling (GT)	Seafarer supply (Officers)	Fleet growth rate in 2020 (%)
1	China (Shanghai, Ningbo, Qingdao, Xiamen, Yantian)	245103781	261269	23257200	195486	134294	3,5
2	The Netherlands (Rotterdam, Vlissingen, Moerdijk, Amsterdam, Botlek)	14522209	117420	109164	8430	9667	-1,4
3	Morocco (Tanger Med, Casablanca, Agadir, Nador)	6980958	18002	n/a	n/a	8081	20,3
4	Romania (Constantza)	643725	5331	35783	0	17708	-4
5	Egypt (Port Said, Damietta, El Sokhna, Alexandria, El Dekheila)	5928454	10825	2364	0	7021	3,2

Note: n/a = information not available. Source: compiled from UNCTAD, 2021.

APPLICATION OF THE MULTICRITERIA DECISION ANALYSIS

Step 3: Normalizing the analyzed criteria

Normalized decision matrix

	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Indicators	Container port throughput (TEU)	Number of port calls	Ship building (GT)	Ship recycling (GT)	Seafarer supply (Officers)	Fleet growth rate in 2020 (%)
China	1	1	1	1	1	0,172
The Netherlands	0,059	0,449	0,005	0,043	0,072	-0,069
Morocco	0,028	0,069	n/a	n/a	0,060	1
Romania	0,003	0,020	0,002	0,000	0,132	-0,197
Egypt	0,024	0,041	0,000	0,000	0,052	0,158

Note: n/a = information not available.

APPLICATION OF THE MULTICRITERIA DECISION ANALYSIS

Step 4: Assigning weights to the decision criteria

Weighted normalized decision matrix

Country	Weightage					
	0,1666	0,1666	0,1666	0,1666	0,1666	0,1666
	Container port throughput (TEU)	Number of port calls	Ship building (GT)	Ship recycling (GT)	Seafarer supply: Officers	Fleet growth rate in 2020 (%)
China	0,167	0,167	0,167	0,167	0,167	0,029
The Netherlands	0,010	0,075	0,000	0,007	0,012	-0,011
Morocco	0,005	0,011	n/a	n/a	0,010	0,167
Romania	0,000	0,003	0,000	0,000	0,022	-0,033
Egypt	0,004	0,007	0,000	0,000	0,009	0,026

APPLICATION OF THE MULTICRITERIA DECISION ANALYSIS

Step 5: Hierarchy of variants. Calculating the performance score and choosing the best option

Performance score and ranking

Country	Weightage						Perform-ance score	Rank
	0,1666	0,1666	0,1666	0,1666	0,1666	0,1666		
	Container port throughput (TEU)	No. of port calls	Ship building (GT)	Ship recycling (GT)	Seafarer supply (Officers)	Fleet growth rate in 2020 (%)		
China	0,167	0,167	0,167	0,167	0,167	0,029	**0,862**	**1**
The Netherlands	0,010	0,075	0,000	0,007	0,012	-0,011	**0,092**	**3**
Morocco	0,005	0,011	n/a	n/a	0,010	0,167	**0,193**	**2**
Romania	0,000	0,003	0,000	0,000	0,022	-0,033	**-0,007**	**5**
Egypt	0,004	0,007	0,000	0,000	0,009	0,026	**0,046**	**4**

RESULTS AND DISCUSSIONS

- China has the highest performance sustainability score of all the 5 compared countries, obtaining the best composite sustainability performance score (0,862);
- Morocco ranked 2nd in terms of maritime sustainability performance, due to its impressive fleet growth rate (20,3%).

RESULTS AND DISCUSSIONS

- The 3rd place was as expected taken by The Netherlands;
- Although it registered a negative fleet growth rate in 2020, it scored high in economic sustainability;
- Another strong point for the European competitor was its constant preoccupation for environmental sustainability, reflected positively in a high score for Ship recycling.

RESULTS AND DISCUSSIONS

- Egypt scored higher than Romania, taking the 4th position;
- Romania was the only country to have a negative score in the analysis;
- Both countries scored very low on indicators such as Ship Building and Ship recycling, but Egypt reported better values for the economic indicators;
- While Romania's performance was better for the social sustainability indicator Seafarer supply (number of officers), Egypt had a better score for the Fleet growth rate in 2020 (3,2%).

CONCLUSIONS

- The objective of the paper: to determine the performance in terms of sustainability for the maritime activity of Egypt and Romania.
- Three more countries of interest (China, The Netherlands, and Morocco) were added to the analysis, as being representative of the world's sea trade.
- Six indicators were analyzed (2020), representing each of the three pillars that define sustainability.

CONCLUSIONS

- The multicriteria analysis (MDCA) method was used for decision-making, in order to examine the sustainability performance of the countries subjected to analysis;
- The most sustainable country for maritime activities proved to be China, followed by Morocco, The Netherlands, Egypt, and Romania;
- China differed significantly from the other competitors, in particular in what concerns economic indicators related to maritime activity and trade

CONCLUSIONS

- In order to achieve a high sustainability performance, the countries should pay equal interest and attention to all pillars of sustainability;
- Even if they score higher in economic indicators, it is not enough to secure a high position in sustainability rankings;
- They should allot significant resources and support initiatives for the development of the social indicators, as well as the environmental ones.

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Thank YOU!

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