Arab Academy
for Science , Technology and Maritime Transport

13 Marlog 2024

The International Maritime Transport and Logistics Conference

"MARLOG 13"

Conference Book

Towards —— Smart Green Blue Infrastructure

3-5 March 2024

Editor-in-Chief
Prof. Akram Soliman Elselmy
Head, Conference Organizing Committee
Professor of Port Planning and Coastal Engineering, AASTMT

Helton Green Plaza Hotel
Alexandria, Egypt

Arab Academy
for Science , Technology and Maritime Transport

13 MarLog 2024

The International Maritime Transport and Logistics (MARLOG 13) Conference

Conference Book

Under The Auspices of

H.E. Mr. Ahmed Aboul Gheit
Secretary General of
the League of the Arab States

H.E. Lieutenant-General Kamel Al-Wazir
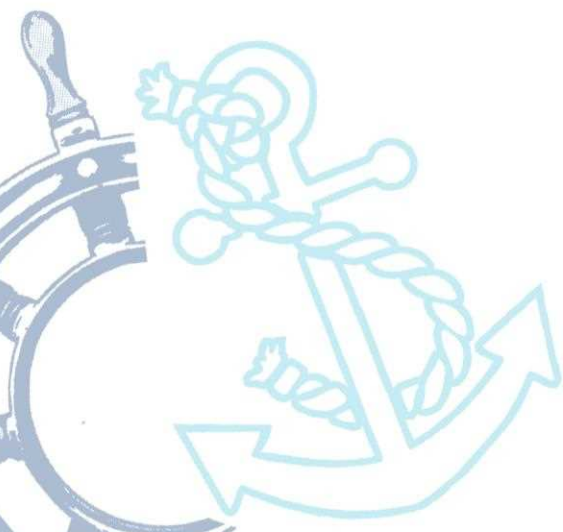Minister of Transport, Egypt

Alexandria, Egypt
3rd-5th March 2024

The International Maritime Transport and Logistics Conference

Towards
Smart Green Blue
Infrastructure
3-5 March 2024 - Alexandria, Egypt

"MARLOG 13"

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A Word from the Conference Chairman

As the president of the Arab Academy for Science, Technology and Maritime Transport and Chairman of the International Maritime Transport and Logistics Conference "MARLOG", I would like to start by expressing my sincere greetings and thanks to our distinguished participants.

The Arab Academy for Science, Technology and Maritime Transport, since its establishment in 1972, played and will continue to play a vital role not only as a specialized organization in the field of education and training but also as an Arab house of expertise that represents the technical arm of the Arab league.

AASTMT, as the organizer of the International Maritime Transport and Logistics Conference, since it was first held in 2011, is keen on making this annual prominent event a great opportunity for sharing the latest updates and coordinating efforts in various fields such as Maritime Transport, Logistics, Engineering, Environment, and Economy.

Finally, I would like to express my deepest appreciation and gratitude to all the renowned figures who attended and participated in this unique event. I hope you have enjoyed this experience and were an active part of the MARLOG 13 conference, as your participation contributed greatly to the success of this conference.

Prof. Ismail Abdel Ghafar Ismail Farag
MARLOG Conference Chairman
AASTMT President

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Abstracts

Preface

To continue our successful path with the conference's 13th edition, the International Maritime Transport and Logistics Conference organizing committee and I were proud and thrilled to welcome our eminent guests.

By its previous iterations, the MARLOG conference was able to distinguish itself as more than just an annual event and a renowned gathering that is highly anticipated by many. Distinguished maritime and engineering specialists from renowned port authorities, esteemed colleges, and well-known enterprises from all over the world congregate under one roof each year thanks to this significant reputation.

MARLOG 13 Conference Proceedings contains 48 research papers, 43 of them were presented in the conference technical program and five were submitted only in the conference proceedings. This year, 55 research papers were submitted to MARLOG 13 from more than 10 different countries around the world, and according to the full paper submitted, the double-blind peer review adapted by the conference and the Technical committee thorough review, 48 research papers were accepted for the conference proceedings.

I would like to extend my gratitude to everyone who helped make MARLOG 13 possible as I finish up this welcome message. AASTMT President Prof. Ismail Abdel Ghafar Ismail Farag, the conference chairman, and all sponsors, partners, and co-organizers are to be thanked first. The members of the organizing committee, the technical committee, the reviewers, and our staff of organizers are also due of praise for their unwavering dedication, support, and ability to make this event happen.

We hope that you have enjoyed your time at the conference and that you managed to gain fruitful and valuable information.

Prof. Akram Soliman Elselmy

Editor in Chief

The International Maritime Transport and Logistics Conference

Towards Smart Green Blue Infrastructure

"MARLOG 13"

3-5 March 2024 - Alexandria, Egypt

13

MarLog

2024

Theme

Towards Smart Green Blue Infrastructure

Conference Chairman	**Prof. Ismail Abdel Ghaffar Ismail Farag** President, Arab Academy for Science, Technology and Maritime Transport, Egypt

Organizing Commitee

To ensure the success of MARLOG, the Arab Academy for Science, Technology and Maritime Transport (AASTMT), in its role as the organizing institution, is collaborating closely Through its MARLOG Conference Organizing Committee members with the esteemed co-organizes, academic and Scientifc Partners. This collaborative efforts is the core reason of MARLOG growing success each year.

Head	**Prof. Akram Soliman Elselmy** Dean, College of Engineering and Technology, AASTMT
Members:	**Prof. Alaa Morsy** Dean, Port Training Institute, AASTMT. **Prof. Mohamed Mahmoud Ali** President Assistant for Technology Development, AASTMT. **Dr. Mohey Eldeen Elsayeh** Dean, College of Maritime Transport & Technology, AASTMT. **Prof. Ahmed Osman Idris** Dean, Maritime Research and Consultation Center, AASTMT. **Prof. Sara Elgazzar** Dean, College of International Transport & Logistics, AASTMT Alexandria. **Prof. Khaled Elsakty** Dean, College of International Transport & Logistics, AASTMT, Cairo. **Dr. Sara Elzarka** Dean, International Transport & Logistics Institute, AASTMT **Dr. Sandra Hadad** Vice Dean for Postgraduate Studies and Scientific Research, College of International Transport & Logistics, ASSTMT.

Technical Commitee

Head	**Prof. Yousry Elgamal** Chairman of IT Committee, National Council of Education, Culture, and Science (UNESCO, ISESCO, ALECSO) Former Minister of Education
Members:	**Prof. Martin Renilson,** Royal Institution of Naval Architects, Australian Division, Australia. **Prof. Bojan Rosi,** Faculty of Logistics, University of Maribor, Slovenia. **Prof. Roberto Revetria,** University of Genoa, Italy. **Prof. Changqian Guan,** U.S. Merchant Marine Academy, USA. **Prof. Sam Yahalom,** State University of New York Maritime College, USA. **Prof. Qingcheng Zeng,** Dalian Maritime University, China. **Prof. Son "Shan" Nguyen,** University of Tasmania, Australia. **Prof. Salman Nazir,** University of South-eastern Norway, Norway. **Prof. Aristotelis Naniopoulos,** Aristotle University of Thessaloniki, Greece. **Prof. Ahmed Amin,** Suez Canal University. **Prof. Alaa A. Abdel Bary,** AASTMT. **Prof. Yasser Elsonbaty,** AASTMT. **Prof. Ehab Mahmoud El Kassas,** AASTMT. **Prof. Islam El-Nakib,** AASTMT. **Dr. Mohammed Daoud,** AASTMT. **Dr. Elsenousy Balbaa,** AASTMT. **Dr. Mahmoud El-Bawab,** AASTMT. **Dr. Hyundeok Kim,** Sunchon National University, South Korea. **Dr. Babak Banijamali,** World Association for Waterborne Transport Infrastructure, PIANC **Dr. Nikitas Nikitakos,** University of the Aegean, Greece **Dr. Gianfranco Fancello,** University of Cagliari, Italy. **Dr. George K. Vaggelas,** University of the Aegean, Greece **Dr. Patrizia Serra,** University of Cagliari, Italy **Dr.Philippe Guillaumet,** MEDports Association, Marseille, France. **Eng. Francesc Carbonell,** Union for the Mediterranean, Spain. **Mrs. Ana Rumbeu Daviu,** Valencia Port Foundation, Port Authority of Valencia, Spain.

Session Chairs

Session 1 — Collaborative Strategies for Sustainable Resilient Ports

Chair: Prof. Yousry Elgamal

Chairman of IT Committee, National Council of Education, Culture, and Science (UNESCO, ISESCO, ALECSO)

Former Minister of Education
Head, MARLOG Conference Technical Committee, AASTMT

Session 2 — Navigating the Blue Path: Leading the Way to Sustainabl Development

Chair: Prof. Dana Corina Deselnicu
Director of the Doctoral School of Entrepreneurship, Business Engineering and Management, University POLITEHNICA of Bucharest, Romania

Session 3A — The Future of Green Ports: Resilience, Sustainability, an Adaptation

Chair: Prof. Hossam Moghazy
Former Minister of Water Resources and Irrigation, Egypt

Session 3B — Sustainable Maritime Operations: Optimizing Performance Through Technology (1)

Chair: Prof. Ahmed Amin
Professor, Civil Engineering Department, Suez Canal University.

Session 4A — Inland Waterway Connections for Greener Canals and Riv Sustainability

Chair: Prof. Khaled Elsakty
Dean, College of International Transport & Logistics, AASTMT, Cairo.

Session 4B — Smart, Green, Blue Infrastructure – Case Studies and Bes Practices

Chair: Eng. Francisco Esteban Lefler
President, The World Association for Waterborne Transport Infrastructure (PIANC), Brussels, Belgium.

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Session 5A — Emerging Technologies and Strategies in Maritime Industry – The Gateway to Optimization and Sustainability

Chair: Mr. Pino Musolino
President of MEDPorts Association
President and CEO of North Central Tyrrhenian Sea Port Authority, Ports of Rome, Italy.

Session 5B — Modern Strategies for Green Blue Infrastructure Project Management

Chair: Mr. Jordi Torrent
MEDPorts Association Secretary General, Barcelona, Spain.

Session 6A — Sustainable Maritime Operations: Optimizing Performance Through Technology(2)

Chair: Prof. Aziz Ezzat
President's Advisor of Education Affairs,
Professor of Industrial and Management Engineering, AASTMT.

Session 6B — Sustainable Maritime Development Through Technological Innovation

Chair: Dr. Elsenousy Balbaa
Vice President for Maritime Affairs, AASTMT

Session 7A — Sustainable Logistics: Leveraging Innovation to Improve Quality, Efficiency, and Environmental Impact

Chair: Dr. Dong Yang
Associate Head of the Department of Logistics and Maritime Studies, The Hong Kong Polytechnic University, Hong Kong SAR, China.

Session 7B — Embracing Innovation: Ship Design and Operation

Chair: Dr. Mohi El Din Mohamed El Sayeh
Dean, College of Maritime Transport and Technology, AASTMT.

Session 8 — Optimizing Maritime Operations Through AI and Technology

Chair: Prof. Maximo Q. Mejia
President, World Maritime University (WMU), Malmö, Sweden

Adel Tawfik, Ahmed Anas, Ahmed Essam, Ahmed Hanafy, Ahmed Kadry, Ahmed Othman Abdelhamid, Ahmed Othman Idris, Ahmed Samir, Akram Solima, Alaa Khalil, Alaa Morsy, Ali Ismail, Ashraf Sharara, Aya Elgarhy, Ayman Adel, Ayman Elnahrawy, Ehab Elmasry, Ehab Etman, Elbadr Othman, Emad Khafaga, Eman Ismail, Essam Seddik, Gamal Abdelnasser, Ghada Elqott, Hisham Bassiouny, Hisham Helal, Ibrahim Elattar, Iham Zidane, Karam Sorour, Karim tonbol, Karma Fathallah, Khaled Elkilany, Khaled Elsakty, Khaled Elsherbiny, Mahmoud Elbawab, Mahmoud Elkalla, Mahmoud Mashaly, Mohamed Abbas Qotb, Mohamed Dawood, Mohamed Fahmy, Mohamed Mahmoud, Mohamed Mourad, Mohamed Youssef, Mootaz Ghazy, Moustafa Abdelgelil, Moustafa Hilaly, Moustafa Saad, Nasser Elmaghraby, Noha Galal, Rola Afifi, Rudy Van Dec Ween, Saad Mesbah, Saleh Mesbah, Salman Nazir, Sameh Kabary, Sandra Hadad, Sara Elgazzar, Sara Elzarka, Sherif Badran, Sherine Nagy, Sherine Youssef, Tamer Adel, Tarek Moustafa, Wael Abdelatif, Wael Kamel, Walid Ghoneim, Yasser Gaber, Yousry Elgamal, Youssef Khairy (AASTMT, Egypt), Hossam Moghazy, Mohamed Saeed Elkhouly, Rawya Kansowah (AU, Egypt), Rafik Galal (DCHC, Egypt), Amr Eltawil (E-JUST, Egypt), Babak Banijamali (PIANC, Belgium), Ahmed Amin (SCU, Egypt), Aly Essam (SCZone, Egypt), George Vaggelas, Nikitas Nikitakos (UoA, Greece), (Egypt), Roberto Revetria (UoG, Italy).

MARLOG Conference Coordinator and Executive Editor:
Amira Mamdouh

MARLOG Conference Book Editor
Shehab Eldin M. Tawfik

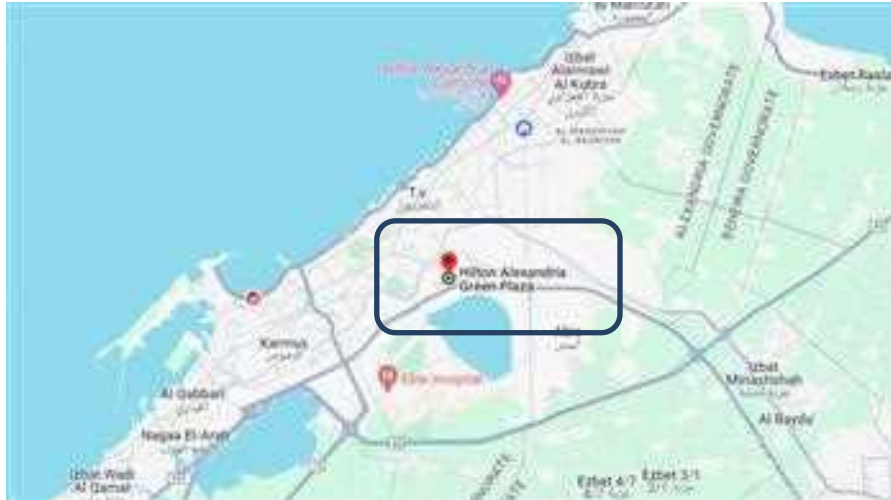| MARLOG Supporting Team: |
| --- |
| Abier Mourad, Mahmoud Essa, Ehab Hamdy, Walid mandour, Fajr Wahba, Nepal Hassan, Pensee Ayman. |

IT Supporting Team:
Mahmoud Farouk, Mohamed Abdel Aal, Gamal Abd El-Nasser A. Said, Mahmoud Elharmeel, Hanaa Adel, Mohamed Kamal, and Ahmed Hassan

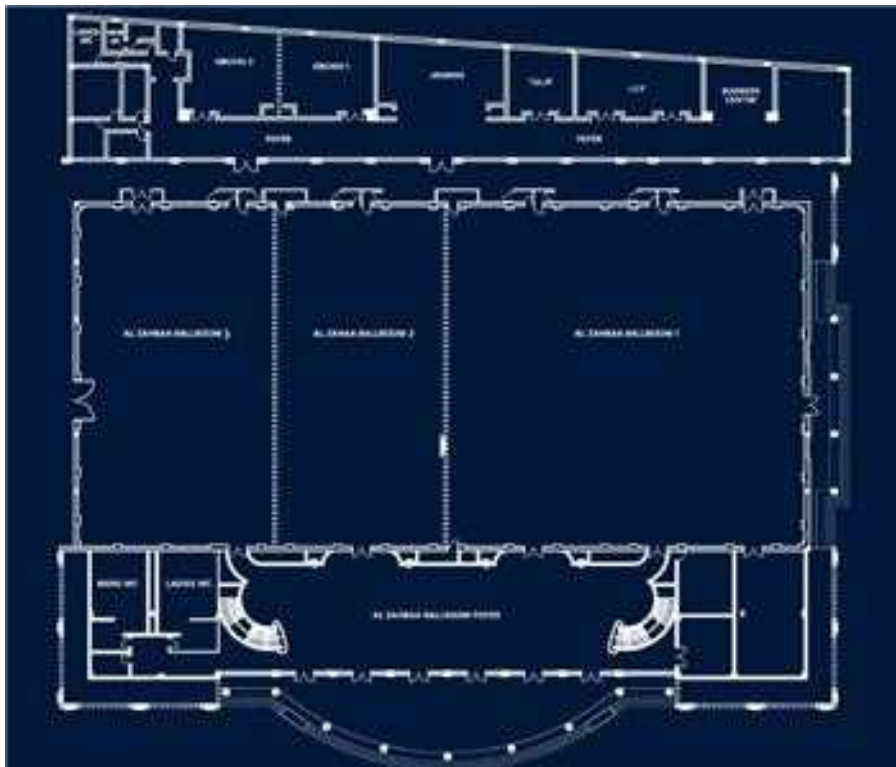# Venue

The MARLOG-13 Conference was held in:

The Hilton Green Plaza Hotel, Alexandria, Egypt.

Floor Plan

General Information

Academic Partners

Staffodshire University, UK

The International University of Logistics and transport, Wroclaw, Poland.
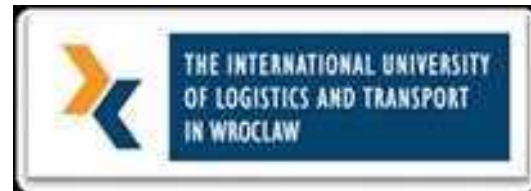
University of Genoa, Italy.

Scientific Partner

The World Association for Waterborne Transport Infrastructure (PIANC)

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Co-Organizers

Inland Waterways International

International Association of Ports and Harbors (IAPH)

MEDPorts Association

Union for the Mediterranean (UfM)

Antwerp/Flanders Port Training Center

Valenciaport Foundation

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Participating Countries

32 Countries participated in the MARLOG 13 Conference:

Italy	Spain	France	Egypt	Slovania	Morocco
Belgium	USA	Kuwait	Poland	Romaia	Albania
Greece	Singapore	Djibouti	UAE	Germany	Libya
China	Lebanon	UK	Sudan	India	Jordan
Malta	Tunisia	Iraq	Malaysia	Kenya	Yemen
		Sweden			
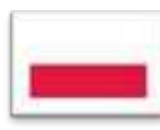
Academic Participation

AASTMT, Egypt

World Maritime University, Sweden

University of Genoa, Italy

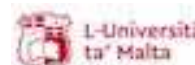University of Southampton, UK

Port Said University, Egypt

University of Strathclyde, UK

Egypt-Japan University of Science and Technology

Dalian Maritime University, China

University of Malta, Malta

Benha University, Egypt
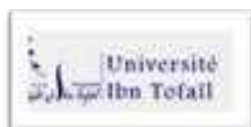
Ibn Tofail University, Morocco

University of Technology Malaysia-UTM, Malaysia

Technical University of Kenya (TUK), Kenya

Indian Maritime University, India

Damanhur University, Egypt

ETSIN Polytechnic University, Spain

Polytechnica University, Romania

University of the Eagan, Greece

University of Pisa, Italy

Pharos University, Egypt

The International University of Logistics and Transport, Poland

University of Maribor, Slovenia

Cairo University, Egypt

Alexandria University, Egypt

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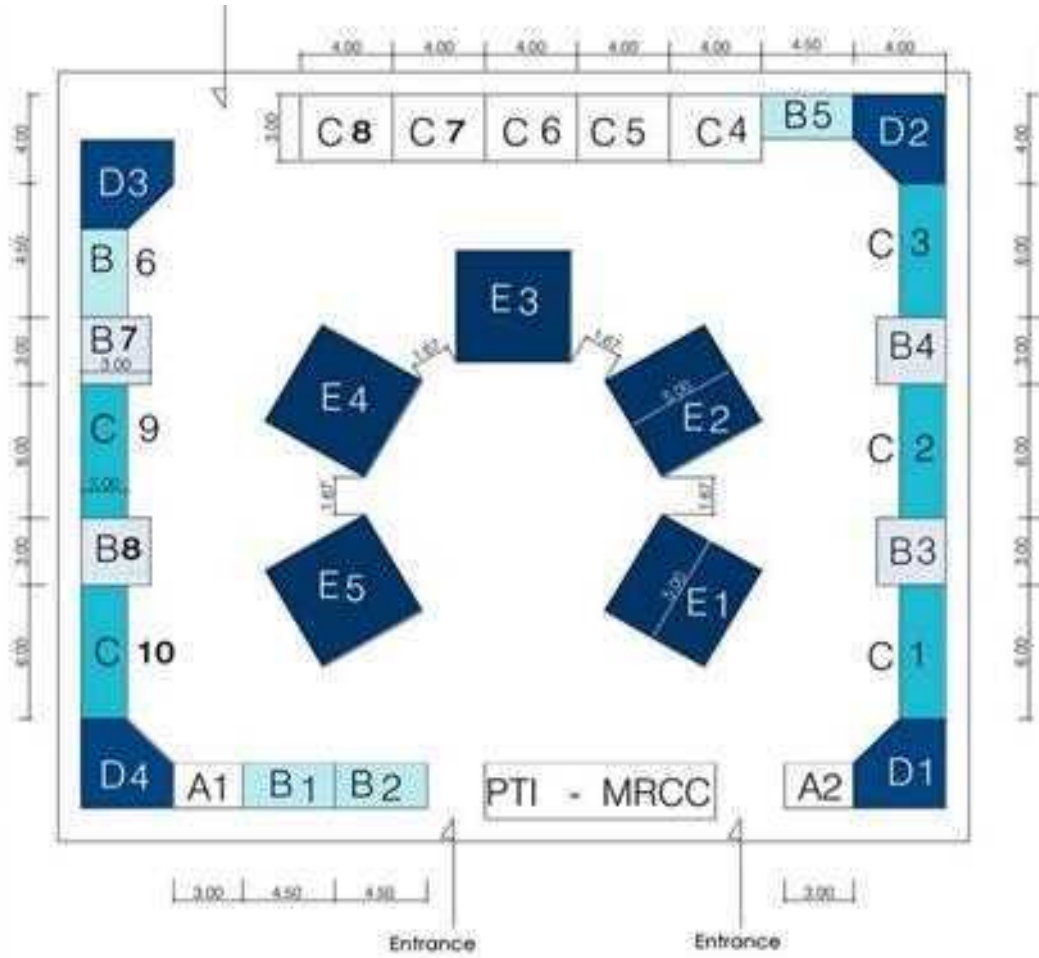
Ehibition Layout

IME 2024 Exhibitors

E1	Egyptian Group For Multipurpose Terminals	
E5	Misurata Free Zone	
D2	MEDports Association	
B1	Light Strong Fast, GEOCELL EGYPT	
E3	Damietta Container & Cargo Handling Co.	
B2	Landmark Marine	

IME 2024 Exhibitors

Suez Canal Authority (SCA)

B3   Suez Shipyard Co.

B4   CANAL ROPE CO.

C2   Timsah Shipbuilding Company

C3   Canal Harbor And Great Projects Co.

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IME 2024 Exhibitors

| B6 | International Marine Works (I.M.W) | |

| B8 | Integrated Solutions For Ports | |

| C1 | Port Said for Engineering Works & Naval Constructions Co. | |

| C9 | General Egyptian Warehouses | |

| D1 | Port Said Container & Cargo Handling Co. | |

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IME 2024 Exhibitors

Arab Academy for Science, Technology and Maritime Transport

C5   College of Engineering and Technology, AASTMT

C4   Port Training Institute, AASTMT

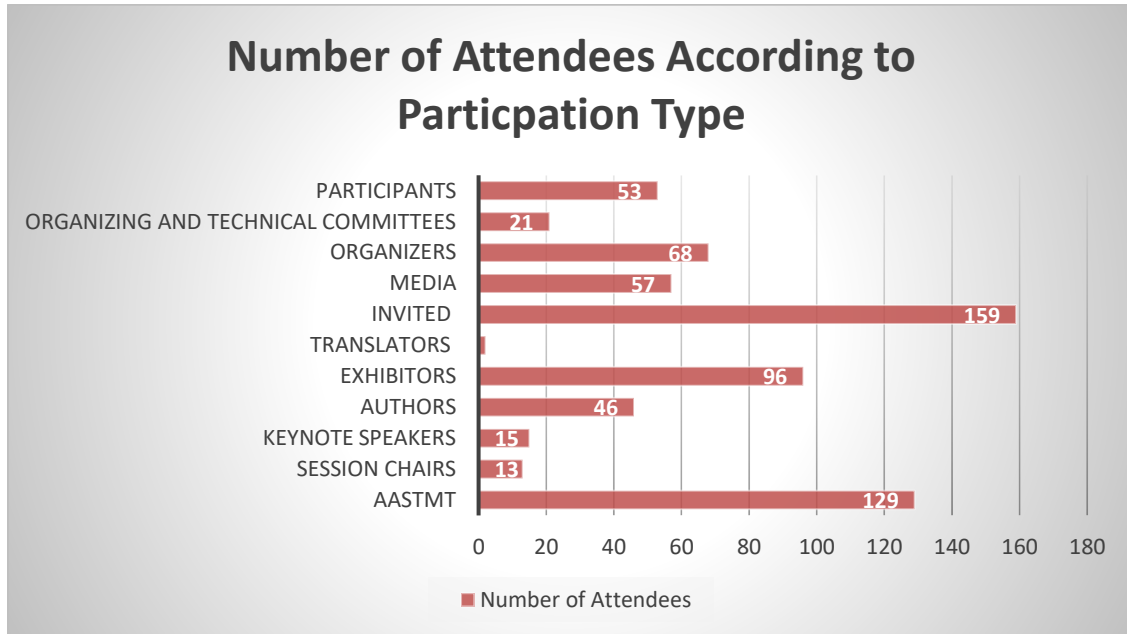A1   College of Maritime Transport and Technology, AASTMT

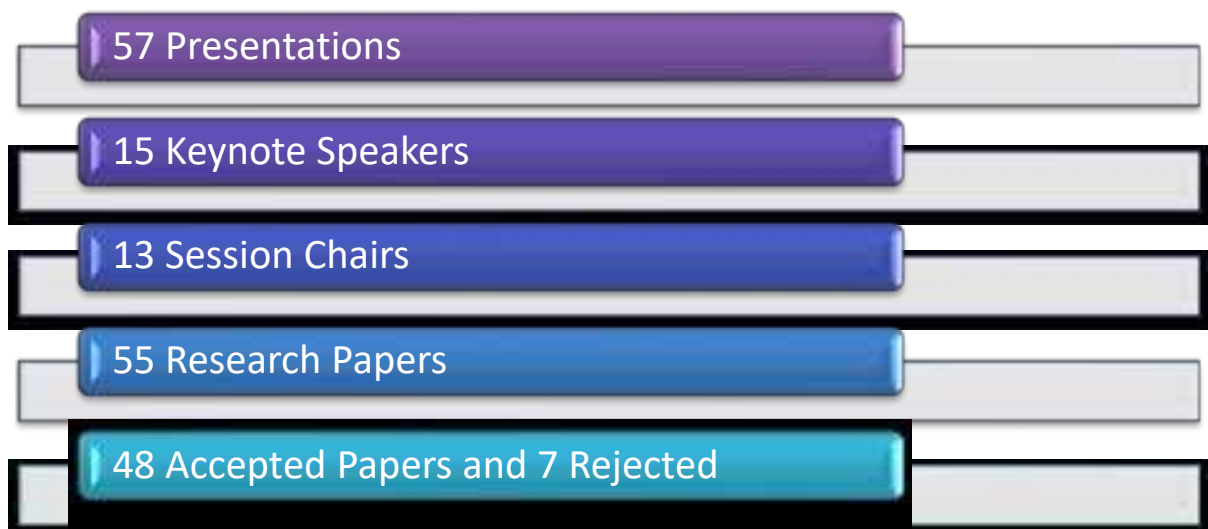D8   Integrated Simulators Complex, AASTMT

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Conference Statistics

Attendance

Number of Attendees According to Participation Type

Participation Type	Number of Attendees
PARTICIPANTS	53
ORGANIZING AND TECHNICAL COMMITTEES	21
ORGANIZERS	68
MEDIA	57
INVITED	159
TRANSLATORS	
EXHIBITORS	96
AUTHORS	46
KEYNOTE SPEAKERS	15
SESSION CHAIRS	13
AASTMT	129

■ Number of Attendees

Total number of Attendees is 729

Conference Program

57 Presentations

15 Keynote Speakers

13 Session Chairs

55 Research Papers

48 Accepted Papers and 7 Rejected

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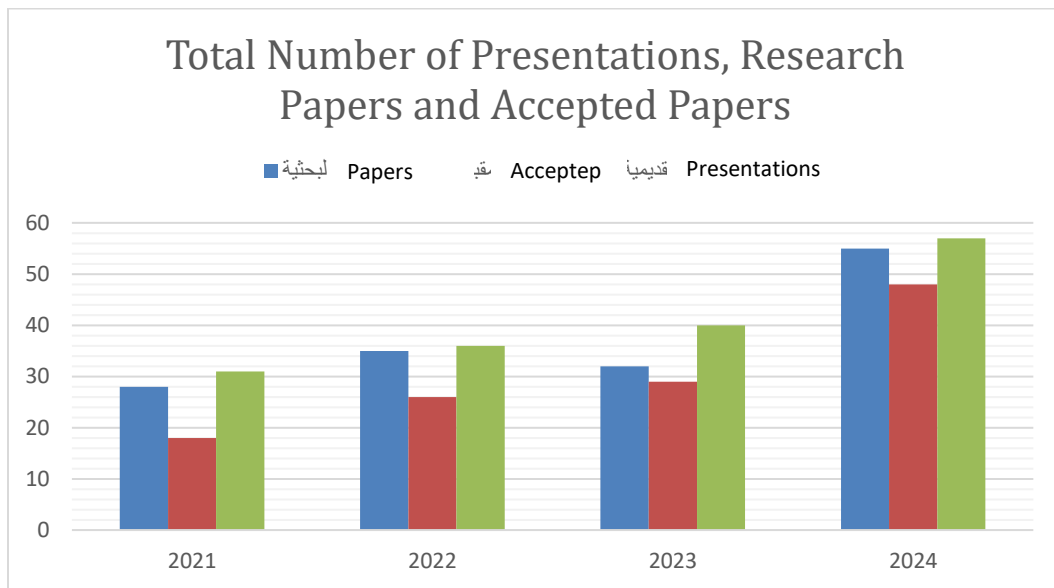Marlog

Conference Statistics

Universities' Participation Compared to Previous Years:
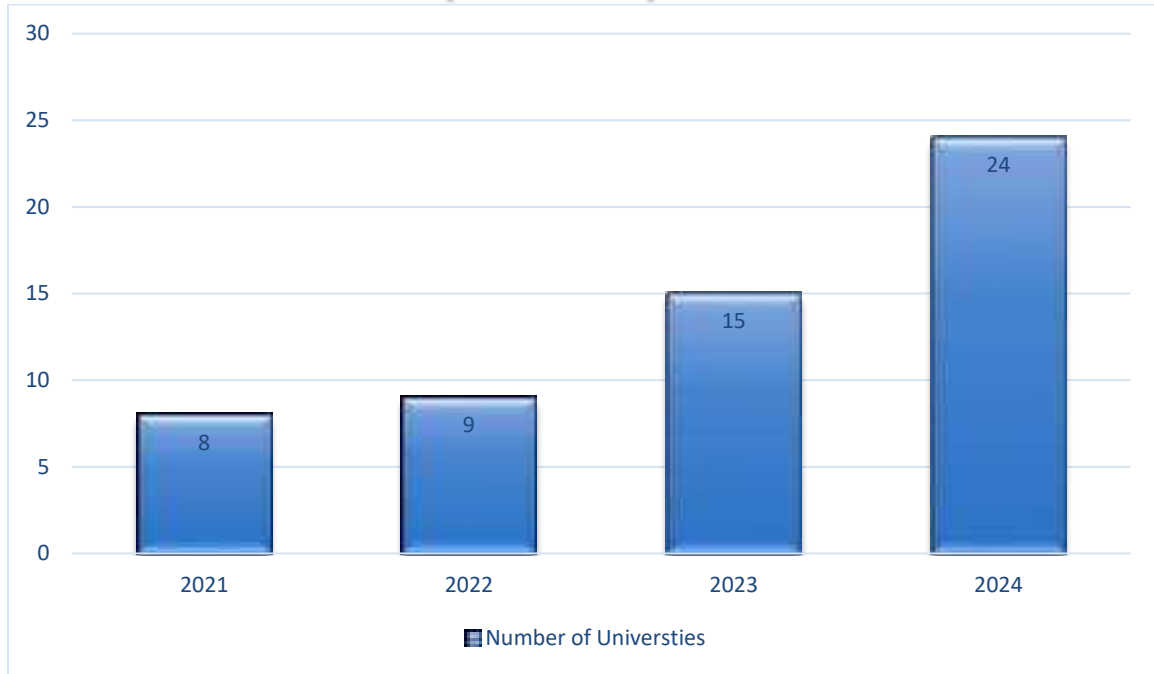
Total Number of Presentations, Research Papers, and Accepted Papers in the conference over the previous years:

Sessions Quick Index

The International Maritime Transport & Logistics Conference

MARLOG 13

Technical Program

03 – 05 March 2024

Sunday, 3rd March 2024

Session 1

Collaborative Strategies for Sustainable Resilient Ports

Prof. Yousry Elgamal

Chairman of IT Committee, National Council of Education, Culture, and Science
(UNESCO, ISESCO, ALECSO)
Former Minister of Education
Head, MARLOG Conference Technical Committee, AASTMT

13:00	**Green and Blue Economy across the Euro-Mediterranean Region** **Mr. Nasser Kamel** Secretary General, Union for the Mediterranean, Spain.
13:15	**Port and Waterway Infrastructure of the Future** **Eng. Francisco Esteban Lefler** President, The World Association for Waterborne Transport Infrastructure (PIANC), Brussels, Belgium.
13:30	**No Miracles Requested! How Ports Can Play an Effective Role in Decarbonizing International Trade Without Disrupting Excessively Our Everyday Lives** **Mr. Pino Musolino** President, MEDPorts Association President and CEO, North Central Tyrrhenian Sea Port Authority - Ports of Rome, Italy.
13:45	**Session Discussion**
14:00	**Break**

Session 2

Navigating the Blue Path: Leading the Way to Sustainable Development

Session Chair
Prof. Dana Corina Deselnicu
Director of the Doctoral School of Entrepreneurship, Business Engineering and Management, University POLITEHNICA of Bucharest, Romania

14:15	**Seaports' Contribution Towards Sustainable Development - Potentials and Challenges** **Prof. Burkhard Lemper** President of Global Shipping Think Tank Alliance (GSTTA), Shanghai, China. Managing Director, Institute of Shipping Economics and Logistics (ISL) Professor at the Bremen City University of Applied Sciences, Germany.
14:30	**Decarbonizing Ports: The Valencia Case** **Mr. Victor Collazos** Research and Development Manager, Valencia Port Foundation, Spain.
14:45	**Trends and Innovations in Sustainable Port Development and Supply Chains** **Mr. Stefan Cassimon** Director, Antwerp/Flanders Port Training Centre, Antwerp, Belgium.
15:00	**An Innovative Approach to Port Monitoring: Digital Twin, Strategic Decision Systems and Port Governance** **Dr. Francescalberto De Bari, Dr. Gianluca Dini, Dr. Giovanni Nardini, Dr. Francesco Papucci, Dr. Matteo Paroli, Dr. Manuela Scarsi, Dr. Ivano Toni, and Dr. Mohi-Eldin M. Elsayeh** Head, EU Programs, The North Tyrrhenian Sea Ports System Authority, Italy.
15:15	**Session Discussion**
15:30	**Lunch**

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Monday, 04th March 2024

Session 3 A

The Future of Green Ports: Resilience, Sustainability, and Adaptation

Session Chair

Prof. Hossam Moghazy

Former Minister of Water Resources and Irrigation, Egypt

09:00	**Key Challenges for the Sustainable Development of Ports and Ongoing Work by IAPH** **Dr. Antonis Michail** Technical Coordinator IAPH and WPSP, International Association of Ports and Harbors, Belgium.
09:15	**MEDPorts in the Era of Disruptions. How to Adapt to Uncertainty** **Mr. Jordi Torrent** MEDPorts Association Secretary General, Barcelona, Spain.
09:30	**Coping with Shocks, Disruptions, and Changing Conditions by Promoting Sustainable, Climate-Resilient and Resilient Port Infrastructure.** **Eng. Francesc Carbonell** Head, Transport and Development Sector, Union for the Mediterranean, Spain.
09:45	**Assessment of Renewable Energy Supply for Shore Side Electricity in Green Ports** **Eng. Miral Michel, Prof. Akram Soliman, and Dr. Ahmed S. Shehata** Professor of Port Planning and Coastal Engineering, Dean, College of Engineering and Technology, AASTMT.
10:00	**Session Discussion**
10:30	**Coffee Break**

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Session 3 B

Sustainable Maritime Operations:

Optimizing Performance Through Technology (1)

Session Chair
Prof. Ahmed Amin
Professor, Civil Engineering Department, Suez Canal University

09:00	**Optimizing Marine Diesel Engine Maintenance: A Proactive Cost-Efficiency Strategy** **Eng. Miral Armanious, Eng. Omar M. Alkholy, Eng. Omar K. Mahdy, Eng. Kareem M. Yousef, Eng. Mohamed N. Abdalazeem, Eng. Omar M. Mowafy and Dr. Ahmed S. Shehata** Marine and Offshoring Department, College of Engineering and Technology, AASTMT, Alexandria, Egypt.
09:15	**Assessment of Ship Fouling Formation, Prevention and Environmental Impact** **Dr. Fawzy Dekinesh and Dr. Mona Kaamoush** Head, Natural Gas and Petrochemical Dep., Integrated Simulator Complex, AASTMT, Alexandria, Egypt.
09:30	**2D Model for Trim Optimization of Tugboat During Bollard Pull** **Mr. Emad Mostafa, Dr. Ahmed S. Shehata, Dr. Ahmed Mehanna and Dr. Elsayed Hegazy** Assistant General Manager (Projects) Petroleum Marine Services, Egypt.
09:45	**Efficient Industrial Wastewater Recycling with IOT** **Dr. Yehia M. Youssef, Dr. Mohamed K. Hassan and Dr. Moamen A. Morsi** Chemical and Petrochemical Engineering Department, College of Engineering and Technology, AASTMT, Alexandria, Egypt
10:00	**The Role of Applying Advanced Cargo Information System on Improving the Performance of Alexandria Port** **Mr. Karim Ashraf Abdelkarim, Dr. Ahmed Ismail Ahmed Hafez, and Mr. Ashraf Ali Abdo Qardash.** Institutional Research Department, AASTMT, Egypt.
10:15	**Session Discussion**
10:30	**Coffee Break**

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Session 4 A

Inland Waterway Connections for Greener Canals and Rivers Sustainability

Session Chair

Prof. Khaled Elsakty
**Dean, College of International Transport & Logistics,
AASTMT, Cairo**

11:00	**Navigating Green: The Impact of IMO's Environmental Policies on Global Shipping and the Suez Canal.** **Mr. Ahmed Hussein Selim and Prof. Adla Ragab** Economic Researcher, Department of Economics, Faculty of Economics and Political Science - Cairo University, Egypt.
11:15	**Analyzing the Impacts of a Suez Canal Logistics Hub on the Global Shipping Industry: A Case Study of the Steel Sector** **Mr. Omar Mokhtar and Dr. Khaled El Sakty** College of International Transport and Logistics, AASTMT, Cairo, Egypt.
11:30	**The Efficiency of River Port Logistics and Its Role in Improving Inland Water Transport Operations in Egypt** **Dr. Dalia Hosni Eldeasty,** Mr. Mostafa Mohamed Saber, Mr. Omar Mostafa Mohamed Ahmed and Mr. Ahmed Mohamed Omar Ibrahim Port Training Institute, Port Said Branch, AASTMT.
11:45	**Improving the River Nile Sustainability through Recycling Retrieved Plastic Waste** **Dr. Mohamed K. Hassan,** Dr. Yehia M. Youssef and Dr. Ahmed A. Ghoneim Professor, Industrial and Management Engineering, College of Engineering and Technology, AASTMT, Alexandria, Egypt.
12:00	**Session Discussion**
12:30	**Break**

Session 4 B

Smart, Green, Blue Infrastructure – Case Studies and Best Practices

Session Chair
Eng. Francisco Esteban Lefler
President, The World Association for Waterborne Transport Infrastructure
(PIANC), Brussels, Belgium

11:00	**The Role of Improving the Infrastructure of Multimodal Transport to Enhance the Efficiency of Seaports Using Interpretive Structural Modeling. (Case Study Damietta port)** <u>Mr. Islam Abdallah,</u> Dr. Ahmed Ismail, Mr. Ahmed Mansour, Mr. Ahmed Mohamed Omar and Dr. Ahmed Mostafa Dr. Mahmoud Yassine Lecturer at College of International Transport and Logistics, Egypt.
11:15	**Energy Management Optimization Based on Facilities Layout Planning for Port Construction: Mediterranean Region Case Study** <u>Eng. Alaa Mamdouh,</u> Dr. Elbadr Osman, Prof. Akram Soliman Elselmy and Dr. Ahmed. S. Shehata Construction and Building Engineering Department, College of Engineering and Technology, AASTMT, Alexandria, Egypt.
11:30	**Medicanes and its Metrological Effects in the Mediterranean Sea: Case Study of Medicane Ianos** <u>Eng. Mohamed Abouelnasr</u> and Prof. Akram Soliman Elselmy M.Eng Student, College of Engineering and Technology, Alexandria, AASTMT. Senior Coastal Engineer, NEOM.
11:45	**Effect of Human Interventions on Hydro-dynamics of Sidi-Abdel Rahman Bay "North Western Coast of Egypt"** <u>Eng. Nada Moghazy,</u> Prof. Akram Soliman and Prof, Maysara Eltahan Teaching Assistant, Construction Engineering and Management Department, Pharos University, Alexandria, Egypt.
12:00	**Optimization of Retrofitting an Anchored Sheet Pile Quay Wall Using Separated Relieving Platform** <u>Eng. Mahmoud Roushdy,</u> Dr. Mohamed Elnaggar and Dr. Ahmed Abdelaziz Marine Engineer, Hill International, North Africa
12:15	**Session Discussion**
12:30	**Break**

Session 5 A

Emerging Technologies and Strategies in Maritime industry – The Gateway to Optimization and Sustainability

Session Chair
Mr. Pino Musolino
President of MEDPorts Association
President and CEO of North Central Tyrrhenian Sea Port Authority, Ports of Rome, Italy

13:00	**Discrete Event Simulation of Truck Appointment Systems in Container Terminals: A Dual Transactions Approach** Dr. Davies Bett, **Dr. Islam Ali, Dr. Mohamed Gheith and Prof. Amr Eltawil** **Egypt - Japan University of Science and Technology, Egypt.**
13:15	**Ncos Online and The Future of Port Operations: Insights from the Digital Integration at the Port of Hamburg, Germany** Dr. Hisham Elsafti, **Dr. Stefan Leschka, Dr. Prema Bhautoo and Dr. Christian Heitmann** Senior Consultant Ports & Terminals in Europe and the Middle East DHI WASY GmbH, DHI Group Bremen, Germany.
13:30	**Predictive Simulation of Onshore Power Supply (OPS) Requirements for Ports** Mr. Raul Redondo, **Mr. Raul Atienza, Ms. Jose Ramon Iribarren, Mr. Arturo Medio and Mr. Luis Ulla.** Director, Maneuvering and Nautical Studies Area, Siport21, Spain.
13:45	**Experimental Assessment to Reduce Emission of Compression Ignition Engine Via Diesel/Biodiesel/Water Blends.** Dr. Loay M. Aboud, **Dr. A.H Abdelbaky Elbatran, Dr. Adel A. Tawfik and Dr. A. E. Elwardany** Senior Maritime Lecture, Marine Engineering Department, Maritime Transport and Technology College, AASTMT, Alexandria, Egypt.
14:00	**Session Discussion**
14:30	**Lunch**

Session 5 B

Modern Strategies for Green Blue Infrastructure Project Management
Session Chair
Mr. Jordi Torrent
MEDPorts Association Secretary General, Barcelona, Spain.

13:00	**Securing the Maritime Industry** **Dr. Mohamed Abdel Fattah** Regional Subject Matter Expert- OT- Fortinet.
13:15	**Measuring Green Port Management as Determinant of Port Attractiveness and Competitiveness** **Dr. Abdelhamid Adarrab and Prof. Mohamed Mamad** Laboratory of Economics and Management of Organizations, Ibn Tofail University, Kénitra, Morocco.
13:30	**Comparative Analysis of Port Governance Models for Green Energy Transition** **Capt. Ahmed M. Ismail, Capt. Mahmoud M. Attia and Capt. Anas S. Alamoush** Opito Program Training Manager, Egypt.
13:45	**A Bibliometric Analysis of Maritime HR Competitiveness Research** **Ms. Nirmeen Elsayed, Mr. Mahmoud Hamza, Mr. Muhammad A. Arfee, Mr. Ahmed Omar and Mr. Ahmed Atef** Lecturer at College of International Transport and Logistics, AASTMT, Aswan, Egypt.
14:00	**Investigating the Impact of Maritime Trade New Trends on The Egyptian Maritime Performance** **Prof. Sahar Elbarky, Dr. Hebatallah Mohamed Elmesmary, Dr. Sarah El Gamal, and Eng. Marwa Mahfouz** Head, Website Electronic News Department, Information and Documentation Center (IDC), AASTMT, Egypt.
14:15	**Session Discussion**
14:30	**Lunch**

Tuesday, 05th March 2024

Session 6 A

Sustainable Maritime Operations:
Optimizing Performance Through Technology (2)

Session Chair
Prof. Aziz Ezzat
President's Advisor of Education Affairs,
Professor of Industrial and Management Engineering, AASTMT

09:00	**The Future of Ports: To be More Efficient, Smart and Resilient** **Dr. Zhao Nan** Deputy Secretary-General of Shanghai International Shipping Institute, China
09:15	**Elevating Wind Energy Harvesting with J-shaped Blades: A CFD-driven Analysis of H-Darrieus Vertical Axis Wind Turbines** **Eng. Ahmed Abdallah,** Dr. Micheal A. William and Dr. Iham F. Zidane Utilities and Energy Section Head, Veterinary Investment Group Pharmaceuticals M.sc Candidate, College of Engineering and Technology, AASTMT, Smart Village Campus, Egypt.
09:30	**Recovery Braking in Electrified Boats Using Dual Active Bridge Dc-Dc Converter with Ultracapacitor** **Prof. Mostafa Hamad**, Eng. Ibrahim Gaber and Dr. Ayman Abdel-Khalik Director, Research and Innovation Center. Professor, Electrical and Control Eng. Deptartment, College of Engineering and Technology, AASTMT, Alamein, Egypt.
09:45	**The Impact of Differences Between Tide Guage and RTK Tide Data on Dredging Calculations in Hydrographic Survey** **Mr. Ahmed Ghareeb**, Dr. Eman Hamdan, and Dr. Ahmed Magdy Chief Surveyor at National Marine Dredging Company (NMDC).
10:00	**Numerical Analysis of Enhancing Water-drop Fairing Design to Mitigate Vortex-induced Vibrations by Applying Angular Slot** **Eng. Michael Adel Shafik**, Eng. Mina G. Mourad, Eng. Osama E. Abdellatif and Dr. Ahmed S. Shehata College of Engineering and Technology, AASTMT, Smart Village Campus, Egypt.
10:15	**Session Discussion**
10:30	**Coffee Break**

Session 6 B

Sustainable Maritime Development Through Technological Innovation

Session Chair

Dr. Elsenousy Balbaa
Vice President for Maritime Affairs, AASTMT

09:00	**Digitalization Journey towards a Green and Smart Port** **Mr. Chan Fook Seng** Senior Director, CrimsonLogic Pte Ltd, Singapore.
09:15	**Artificial Intelligence and Geospatial Technologies for Sustainable Maritime Logistics** **Dr. Alexandra Ioanid** and Eng. Nistor Andrei Associate Professor, University POLITEHNICA of Bucharest, Romania.
09:30	**Greening Maritime Energy: A Sustainable Approach to Hydropower Generation Through Mathematical Modelling in Graving Dock Flooding** **Eng. Miral Armanious, Eng. Omar K. Mahdy, Eng. Omar M. Alkholy, Eng. Kareem M. Yousef, Eng. Yousef M. Shaban, Eng. Amir M. Abu Bakr and Dr. Ahmed S. Shehata** Marine and Offshore Engineering Department, College of Engineering and Technology, AASTMT, Alexandria, Egypt.
09:45	**Data and Model Dual Driven Approach Optimizing Appointment Quota of External Container Truck** **Dr. Cuijie Diao, Dr. Huiyun Yang and Dr. Zhihong Jin** Professor, College of Transportation Engineering, Dalian Maritime University, China.
10:00	**Simulation-Optimization Model in Managing the Empty Container Movements Problem Through Repositioning Strategies** **Prof. Tomaž Kramberger and Dr. Alaa Abdelshafie** Vice Dean, Faculty of Logistics, University of Maribor, Slovenia.
10:15	**Session Discussion**
10:30	**Coffee Break**

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Session 7 A

Sustainable Logistics: Leveraging Innovation to Improve Quality, Efficiency, and Environmental Impact

Session Chair

Dr. Dong Yang
Associate Head of the Department of Logistics and Maritime Studies, The Hong Kong Polytechnic University, Hong Kong SAR, China

11:00	**Stability Analysis of Maritime Logistics Alliance Based on Blockchain** **Prof. Lixin Shen,** Dr. Jinglin Lin, Dr. Yanan Wang, and Dr. Xueqi Qian Vice Dean, School of Maritime Economics and Management, Dalian Maritime University, China.
11:15	**Logistics Cooperation in the Far-East: Prioritizing Supply Chain Requirements to Strengthen Intra-Regional Integration of Maritime Transport Networks** **Dr. Enrico D'Agostini,** Prof. Dana Corina Deselnicu, Prof. Frank Bezzina and Dr. Antonietta Rosiello Senior Lecturer in Logistics - Department of Business & Enterprise Management, University of Malta, Malta
11:30	**Improving the Quality of Services in a Logistic Company Using the Pareto Analysis** **Prof. Dana Corina Deselnicu and** Dr. Sandra Hamy Haddad Director of the Doctoral School of Entrepreneurship, Business Engineering and Management, University Politehnica of Bucharest, Romania.
11:45	**Logistics Performance as Facilitator to Trade Performance: An Indian Perspective** **Dr. Mrinal Kumar Dasgupta,** Dr. Toorban Mitra, and Dr. Krushna Mohan Pattanaik Assistant Professor, Indian Maritime University, Kolkata Campus, India.
12:00	**Achieving Sustainable Development in Logistics: A Path to Environmental and Economic Efficiency** **Dr. Karolina Wnuk and** Prof. Stanisław Ślusarczyk Logistics and Transport Department, The International University of Logistics and Transport in Wroclaw, Wroclaw, Poland.
12:15	**Session Discussion**
12:30	**Break**

Session 7 B

Embracing Innovation: Ship Design and Operation

Session Chair
Dr. Mohi El Din Mohamed El Sayeh
Dean, College of Maritime Transport and Technology, AASTMT

11:00	**A Novel Dynamical Route Optimization Method to Improve Ship's Voyage Time Regarding Involuntary Speed Reduction: Time Boundary Semicircles** **Mr. Ahmad A. Moussa**, Mr. Amman A. Ali, Dr. Ahmed S. Shehata and Dr. Mohi El Din Sayeh Institute of Maritime of Upgrading Studies, AASTMT.
11:15	**Autonomous Ships in Confined Areas** **Dr. Thibaut Van Zwijnsvoorde** PhD, Civil Engineer, Nautical Researcher at Flanders Hydraulics Research, Belgium.
11:30	**Incorporating Green Ship Recycling Regulations into the Early Design Stage of Ships** **Eng. Walid Bahgat**, Dr. El-Sayed Hegazy, Dr. Heba S. El-Kilani, Dr. Amman Ali and Dr. Mostafa M. Mostafa Second Lecturer, Institute of Maritime Upgrading Studies, AASTMT, Egypt.
11:45	**Analyzing the Impact of Various Geometries on the Operability of Crew Transfer Vessels** **Dr. Tahsin Tezdogan** and Dr. Liam Barbour Associate Professor in Maritime Engineering, Maritime Engineering Research Group Department of Civil, Maritime, and Environmental Engineering, University of Southampton United Kingdom.
12:00	**Session Discussion**
12:30	**Break**

Session 8

Optimizing Maritime Operations Through AI and Technology

Session Chair
Prof. Maximo Q. Mejia
President, World Maritime University (WMU), Malmö, Sweden

13:00	**Integrating Artificial Intelligence and Geospatial Technologies for Supply Chain Optimization** **Mr. Nistor Andrei, and Prof. Cezar Scarlat** Doctoral School of Entrepreneurship, Business Engineering & Management, National University for Science and Technology POLITEHNICA Bucharest, Bucharest, Romania.
13:15	**A Real-Time Port Performance Monitoring System and its Application** **Dr. Dong Yang** Associate Professor and Associate Head of the Department of Logistics and Maritime Studies, The Hong Kong Polytechnic University, Hong Kong SAR, China.
13:30	**Development of a Proactive Maintenance Plan for Failure Identification in Ship Engine System** **Eng. Miral Armanious, Dr. Ahmed Mehanna, Dr. Sherine Nagy, and Dr. Ahmed S. Shehata** Marine and Offshore Engineering Department, College of Engineering and Technology, AASTMT, Alexandria, Egypt.
13:45	**Pilot-Assisted Underwater Acoustic Channel Estimation for MIMO OFDM Systems Using Sparse Bayesian Learning Algorithm** **Ms. Asmaa Yahia and Dr. Eman Hamdan** Associate Professor, Electrical Engineering, Vice Dean, Postgraduate Studies and Scientific Research, College of Maritime Transport and Technology AASTMT, Alexandria, Egypt.
14:00	**Session Discussion**
14:20	**Break**

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Session 1

Collaborative Strategies for Sustainable Resilient Ports

GREEN AND BLUE ECONOMY ACROSS THE EURO-MEDITERRANEAN REGION

Mr. Nasser Kamel

Secretary General, Union for the Mediterranean, Spain

Keywords: Blue Economy, Sustainability, Economic Growth.

ABSTRACT: Sustainable Blue Economy is at the heart of the world's climate and economic agenda and is undisputedly a sector of the upmost importance not only for the rational and sustainable use of ocean resources but very much also for the economic growth of the Mediterranean region ensuring better livelihoods and job creation. With this goal in mind the Union for the Mediterranean (UfM) promoted last June a Blue Finance Conference that brought together financial institutions, banks (multilateral and national), private investors, UfM Member States and industry representatives to exchange information on funding, discuss criteria and viability of projects and initiatives which may help attract investments in the Blue economy sectors. More recently, at the COP28 in Dubai, the UfM was one of the signatories of the Blue Mediterranean Partnership, and today, this new multi-donor and multi-IFI Partnership, has been set up to leverage Sustainable Blue Economy investments in the region. Partners aim to mobilise at least €1 billion in investments.

PORT AND WATERWAY INFRASTRUCTURE OF THE FUTURE

Eng. Francisco Esteban Lefler

President of the World Association for Waterborne Transport – PIANC, Belgium

Keywords: Infrastructure, Waterways, Green Logistics.

ABSTRACT: Infrastructure is the physical support of Port Operation. Determines Port capacity and connectivity, both maritime and landwards. The leading role of the Ports and Waterways in the future of green logistics and in the Blue Economy demands a digital and smart infrastructure, connected.

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HOW PORTS CAN PLAY AN EFFECTIVE ROLE IN DECARBONIZING INTERNATIONAL TRADE WITHOUT DISRUPTING EXCESSIVELY OUR EVERYDAY LIVES

Mr. Pino Musolino

President of MEDPorts Association, President of the Port Authority of the Central-Northern Tyrrhenian Sea (ports of Civitavecchia, Fiumicino, and Gaeta)

Keywords: Decarbonization, Ports, Technology, environment.

ABSTRACT: Is the situation really as bad as it seems? Are we already beyond the point of no return? Some several technologies and options can still be adopted if timely enforced and coordinated. And there is ample margin for incremental improvements. Indeed, transitioning toward decarbonisation will be costly. It will take time, but there are many opportunities to be taken and with the right mindset and concerted efforts, a lot can be done and some partial results can be achieved in the short-to-mid-term.

Session 2

Navigating the Blue Path: Leading the Way to Sustainable Development

SEAPORTS' CONTRIBUTION TOWARDS SUSTAINABLE DEVELOPMENT: POTENTIALS AND CHALLENGES

Prof. Burkhard Lemper

President of Global Shipping Think Tank Alliance (GSTTA), Shanghai, China. Managing Director, Institute of Shipping Economics and Logistics (ISL). Professor at the Bremen City University of Applied Sciences, Germany

Keywords: Sustainable Development, Supply Chains, Regulations, Management.

ABSTRACT: Concerning the central role that ports play in global supply chains and thus for the respective national economies, they must not only adapt to this change towards a more sustainable way of doing business but can and must also play a decisive role in shaping it. Due to their central position within maritime transport chains, seaports contribute to sustainable development in various ways. At the same time, ports can benefit from the associated potential by actively shaping this role. To achieve this, port administrations have various options at their disposal. In addition to implementing regulations and standards, port administrations can influence sustainable development through incentive systems, fees and market-based measures.

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DECARBONIZING PORTS: THE VALENCIA CASE

Mr. Victor Collazos

Research and Development Manager, Valencia Port Foundation, Spain

Keywords: OPS, Fuels, Decarbonization.

ABSTRACT: The presentation discusses the following points:

1) **New Fuels: Flagship Projects:**

   - H2 Ports

   - Safety of Ammonia as Fuel: The Use Case of Spain

   - Sagunto: From LNG to Ammonia

2) **The Port Electrification:**

   - On Shore Power Supply - OPS

   - Hypobatt (Supercharger), AENEAS, Bluebarge (Super Batteries).

TRENDS AND INNOVATIONS IN SUSTAINABLE PORT DEVELOPMENT AND SUPPLY CHAINS

Mr. Stefan Cassimon

Director, Antwerp/Flanders Port Training Centre, Antwerp, Belgium

Keywords: Innovation, Renewable Energy, Port Operations.

ABSTRACT: This presentation will explore the latest trends and innovations that will shape sustainable port development and supply chains. Focusing on the intersection of environmental responsibility and operational efficiency, we will look into the key advancements driving positive change in the maritime industry. From green infrastructure initiatives to digitalization and renewable energy adoption, this session will provide insights into how ports are evolving to meet the demands of a rapidly changing world. By presenting current best practices and future projections from the Port of Antwerp-Bruges and other international ports, attendees will gain a comprehensive understanding of the strategies and technologies driving sustainable development in port operations and global logistics.

An innovative approach to Port Monitoring: digital twin, strategic decision systems and port governance

Francescalberto De Bari [(1)]**, Gianluca Dini** [(2, 3)]**, Giovanni Nardini** [(2, 3)]**, Francesco Papucci** [(1)]**, Matteo Paroli** [(1)]**, Manuela Scarsi** [(1)]**, Ivano Toni** [(1)]**, Mohi-Eldin M. Elsayeh** [(4)]

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(4) *College of Maritime Transport & Technology (CMTT), Arab Academy for Science, Technology & Maritime Transport (AAST&MT), Alexandria, Egypt*

ABSTRACT

This paper presents an innovative approach to port monitoring systems and highlights the transformative potential of digital twin technology in the dynamic and complex port environment.

To enable a seaport digital twin it is necessary to leverage a "decoupled layers architecture" for port monitoring, emphasizing the importance of an open, scalable, and standard digital architecture. The architecture comprises "on-field components," "communication and connectivity networks" utilizing 5G and Edge Computing, and a "data lake approach" employing a standard microservice architecture.

A significant focus is placed on cybersecurity issues arising from the seaport digital twin, emphasizing the importance of collaborative efforts and regulatory measures. Digital twins are also presented as a tool for simulation and training, allowing the optimization of cybersecurity strategies, especially in the context of IoT-based systems.

The paper concludes by outlining specific functions of digital twins in enhancing innovative port governance, including port development and planning, predictive infrastructure maintenance, environmental monitoring, real-time asset monitoring, security modeling, and operational optimization of port equipment. The proposed "decoupled" approach and the integration of artificial intelligence highlight the potential of digital twins for dynamic and predictive decision-making in seaport management.

Session 3 A

The Future of Green Ports: Resilience, Sustainability, and Adaptation

KEY CHALLENGES FOR THE SUSTAINABLE DEVELOPMENT OF PORTS AND ONGOING WORK BY IAPH

Dr. Antonis Michail

Technical Coordinator IAPH and WPSP, International Association of Ports and Harbors, Belgium

Keywords: IAPH, WPSP, Digitalization, Energy, Resilience.

ABSTRACT: The presentation presents an overview of the key focus/priority areas of the International Association for Ports and Harbours IAPH:

- Climate and Energy,
- Digitalization,
- Risk and Resilience.

While highlighting ongoing IAPH and World Ports Sustainability Program (WPSP) work.

MEDPORTS IN THE ERA OF DISRUPTIONS. HOW TO ADAPT TO UNCERTAINTY

Mr. Jordi Torrent

MEDPorts Association Secretary General, Barcelona, Spain

Keywords: Ports, Supply Chains, MEDPorts.

ABSTRACT: The last five years supply chains and ports have experienced more disruptions than probably in the previous 30. Is this the new normality? How can ports that need to plan ahead normally in terms of decades work in such an environment? Are there opportunities for Mediterranean ports in this new era?

COPING WITH SHOCKS, DISRUPTIONS AND CHANGING CONDITIONS BY PROMOTING SUSTAINABLE, CLIMATE-RESILIENT AND RESILIENT PORT INFRASTRUCTURE

Eng. Francesc Carbonell

Head, Transport and Development Sector, Union for the Mediterranean, Spain

Keywords: Ports, Shipping, Governments, Policies, Infrastructure.

ABSTRACT: Ports and shipping are pivotal in transport system connectivity, given their global economic reach. They ensure the flow of essential supplies during conflicts and emergencies and also serve as critical components of humanitarian relief efforts. Their resilience and adaptability are vital for global security and stability, addressing longer-term sustainability goals. Sustainable resilient and adaptable infrastructure to face shocks and disruption impacting ports is thus essential. At the same time, ensuring that port infrastructure contributes to a net zero transition remains critical. In this context, a collaborative effort involving governments, multilateral banks, international organisations, businesses, and communities worldwide is required to build more resilient port infrastructure and, in some cases, to rebuild infrastructure impacted by natural disasters and geopolitical conflicts and restore global connectivity. Additionally, innovative policies that can help leverage the development of infrastructure that focuses on resilience and adaptation and are aligned with environmental and societal needs need to be put in place. The private sector should also engage with governments in delivering infrastructure projects that prioritise sustainability by integrating renewable energy sources, energy-efficient systems, and low-carbon technologies.

ASSESSMENT OF RENEWABLE ENERGY SUPPLY FOR SHORE SIDE ELECTRICITY IN GREEN PORTS

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Keywords: Green Port, Renewable Energy, Experimental Prototype, Energy Management, Wind Energy, Solar Energy.

ABSTRACT: Nations' economies have become considerably dependent on ports. Because of the concentration of harmful levels of pollution in and around ports, many countries started to take on the green port approach worldwide, which lowers the impact of ports and their operation on the environment given the wide interest in adapting renewable energy sources in ports for their electricity demands. Because the port is located inside the city borders of Alexandria, Egypt, there is noise, traffic, and air pollution. Based on the proposed "Green Port" development project, this study offers a plan to convert seaports into ecologically friendly ports. To determine how effective shoreside electricity is at reducing emissions, this paper estimates the percentage of pollution emitted by ships in the form of particulate matter and CO_2. This pollution could be reduced by using a hybrid renewable energy system that connects to the grid and has wind turbines and photovoltaic cells to power berthed ships. The process will be simulated using the energy management system and an experimental model of a solar-wind hybrid power system to demonstrate that wind turbines and photovoltaic solar energy can be sufficient to meet all the ships' energy needs in the port of Alexandria. The simulation's results, combined with data from an experimental prototype, demonstrate the economic viability of the integrated renewable energy system in the port of Alexandria. The simulation's small-scale components sufficiently provided a continuous power rating of roughly 51% of each one-megawatt load.

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Session 3B

Sustainable Maritime Operations:
Optimizing Performance Through Technology (1)

OPTIMIZING MARINE DIESEL ENGINE MAINTENANCE: A PROACTIVE COST-EFFICIENCY STRATEGY

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Keywords: Proactive Maintenance, Cost Reduction, Marine Diesel Engines, Mathematical Model, Optimization.

ABSTRACT: The world is currently working towards applying proactive maintenance, as it leads to reducing operating costs over time. As the previous studies didn't analyse the cost advantage of applicate proactive maintenance techniques compared to other maintenance approaches in the maritime industry. The aim of this paper is to show the benefits of using proactive maintenance on marine diesel engines which are highlighted by a reduction in maintenance costs. A mathematical model has been created to show the cost reduction of using proactive maintenance in comparison to other maintenance types depending on downtime cost, spare parts cost, and services cost. The results show the benefits of using proactive approaches to reduce maintenance costs with an average of $2815.22 compared to predictive maintenance.

ASSESSMENT OF SHIP FOULING: FORMATION, PREVENTION AND ENVIRONMENTAL IMPACTS

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ABSTRACT: This research investigates The effects of biofouling on fuel consumption and environmental impact. The influence of biofouling on the ship's hull from both an environmental and economic standpoint, as well as the requirement for new, cutting-edge antifouling technologies to meet future demand. The study reveals the various types of anti-fouling paints under the two main mechanisms self-polishing copolymers (SPCs) and fouling release coatings (FRCs) that were developed following the 2001 Tributyltin (TBT) ban. These mechanisms increased pressure on paint manufacturers to create an effective substitute for TBT-based paint as well as on shipping companies to find the most effective anti-fouling systems. Through Strength Weaknesses Opportunities Threats (SWOT) analysis, the study presents a methodology to help shipping companies choose the most effective anti-fouling system among several options. The outcome reveals the strengths and weaknesses of the potential anti-fouling systems.

2D MODEL FOR TRIM OPTIMIZATION OF TUGBOAT DURING BOLLARD PULL

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Keywords: Trim Optimization, Bollard Pull, Tugboat, Alexandria.

ABSTRACT: Trim optimization is one of the finest strategies to reduce fuel consumption. The trim merely has to be modified for changes in ballast or weight distribution and even both together. To ascertain how bollard pull forces affect trim optimization, which needs to be checked and considered, the study employ a tug hull model in its numerical simulation. However, high angles with tensions significantly change the trim angle, so tug trim needs to be adjusted to obtain the appropriate different trim measurements are used in the forward and stern to get the optimum trim.

Nonetheless, the study aims to demonstrate the significant impact of bollard pull angles since bollard

effects are noted when a combination of high tension and angle alters the trim and correction required in the selection the appropriate trim optimization.

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EFFICIENT INDUSTRIAL WASTEWATER RECYCLING WITH IOT

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ABSTRACT: Water treatment is essential for preventing water crises and ensuring water quality for different purposes. Parameters like pH, TDS, and turbidity are used to measure water quality, which varies based on the source of wastewater. Industrial wastewater is typically highly polluted. This paper proposes a smart water quality management system using IoT sensors to monitor parameters in a treatment plant. It focuses on treating detergent production line wastewater, adhering to environmental standards. The system's outputs have applications in water reuse, firefighting, and ornamental plant agriculture. The system is programmed using Arduino coding software, displaying sensor data on a computer with Realterm software. Overall, this study presents an integrated approach to efficient water treatment and quality management.

THE ROLE OF APPLYING ADVANCED CARGO INFORMATION SYSTEM ON IMPROVING THE PERFORMANCE OF ALEXANDRIA PORT

Mr. Karim Ashraf Abdelkarim (1) **, Dr. Ahmed Ismail Ahmed Hafez** (2) **and Mr. Ashraf Ali Abdo Qardash**(3).

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ABSTRACT: Digital transformation in ports enhances efficiency, reduces congestion, and meets global trade demands through real-time data, automation, and connectivity. In this context, the implementation of the Advanced Cargo Information system (ACI) fosters better data exchange and coordination, ensuring compliance with international regulations, increasing transparency in the cargo flow, and boosting the overall efficiency and security at Alexandria port. It relies on pre-registration to identify goods, delivery dates, customs procedures, inspections, transportation, and destination. This improves planning, reduces delays, and increases transparency and credibility. ACI system enhances safety and performance, benefiting stakeholders and improving efficiency and quality in the sector. This research aims to identify the impact of applying ACI system on enhancing the performance of Alexandria port. To achieve research aim, SWOT analysis applied to identify weaknesses and threats of implementing ACI system that currently applied in Alexandria port, to understand its implementation and how to overcome the current system's drawbacks in Alexandria port. In addition, the researcher adapted a descriptive and analytical approach. An electronic questionnaire administered and analyzed using SPSS. This research has found that for the ACI system to achieve its objectives, it is necessary to emphasize the digital transformation of registering and storing data and documents. This research is considered as the first research that evaluates the customs procedures before and after applying ACI system in Alexandria port.

DETECTING SUSPICIOUS ACTIVITIES AT SEA USING SYNTHETIC APERTURE RADAR (SAR) SATELLITE IMAGERY AND AIS DATA

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Keywords: Vessel detection, Satellite data, Geoinformatics, Geoportal, Methodology.

ABSTRACT: Nowadays, ship detection using remote sensing images is considered one of the most important aspects of maritime surveillance systems, as it enables the monitoring of a range of maritime activities such as shipping traffic, safety and security at sea, cargo transportation, maritime defence, fisheries control, oil spill detection, etc. In this paper, a methodology is proposed to collect, process and analyse Sentinel-1 Synthetic Aperture Radar (SAR) data for maritime activity, which are further correlated with relevant AIS (Automatic Identification System) datasets, to identify vessels that may not require AIS or related systems or vessels involved in illegal activities. The rapid development of remote sensing science and the wide variety of freely available satellite data and related tools have contributed to this goal. All datasets are stored and visualized through a developed portal specifically designed to host spatial data. Geoportal is easily accessible by many users, offering a wide range of services such as download, visualization, and analysis. Geoportal is expected to be a valuable tool that can provide easy access to accurate high resolution spatial data to a wide range of individuals, scientists, decision makers and other stakeholders.

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Session 4A

Inland Waterway Connections for Greener Canals and Rivers Sustainability

NAVIGATING GREEN: THE IMPACT OF IMO'S ENVIRONMENTAL POLICIES ON GLOBAL SHIPPING AND THE SUEZ CANAL

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ABSTRACT: The maritime transport sector is crucial for the world economy, responsible for 85% of global trade volume, but only contributes 2.89% of global carbon emissions. The International Maritime Organization (IMO) has set an ambitious goal of near-zero emissions by 2050 and set short-, medium-, and long-term policies for promoting green shipping. However, these policies also pose challenges and economic burdens for the shipping sector. Medium-term policies will lead to an increase in shipping costs due to the carbon tax. The study examined the impact of IMO's green policies on the global fleet, international trade, and the Suez Canal, which contributes to a strong reduction in emissions. The autoregressive distributed lag (ARDL) model showed a positive and significant short- and long-term effect of world seaborne trade on the Suez Canal trade. However, IMO's policies showed no immediate significant impact in the short-term but negative long-term effects; however, the positive long-term effects of world seaborne trade were found to be greater than the negative long-term effects of IMO's policies on Suez Canal trade.

A SUEZ CANAL LOGISTICS HUB ROLE IN THE GLOBAL SHIPPING NETWORK: A CASE STUDY OF A STAINLESS-STEEL PRODUCT

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Keywords: Maritime Network, shipping Route, Suez Canal, Total Landed Cost

ABSTRACT: This research explores the implications of developing a logistics hub along the Suez Canal for worldwide shipping routes, with specific attention given to the effects on the stainless-steel business. As a methodology, it applied the Total Landed Cost (TLC) and transportation scenarios on selected trade lanes, such as those going through the Suez Canal. The main findings have revealed that the Suez Canal Logistics Hub has lower TLC than alternative logistic hubs through direct and transhipment services. The development of this logistics hub could lessen transportation costs for numerous industries by streamlining the shipment of goods through the Suez Canal. Further analysis may reveal additional time and money savings benefits to specific sectors like stainless steel. While this research provides insightful initial data, more comprehensive exploration is needed to fully comprehend the diverse impacts across various import-export industries.

The implication of this research relies on the significance of strategic positioning for boosting shipping operations and accelerating business growth. It draws attention to the TLC as an indicator for determining efficiency and competitive advantage. Finally, it highlights the need for continuous infrastructure development and government support.

THE EFFICIENCY OF RIVER PORT LOGISTICS AND ITS ROLE IN IMPROVING INLAND WATER TRANSPORT OPERATIONS IN EGYPT

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ABSTRACT: Transport via inland waterways, especially river transport, has gained geostrategic importance in recent years due to the significant economic savings and environmental sustainability it achieves. The cost of logistics in river transport is 7% of the cost of land transport and 50% of the cost of rail transport. Although river transport is the most environmentally sustainable among the various means of transport, rivers are still the least developed in many countries, including Egypt, (Rivera, et al., 2022). Effective river navigation requires maintaining the river's flow and ensuring its smoothness by carrying out dredging operations to maintain a depth that ensures safe navigation. In the river, in addition to the ease of crossing barriers, there are dams and bridges along the rivers.

River transport also suffers from several infrastructure problems, including ports and docks, a shortage of container terminals, and the lack of fueling stations along the river course because of low investment rates, in addition to the difficulty of finalizing licenses and equipment. River units are not subjected to international supervision and classification societies throughout their construction stages.

IMPROVING THE RIVER NILE SUSTAINABILITY THROUGH RECYCLING RETRIEVED PLASTIC WASTE

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Keywords: Nile River, Sustainability, water resources pollution.

ABSTRACT: This work represents collaboration between the research team and the VeryNile organization aiming to improve the sustainability of the Nile River by cleaning the Nile from plastic waste recycling this waste into a value-added product. VeryNile was launched in 2020 to empower the local fishermen to clean the Nile daily. Every day, this green army removes an average of 100kg of plastic waste from the Nile, which is almost 40 tons per year. Mixed with about 60 tons of agricultural waste, we could produce 100 tons of wood plastic composite (WPC) every year. In this research, wood plastic composite was produced from recycled high-density polyethylene (HDPE) and different types of agriculture wastes. Agriculture wastes were dried in the sun for about one month. Then wood powder was produced from these wastes using three steps: cutting, crushing, and grinding. HDPE waste was cut using plastic crushing machine to produce plastic flakes. Then, plastic pellets were produced from these flakes using plastic pelletizer machine. Finally, wood flour and plastic pellets were mixed, compounded and formed into the final shape using conical double screw extruder. Tensile test, bending test, and water absorption test were done on the produced samples. results show that the mechanical and physical properties of the produced WPC are suitable for many applications: decking, fencing, seat, garden toys, and kitchen cabinet. WPC produced from cotton stem was found to have maximum tensile strength while WPC produced from chili peppers stems wood` was found to have maximum bending strength. WPC produced from orange tree wood gave minimum water absorption. So, it's the most suitable type for outdoor applications.

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Session 4B

**Smart, Green, Blue Infrastructure
- Case Studies and Best Practices –**

THE ROLE OF IMPROVING THE INFRASTRUCTURE OF MULTIMODAL TRANSPORT TO ENHANCE THE EFFICIENCY OF SEAPORTS USING INTERPRETIVE STRUCTURAL MODELING.
(CASE STUDY DAMIETTA PORT)

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Keywords: Seaports, Infrastructure, Multimodal transport, Interpretive Structural Modeling.

ABSTRACT: This study investigates the role of improving the infrastructure of multimodal transport in enhancing the efficiency of seaports, with a specific focus on Damietta Port. The purpose of the research is to assess how strategic enhancements to multimodal transport infrastructure can contribute to increased efficiency in port operations. The methodology employed is Interpretive Structural Modeling (ISM), which enables a comprehensive understanding of the interrelationships among different elements within the multimodal transport system and their impact on port efficiency. Through the analysis of Damietta Port as a case study, this research aims to provide valuable insights into the critical factors and their hierarchical relationships within the multimodal transport infrastructure that influence port efficiency. The findings of this study can inform strategic decision-making processes for port authorities, policymakers, and stakeholders involved in the development and optimization of port facilities and their associated transport networks.

ENERGY MANAGEMENT OPTIMIZATION BASED ON FACILITIES LAYOUT PLANNING FOR PORT CONSTRUCTION: MEDITERRANEAN REGION CASE STUDY

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Keywords: Facilities management, port site layout, green port, sustainability, Homer.

ABSTRACT: The construction industry is one of the largest sectors in the world economy, but it suffers from a lot of problems, most of them related to construction project management, like cost, productivity, safety, schedule, site layout, and environmental impact. Sustainable development and climate change are global challenges that must be protected from the impact of construction, especially ports. In this approach, this research has to focus on the ports, which contain all kinds of activities, buildings, and facilities. As a result, ports rank among the most environmentally impactful constructions. The emission of carbon dioxide (CO_2), sulphur oxides (SO_2), and nitrogen oxides (NO_2) from ports has a key impact on climate change and the greenhouse effect; consequently, the solution to this problem is using clean energy through construction facility layout management in ports. The aim of this research is to convert an existing port to a green port through energy savings using solar and wind energy using Homer software to obtain an optimal port construction facility layout with minimum cost, area, and gas emissions. This case study takes place in the Mediterranean region using Homer software to obtain ten hybrid renewable energy systems, each producing 1000 kwh, and then calculate the area needed for each one. This case uses all the results of cost, area, and carbon emissions on SPSS to validate and get the optimal construction facility layout. The final selection indicates that PV, converter, or battery is the optimal HRES for the selected region, which provides the minimum cost of energy, which saves 70% more than the other scenarios and also saves around 85% of the area required by its alternatives. Since there are no carbon emissions in this scenario, the research concludes that it offers the best environmental protection.

MEDICANES AND ITS METROLOGICAL EFFECTS IN THE MEDITERRANEAN SEA: CASE STUDY OF MEDICANE IANOS

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Keywords: Sustainable Infrastructure, Medicanes, Mediterranean Sea, Flood Management, Extreme Events, Risk Assessment.

ABSTRACT: A rising amount of data suggests that human-produced greenhouse gases (GHGs) are altering the Earth's climate. Past metrological events can be used for studying and calibrating the prediction models to predict future extreme events and their effect on coastal flooding due to wave heights and storm surges in the Mediterranean Sea. The paper studies the past and future Medicanes and its metrological effects in the Mediterranean Sea to achieve a sustainable resilient infrastructure perspective in the Mediterranean ports for climate adaptation. DHI MIKE21 SW and HD FM numerical modules are used to study past extreme events of Medicane Ianos and predict future extreme events. This simulation is prepared to study the future and past extreme events of eastern Medicanes, and their effect on oceanographic wave heights and storm surges generated in the Mediterranean Sea. The predicted significant wave height (H_s) within the eastern part of the Mediterranean Sea can reach up to twelve meters, which can cause severe damage to offshore and nearshore infrastructure. The predicted storm surge (S_s) within the eastern part of the Mediterranean Sea reaches 40 centimeters, which can cause coastal flooding, unpredicted wave runup, overtopping and civilian coastal incidents. The result of the analysis shows that performing a regular risk assessment by numerically studying the effect of climate change on extreme atmospheric events for Mediterranean Sea is essential to achieving a sustainable resilient infrastructure perspective for Mediterranean ports. It is recommended to perform a regular risk assessment of the effect of climate change on extreme atmospheric events for the Mediterranean Sea.

EFFECT OF HUMAN INTERVENTIONS ON HYDRO-DYNAMICS OF SIDI-ABDEL RAHMAN BAY "NORTHWESTERN COAST OF EGYPT"

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ABSTRACT: Sidi Abdel Rahman is the most precious coastal zone in the Egyptian North Coast. It is suffering from severe erosion. It has a variety of Coastal structures, including jetties, groins, revetments, and breakwaters; they were built to prevent coastal erosion. The study area involves tourism villages, located in Sidi Abdel Rahman Bay, which were subjected to fast erosion that got accelerated from May/June 2020 onward. This erosion led to the loss of approximately 40 meters of beach sand from the northern part of some beaches that are obviously redeposited southward. This may have been triggered by a number (or combination) of factors including climate-induced sea-level rise, and/or human-induced changes to sediment supply to the coast. This study aims to assess the shoreline changes during the interval between (2003-2021) in the study area of Sidi Abdel Rahman area. Also to evaluate the impact of the constructions of Marceillia and Hacienda resorts and the prediction of their future position. To achieve the aim of the study; Digital Shoreline Analysis System software (DSAS) had been used to illustrate the shoreline changes. Also, a 1D numerical model (LITPACK) was set up to predict the future position of the shoreline after 5 years. The results showed that urbanization and coastal structures caused significant erosion in the coastal area. Also, the results showed the amounts of sediment transport (accretion/erosion) in specific areas. The numerical model has shown that the area will suffer intensive erosion for around 1000 m distance with an average annual rate of 12m/year. The study recommends soft solutions as nourishment in addition to a set of hard protection measures of groins to eliminate erosion in this area.

OPTIMIZATION OF RETROFITTING AN ANCHORED SHEET PILE QUAY WALL USING SEPARATED RELIEVING PLATFORM

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ABSTRACT: In the maritime field, quay walls serve as vital components of port infrastructure, acting as pivotal linchpins in the maritime arena. Anchored sheet piles, a globally employed type of quay wall, play a crucial role in meeting the diverse service needs of seafaring vessels. As the maritime field experiences growth and vessels increase in size and tonnage, the necessity to upgrade existing quay walls becomes imperative to accommodate evolving demands. This paper focuses on optimizing the retrofitting process through the addition of a relieving platform structurally separated from the existing quay wall, utilizing finite element analysis for a comprehensive investigation. The research comprises dual-phase exploration, commencing with a verification stage followed by a parametric study. In the verification phase, field measurements conducted by others were employed to validate the numerical model. Subsequently, the validated model underwent expansion, encompassing various backfill soil types, number of piles supporting the platform, stiffness of the used piles, spacing of piles, bearing levels of piles, and different platform elevations. The results indicate that an increased number of piles supporting the platform is unfavorable when dealing with cohesionless soils, slightly reducing the maximum straining actions on the front wall and the tension affecting the tie rods. Conversely, straining actions on the pile rows were marginally reduced, regardless of the backfill soil type. Additionally, increasing the pile stiffness noticeably reduced the lateral displacement but increased the maximum bending moment on the front wall for all examined soil types, but the tie rod tension slightly decreased. Moreover, increasing the pile spacing has a modestly increased effect on the straining actions for the front wall and tie rods in cohesionless soils, with negligible effects in cohesive soils. Adjusting the pile bearing levels has a minor effect on the front wall and tie rods, whereas an increase in the bearing level results in heightened straining actions affecting those piles. Finally, modifying the platform elevation significantly increases the bending moment affecting the front wall, emphasizing the need for careful safety checks when adjusting the platform elevation.

MARITIME ENGINEERING EDUCATION:
A CRUISE SCHOOL ACTIVITY ON BOARD CASE

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Abstract: The maritime industry's rapid evolution, driven by technological advancements, underscores the imperative for marine engineers to acquire contemporary skills, including firsthand knowledge of onboard ship operations. While modelling and simulation techniques are fundamental in engineering education, direct exposure to operational realities is equally indispensable. Witnessing cargo and passenger handling, alongside onboard workflow organization, fosters an appreciation for precision and quality, particularly at advanced academic levels. This paper analyses prevalent methodologies in educating master's and PhD students in maritime transportation engineering. It introduces a pioneering case study, a collaborative initiative among multiple universities, centred on a cruise school conducted aboard a ship. Throughout the cruise, students received training in diverse logistics and decision-making processes through modelling and simulation methodologies. Additionally, they had the unique opportunity to observe crew operations during loading and unloading activities, both from shore and onboard, augmenting their understanding of real-world maritime practices. Expanding upon this foundation, this educational framework encompasses conventional classroom settings, immersing students within the dynamic maritime ecosystem. Beyond theoretical instruction, the ship serves as a dynamic research platform, facilitating interdisciplinary collaboration and practical experimentation. Furthermore, students engage with industry professionals, attend conferences, and explore career pathways, enriching their academic pursuits and industry acumen. This collaborative educational paradigm equips maritime engineering students with holistic competencies, preparing them to navigate the complex challenges and opportunities within the evolving maritime landscape.

Session 5A

Emerging Technologies and Strategies in Maritime industry – The Gateway to Optimization and Sustainability

DISCRETE EVENT SIMULATION OF TRUCK APPOINTMENT SYSTEMS IN CONTAINER TERMINALS: A DUAL TRANSACTIONS APPROACH

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Keywords: Discrete event simulation, truck appointment system, congestion, dual transaction

ABSTRACT: marine container terminals (ct) are vital hubs in the global maritime logistics network. They act as the link between sea-borne and landside-based operations. Effective planning and execution of drayage operations remain paramount in optimizing resource usage and enhancing port efficiency. Congestion remains to be a serious challenge in and around the ct. This is primarily due to the unmanaged arrival of external trucks (ets), which eventually leads to the buildup of lengthy queues at the gates of the ct and yard area. As a result, it detrimentally impacts the average truck turnaround time (ttt) and the overall port efficiency. In response to the aforementioned challenge, this study seeks to develop a simulation model of a truck appointment system (tas) that leverages a dual transactions approach to effectively mitigate congestion and further reduce the number of empty truck trips while performing pick-up or drop-off tasks. The outcomes of the study will be beneficial to both terminal managers and trucking companies (tcs). Firstly, port managers will be able to match the available yard resources with the requested appointments in advance to eliminate gate and yard queues and reduce waiting times. Consequently, trucks are expected to arrive at the terminal at the stipulated times to perform specific tasks. Secondly, the drayage operators are expected to improve the utilization of their trucks since the dual transactions approach allows truckers to drop off and pick up a container in a single trip, thus cutting down on empty truck trips.

NCOS ONLINE AND THE FUTURE OF PORT OPERATIONS: INSIGHTS FROM THE DIGITAL INTEGRATION AT THE PORT OF HAMBURG, GERMANY

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ABSTRACT: NCOS ONLINE, developed by DHI, is a modular, physics-based port management system designed to enhance maritime operations' safety and efficiency. This system aims to optimize vessel traffic, expand the capacity of existing port assets, minimize delays, and equip port and maritime safety authorities with a high-precision virtual environment for informed decision-making. Implemented in over 15 major ports globally, DHI collaborates closely with each port to tailor the system and its advanced numerical models, ensuring precise simulation of port operations. This paper presents NCOS ONLINE and a case study on its implementation at Germany's largest seaport, the Port of Hamburg, focusing on addressing both current and future challenges.

PREDICTIVE SIMULATION OF ONSHORE POWER SUPPLY (OPS) REQUIREMENTS FOR PORTS

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Keywords: OPS, AIS data, traffic forecast, power demand.

ABSTRACT: Port infrastructure development projects require reliable data for the transition into "smart ports". The purpose of Onshore Power Supply (OPS) is to connect the ship to the electricity grid, reducing CO_2 emissions and noises at port areas. In order to comply with governmental orders, ports have to be able to fulfill 90% of the electricity demand of container ships, passenger ships and ro-ro vessels by 2030. Nevertheless, there are still barriers to the development of this technology, as the installation requires a large investment, renewal of the fleets and available substations near ports. A methodology developed by Siport21 is described using a mathematical model of traffic forecast, based on statistical methods and simulation techniques. As a result, it helps ports in decision-making about the infrastructure required by the OPS technology. The tool considers the terminals of the port and traffic data based on Automatic Identification System (AIS) information to determine the power demand requirements by following the "4th IMO Greenhouse Gas Study" for ships power consumption.

EXPERIMENTAL ASSESSMENT TO REDUCE EMISSION OF COMPRESSION IGNITION ENGINE VIA DIESEL/BIODIESEL/WATER BLENDS

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Keywords: Compression Ignition Engine, Diesel/Biodiesel/Water blends, Exhaust Emissions.

ABSTRACT: Environmental concerns are a driving factor in alternative fuel development. Diesel and biodiesel are commonly utilized for engines; however, their emission causes significant pollution. Fuel additives are a promising method to reduce emissions. This research is emulsified water into diesel and biodiesel fuels per volume of 1%, 3%, and 5% to form W1, W3, and W5 for the diesel/water mixture and B30W1, B30W3, and B30W5 for B30/water mixture to evaluate their affection on performance and emissions. All blends exposed to an ultrasonication blender are to be homogeneous. A single-cylinder engine is utilized for experiments at 2000 rpm with different loads (0%-80%) of full load. The results revealed that in 80% of the full load, the diesel/water blends achieved the highest NOx reduction. It considered the produced ACPA biodiesel to be an eco-friendly and clean fuel. It also gained better complete combustion at 80% load by lesser percent of CO emission of 23% relates to local-fossil diesel, and B30 recorded approximate brake specific fuel consumption at 80% of full load; therefore, the water surrogates with biodiesel through these percentages aren't reliable for performance and emissions.

Session 5B

Modern Strategies for Green Blue Infrastructure Project Management

KEY CHALLENGES FOR THE SUSTAINABLE DEVELOPMENT OF PORTS AND ONGOING WORK BY IAPH

Dr. Mohamed Abdel Fattah

Regional Subject Matter Expert- OT- Fortinet

Keywords: Fortinet, Cybersecurity, Safety.

ABSTRACT: Fortinet's unique cybersecurity approach adapts and keeps pace with the maritime sector's digital and dynamically evolving ecosystem and strengthens the safety and reliability of its critical Infrastructure. Find out how Fortinet can protect your critical resources and systems, eliminate the complexity within your distributed environment and secure IT/OT convergence.

MEASURING GREEN PORT MANAGEMENT AS DETERMINANT OF PORT ATTRACTIVENESS AND COMPETITIVENESS

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ABSTRACT: This paper introduces 'Green Port Management (GPMan)' as a pivotal element among the 'nine Port Attractiveness Determinants (PADs)', leveraging an extensive review of 87 publications from 1970 to 2022. Through a rigorous methodology, the study refines the concept of 'GPMan', with 15 seminal works that were scrutinized in-depth. This analysis culminated in the identification of seven critical attributes that encapsulate 'GPMan', addressing a notable gap in existing literature which often discusses 'GPMan' without presenting clear, measurable indicators for port attractiveness. To bridge this knowledge gap, the findings propose a structured framework for evaluating the green attractiveness of ports. This framework is crucial for academics and managers alike, enabling the assessment of a port's capacity to attract eco-friendly actors economically and to quantify its ecological impact on stakeholders. Significantly, the research underscores three predominant attributes: the dynamic implementation of green port projects aimed at mitigating environmental impact, the establishment of a robust regulatory framework through the adoption of environmental regulations at national, regional, and global levels, and the implementation of a system to reward or penalize port operators based on their adherence to predefined environmental criteria. Additionally, the paper showcases various projects across Africa, illustrating the diverse green and sustainable strategies that port managers have adopted to enhance Green Port Management effectively. By filling the existing research void and offering insights for a future research agenda, this study not only advances the discourse on 'GPMan' but also provides a comprehensive approach to enhancing port attractiveness through sustainable practices.

COMPARATIVE ANALYSIS OF PORT GOVERNANCE MODELS FOR GREEN ENERGY TRANSITION

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Keywords: Port Governance, Decarbonisation, Energy Transition, Sustainability.

ABSTRACT: Since the beginning of maritime trade, Ports have consistently driven global economic and societal progress. Concerns have arisen due to the environmental impact of port operations, particularly emissions. Thus, it has become essential to highlight the recognition of the International Maritime Organization (IMO) toward ports being as pivotal in the logistics network and their ability to reduce greenhouse gas (GHG) emissions from shipping. This emphasises the importance of ports adopting measures to decrease emissions and promote sustainability, aligning with global efforts to decrease the environmental impact of maritime trade. The transformation of ports towards eco-friendly and sustainable practices represents not only an urgent imperative but also a substantial challenge characterised by numerous obstacles. In this sense, port governance can be seen as a determinant factor in moulding port strategies and tools adoption to foster environmentally responsible practices within ports and beyond.

A BIBLIOMETRIC ANALYSIS OF MARITIME HR COMPETITIVENESS RESEARCH

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ABSTRACT: This paper aims to explore and delineate the prevailing scientific trends within the domain of "Human Resources Competitiveness in the Maritime Industry." To assemble relevant information, an extensive examination of global literature on the subject was conducted, utilizing databases such as Scopus and Web of Science. In this paper, the R language was applied with the bibliometric package to execute a meticulous bibliometric analysis. Visualization techniques were applied to provide researchers with a clearer overview, facilitating an enhanced understanding of specific subject areas within the research. This investigation furnishes valuable insights into the progression of research on "Human Resources Competitiveness in the Maritime Industry." It identifies significant contributors, including noteworthy authors, countries, and institutions, while also outlining the primary directions for future research. It is essential to acknowledge the limitations of this study: there might be an oversight in retrieving all relevant documents, given the focus on fully published papers in the English language. Moreover, the study recognizes the absence of similar existing research, which may signify a unique contribution. However, it is crucial to note that while no similar studies were found, the assertion of uniqueness would be more robustly supported by emphasizing specific aspects or methodologies that distinguish this study from others. We strived to present a comprehensive panorama of this research field, yet it is imperative to recognize the limitations in data collection, especially concerning potential language bias and the possibility of omitting non-English publications. Additionally, there is a need to provide insight into the management of data privacy and confidentiality within bibliometric analysis, an aspect that demands attention in studies involving diverse data sources.

INVESTIGATING THE IMPACT OF MARITIME TRADE NEW TRENDS ON THE EGYPTIAN MARITIME PERFORMANCE

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ABSTRACT: Maritime transport is the pillar of global trade. The economy is generally impacted by maritime transport and its related activities. Egypt's key geographic location within major East-West trade corridors renders its maritime sector of both economic and geopolitical significance. In addition to the recent initiatives of expanding the Egyptian port capabilities the sector faces rising regional volatility risks that could hamper performance. The aim of this study is to empirically investigate the impact of maritime trade new trends including the climate change, port disruption, structural shift in globalization, external disruptions, on the Egyptian maritime transport sector performance and to what extent the digitalization practices can enhance the performance within those new trends. The methodology is focused on qualitative research using a semi-structured interview tool with the head of maritime transport sector, chairmen of ports authorities and few of the dominant companies in maritime transport. The ports that adopted digitalization were the target sample. The Findings clarified the significant impact of those trends on the maritime sector in terms of expenditures, dwell time handling rates, average waiting time, penalty fees/charges, delays, and other key performance indicators (KPIs). Finally, this study is filling the gap in the literature review, and it gives insights to the policy makers and stakeholders on the development of the maritime transport sector in Egypt. For the future work, the researchers are conducting a quantitative analysis by utilizing an online survey tool and AMOS software for structural equation model analyses (SEM).

Session 6A

**Sustainable Maritime Operations:
Optimizing Performance Through Technology (2)**

THE FUTURE OF PORTS: TO BE MORE EFFICIENT, SMART AND RESILIENT

Dr. Zhao Nan

Deputy Secretary-General of Shanghai International Shipping Institute

Keywords: Ports, Global Economy, Port Cluster.

ABSTRACT: The presentation analyzes the future trends of the ports in terms of port volume, port service, port silence and the relationship between the port and the city. Due to the uncertainties and changes in the global economy and trade, the port service efficiency should be improved, and the ports should be cooperated within the port cluster. In addition, the port is facing the challenges of the decarbonization in shipping industry.

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ELEVATING WIND ENERGY HARVESTING WITH J-SHAPED BLADES: A CFD-DRIVEN ANALYSIS OF H-DARRIEUS VERTICAL AXIS WIND TURBINES

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ABSTRACT: This research introduces a novel J-shaped aerofoil designed to enhance the performance of H-Darrieus Vertical Axis Wind Turbines (VAWTs). A comprehensive comparison is conducted between the J-shaped aerofoil and the standard NACA 0015 airfoil to assess their impact on turbine efficiency. The study employs a two-dimensional, incompressible, transient, and turbulent flow model to capture airflow around the turbine blades. Model verification and validation are carried out through systematic evaluation of various parameters, including mesh sizes, time steps, turbulent models, and discretization techniques.

Computational Fluid Dynamics (CFD) simulations give useful insights into the aerodynamic features of H-Darrieus VAWT blades, indicating greater performance of the J-shaped airfoil over conventional designs. Results suggest that blades with the J-shaped aerofoil demonstrate increased overall performance and, notably, a 142% increase in beginning torque compared to the normal NACA 0015 type. This research not only contributes a new and efficient aerofoil design for vertical axis wind turbines but also offers full knowledge of its aerodynamic benefits via rigorous simulation and analysis.

RECOVERY BRAKING IN ELECTRIFIED BOATS USING DUAL ACTIVE BRIDGE DC-DC CONVERTER WITH ULTRACAPACITOR

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Keywords: DAB converter; DC-DC converter; Recovery braking; Electrified boats; Power flow control; Sustainable transportation.

ABSTRACT: Regenerative electric propulsion involves AC motors recharging batteries during sailing. This paper presents the application of a dual active bridge (DAB) DC-DC converter-based interface system for recovery braking in electrified boats (EBs), incorporating ultracapacitors. The study focuses on examining the charging and discharging scenarios of ultracapacitors in the system. The proposed method utilizes a simple proportional-integral (PI) controller to regulate the terminal inverter voltage direction by adjusting the phase shift angle of the DAB converter. The MATLAB/SIMULINK software package is employed to model and simulate the proposed interface system. The study explores energy recovery during braking operations in EB and proposes an effective control strategy for energy distribution from batteries and ultracapacitors for EB applications. This approach reduces electrical energy production. The DAB converter offers several advantages, including bidirectional power flow capability and high efficiency. By integrating ultracapacitors into the system, the recovery braking energy can be efficiently captured and stored for later use, enhancing the overall energy efficiency of EBs. The charging case involves transferring the excess energy from the braking process to the ultracapacitors, replenishing their energy storage. On the other hand, during the discharging case, the stored energy in the ultracapacitors is utilized to power the boat's electrical systems, reducing the reliance on the main power source. Permanent magnet synchronous motor (PMSM) is coupled to a DC/AC converter system that serves as a thruster system to simulate the energy requirements of an EB during propulsion operations. The main objectives of the proposed control approach are fast current tracking for the battery system, ultracapacitor-based DC bus voltage stability, and energy load distribution for an EB under a range of demand scenarios. The ultracapacitor which act as a secondary energy source for the EB shall be connected to a DC bus using a bidirectional DC-DC converter. Multiple cells are arranged in series and potentially also in parallel to make up an ultracapacitor pack.

THE INFLUENCE OF VARIATIONS BETWEEN TIDE GAUGE AND RTK TIDE DATA ON DREDGING CALCULATIONS IN HYDROGRAPHIC SURVEYS

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Keywords: Volume Calculation in Dredging, Hydrographic survey, Tide Gauge, RTK Tide.

ABSTRACT: This paper explores the impact of discrepancies between Tide Gauge and RTK (Real-Time Kinematic) Tide information on dredging computations in hydrographic surveys. The research focuses on cases where an average discrepancy of 10 cm exists between the two tide measurement sources. There are differences of 0.037 cm between them at a distance of 1 km from the base station, and these differences quickly increase as we sail further away from the base station, exceeding our expectations by about 0.139 cm at a distance of 10 km. The study aims to highlight how an average of 10 cm difference between Tide Gauge and RTK Tide measurements affects the accuracy of dredging computations. The results shed light on how such discrepancies can impact the accuracy and reliability of dredging computations, influencing navigational safety and operational efficiency in maritime settings. The research underscores the necessity of minimizing these discrepancies and proposes potential strategies to mitigate their influence on dredging computations. The study contributes significant insights for improving the accuracy of dredging calculations and enhancing navigational safety and operational efficiency in maritime settings.

NUMERICAL ANALYSIS OF ENHANCING WATER-DROP FAIRING DESIGN TO MITIGATE VORTEX-INDUCED VIBRATIONS BY APPLYING ANGULAR SLOT

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Keywords: Marine riser, vortex-induced vibration, CFD.

ABSTRACT: Marine risers are crucial components of offshore oil and gas production systems, connecting the seabed to the surface platform. They are susceptible to vortex-induced vibrations (VIV). As a result, marine risers are susceptible to failure, which can have disastrous effects, including environmental damage, loss of output, and even loss of life. Vortices that are generated in the viscous boundary layer tend to separate toward the downstream end of the cylinder. A fairing is a body with a hydrofoil shape added to the marine risers to reduce the effect of VIV on the marine riser. The investigation will be undertaken using a two-dimensional computational Fluid dynamics model using the software ANSYS Fluent. A slot is applied to a water-drop fairing that has a top shape angle of 80° to improve the suppression of the VIV. The behavior of the fairing in VIV is compared using the root mean square of the lift coefficient ($C_{l\,RMS}$). The angle between the slot and the vertical is altered to discover the ideal angle that shows the lowest value of $C_{l\,RMS}$. The results of the current investigation identified the ideal possible angle for the slot. The slot that has an angle of 30 clockwise with vertical has been shown to be the best at dampening VIV, with a 37.8% reduction in $C_{l\,RMS}$.

COMPREHENSIVE OVERVIEW ON ADDITIVE MANUFACTURING OF LATTICE STRUCTURES USING SELECTIVE LASER MELTING

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Keywords: Additive Manufacturing, Lattice Structure, Selective Laser Melting, Sustainability

ABSTRACT: Additive Manufacturing (AM) has emerged as a revolutionary technology for creating a wide range of geometries, especially complex-shaped ones. The intrinsic characteristics and potential benefits of AM techniques can improve manufacturing process sustainability through the reduction of material waste, machine emissions, and energy usage. This had allowed AM to be recognized as a potentially green technology. On the other hand, lattice structures are characterized by their intricate network of interconnected struts and nodes that are organized regularly and repetitively. They provide a unique combination of lightweight, high strength, and material efficiency. This makes them excellent candidates for many applications ranging from aerospace and biomedical to architecture and automotive parts. In addition, such cellular materials had found diverse applications within marine engineering, including lightweight ship components, customized underwater sensors, offshore platform structures, and energy-efficient propellers. In this paper, a detailed review of the fabrication of lattice structures using Selective Laser Melting (SLM), one of the most prominent AM techniques, will be presented. This paper explores the fundamental principles of lattice structure design. It also investigates the capabilities and limitations of the SLM technique in terms of accuracy, layer thickness, raw material, and process parameters. Furthermore, the advantages, challenges, and future prospects of integrating SLM-fabricated lattice structures are also thoroughly discussed. Such a comprehensive survey would provide a deep understanding of the current landscape of SLM for the printing of high-strength-to-weight ratio lattice structures that would meet the demands of modern engineering challenges and promote innovation and sustainability across various fields.

Session 6B

Sustainable Maritime Development Through Technological Innovation

DIGITALIZATION JOURNEY TOWARDS A GREEN AND SMART PORT

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ABSTRACT: Port digitalisation is a journey of transformation and does not happen over-night. The ultimate aim of digitalisation is to achieve a smart port status to improve operations efficiency and a green port through reduction of carbon emission by optimising truck-trips, minimising gate congestions and just-in-time port call. Ship operators and ship agents are burdened with having to fill in paper documents, in many cases, repeating the same information and distribute these to various government agencies such as port and maritime authority, customs, and health authorities. This increases costs and causes delays. One of the aims of digitalisation is to lighten or totally remove this burden.

ARTIFICIAL INTELLIGENCE AND GEOSPATIAL TECHNOLOGIES FOR SUSTAINABLE MARITIME LOGISTICS.
CASE STUDY: PORT OF CONSTANTA, ROMANIA

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ABSTRACT: This study analyzes the potential impact of Artificial Intelligence (AI) and geospatial technologies on maritime logistics, into guiding the industry towards unprecedented operational efficiency, precision, and sustainability. It highlights the critical role these technologies play in optimizing maritime operations, including demand forecasting, route optimization, and enhancing operational visibility, thereby significantly boosting efficiency. With a focus on sustainability, the paper illustrates how AI and geospatial technologies contribute to emission reduction, energy efficiency, and the development of green infrastructure within ports, aligning with global sustainability objectives. By leveraging the analytical skills of AI alongside the detailed mapping capabilities of geospatial technologies, the research outlines a forward-looking approach to maritime logistics that not only addresses immediate operational benefits but also underscores a commitment to ethical and sustainable maritime practices. This integration marks a milestone in the maritime sector, redefining industry standards and paving the way for a more sustainable and efficient future in maritime logistics.

GREENING MARITIME ENERGY: A SUSTAINABLE APPROACH TO HYDROPOWER GENERATION THROUGH MATHEMATICAL MODELLING IN GRAVING DOCK FLOODING

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ABSTRACT: Dry docking is a common procedure for maritime vessels to enable necessary tasks including maintenance, inspection, and design changes. Since the world is becoming more dependent on renewable energy, the aim of this study is to develop a mathematical model to estimate hydropower generated from the filling process of graving docks. A thorough case study has been conducted with an emphasis on ASRY dry dock No. 1 in order to achieve this goal. By strategically placing hydroelectric turbines throughout the dry dock filling period and utilizing only the natural head difference between sea level and the dry dock level, the study aims to assess the viability and effectiveness of hydropower generation. The case results state that a cost saving of approximately 1 MW per intake line of the dock can be achieved which saves approximately 4572 kg of CO_2 emissions for the whole operation that could have been released into the environment if this power is generated using natural gas.

DATA AND MODEL DUAL-DRIVEN APPROACH OPTIMIZING APPOINTMENT QUOTA OF EXTERNAL CONTAINER TRUCK

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ABSTRACT: The truck appointment system sets quotas for each period to control the volume of external trucks arriving at the port. Optimizing appointment quotas is crucial for reducing the dwell time of external trucks and enhancing the utilization of terminal resources. Therefore, a method that combines data-driven and model-driven approaches was proposed to optimize appointment quotas by leveraging historical data. Gaussian process regression was employed to mine the correlation between the number of external trucks arriving at terminals and the truck turnaround time under different operation types in each appointment period. The objective was to minimize waiting costs for external trucks and transfer costs associated with deviations from the expected arrival periods. A non-linear mixed-integer programming model was formulated, and a genetic algorithm was designed for its solution to optimize appointment quotas under different operation types in each appointment period. The data-driven results indicate that Gaussian process regression yields a 2% lower relationship error than polynomial regression. The optimization model, which refined the operation types, reduces the total cost by 5.13% compared to traditional methods and decreases the extreme variance of appointment quotas by 64%.

SIMULATION-OPTIMIZATION MODEL IN MANAGING THE EMPTY CONTAINER MOVEMENTS PROBLEM THROUGH REPOSITIONING STRATEGIES

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Keywords: Empty container management, Shipping industry, Maritime transportation, modelling approaches, Simulation-based optimization.

ABSTRACT: In recent decades, the management of container transportation has emerged as a crucial facet of the global maritime industry. The continuous surge in container movement worldwide, driven by economic growth, has inevitably led to challenges related to trade imbalances and empty containers. The logistics associated with empty container movements represent one of the most intricate challenges in the shipping sector. With the escalating global trade imbalances, the imperative repositioning of containers immediately after being emptied has become apparent. This paper delves into the diverse practices governing the motion of empty containers, encompassing organizational policies, technical solutions, and optimization applications. Leveraging the advancements in computer-aided systems, the paper advocates the integration of simulation and optimization models to address the complexities of empty container challenges. It demonstrates how the synergies of optimization-based simulation may yield high-quality solutions at a reduced computational cost. The model's practical application, focusing on ports in Asia and the Middle East, offers insights into its effectiveness for one of the largest shipping lines globally. The results demonstrate that the proposed optimized repositioning strategy can significantly reduce the shipping line's costs and make full use of empty containers in the planning horizon.

Session 7A

Sustainable Logistics: Leveraging Innovation to Improve Quality, Efficiency, and Environmental Impact

STABILITY ANALYSIS OF MARITIME LOGISTICS ALLIANCE BASED ON BLOCKCHAIN

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Keywords: Blockchain; Maritime Logistics Alliance; Game Theory

ABSTRACT: Maritime logistics plays a vital role in international trade. Maritime logistics alliance improves the efficiency, service quality and competitiveness of maritime logistics through member cooperation and resource sharing. Blockchain can solve the problems of information asymmetry and lack of trust in logistics alliances because of its decentralization, so it is urgent to study the benefit distribution among members of maritime logistics alliances based on blockchain, to realize the operation of maritime logistics alliances based on blockchain platforms. This paper analyzes the change of benefit distribution mode based on the operation of the blockchain platform, constructs a three-way evolutionary game model based on the core influencing factors of the change, and simulates the evolution path of each influencing factor to ensure the transparency and fairness of benefit distribution.

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LOGISTICS COOPERATION IN THE FAR-EAST: PRIORITIZING SUPPLY CHAIN REQUIREMENTS TO STRENGTHEN INTRA-REGIONAL INTEGRATION OF MARITIME TRANSPORT NETWORKS

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Keywords: logistics cooperation, far-east region, big data, text mining, q-method, policy recommendations

ABSTRACT: Logistics cooperation among countries is an important policy tool with potential for strengthening the international competitiveness and economic growth of regions. In the Far-East region, joint efforts to increase the coordination of maritime logistics activities have undergone since 2006 between the governments of China, South Korea and Japan. This paper aims at finding a potential gap in past and current logistics cooperation requirements for the Far-east region to provide suitable logistics policies to be implemented in the region. In the first step of the study, past joint statements of China, Republic of Korea and Japan's ministerial conference on transport and logistics were examined. Thereafter, a text mining methodology was applied to highlight key areas of logistics and derive related network patterns by analyzing the degree centrality and the community betweenness of the most frequent terms. Secondly, a q-methodology was utilized to analyse whether new priorities areas should be discussed among governments to increase logistics cooperation in the region. A gap analysis between logistics trends derived from text mining and current trends derived from the Q-method led to suggest that there is a gap between past and current logistics requirements and particularly in the areas of environment, technology, standardization and adoption of best practices.

IMPROVING THE QUALITY OF SERVICES IN A LOGISTICS COMPANY USING THE PARETO ANALYSIS

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Keywords: quality management, service management, quality of services, logistics, maritime transport, Pareto analysis.

ABSTRACT: The objective of the paper is to analyze and improve the quality of shipping services within a logistics company operating in Romania, using the Pareto analysis as a decision-making tool. The paper reviews the theoretical aspects regarding the quality of services, followed by a case study consisting of applying the Pareto principle and method to the maritime transport service offered by the logistics company. The most important problems faced by the company in shipping were identified based on the customers' complaints, followed by the application of the Pareto analysis. The results show that the most significant problems reported by the 60 customer complaint forms were incomplete documentation, exceeding transport time, and incorrect placement of cargo. The Pareto analysis revealed that if the company focuses on solving these critical issues, around 70% of the company's current problems can be solved, leading to increased quality of services and increased customer satisfaction, consequently.

LOGISTICS PERFORMANCE AS FACILITATOR TO TRADE PERFORMANCE: AN INDIAN PERSPECTIVE

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ABSTRACT: With the growing realisation of the importance of global integration in the production and consumption value chain, the importance of maritime logistics and transportation facilitating international trade is profoundly recognised. Further, a proliferation of collaborative trade agreements among different trade partners is ascribed to play a significant role. However, such external dynamics and engagements in international trade would propel blue economic growth if backed by strong maritime logistics initiatives and establishment. In this context, deep routed challenges, particularly in the domestic maritime logistics sector in manufacturing hubs like India, could potentially hamper her comparative advantages in international trade. It is in this context that this paper comes as an intercession by analysing India's Logistics Performance Index (LPI) and its impact on trade performance. Also, this paper provides a comparative analysis of India's LPI with that of other trade competitors from South and East Asia and tries to find out challenging areas of maritime logistics for India and suggest the required policy prescription thereof. Such acknowledgement is a compulsion for a country like India when escalated uncertainties due to episodes of COVID-19, the Russia-Ukraine War, and dips in the business cycles of many countries that demanded green and resilient supply chain and logistics practices. The paper prescribes that domestic reforms to ease out challenges in Indian maritime logistics coupled with external engagements would provide a flat form for India to reap the optimal gains from international trade.

ACHIEVING SUSTAINABLE DEVELOPMENT IN LOGISTICS: A PATH TO ENVIRONMENTAL AND ECONOMIC EFFICIENCY

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Keywords: Logistics, Waste and Emission Reduction, Sustainable Development.

ABSTRACT: The logistics sector plays a crucial role in global trade and economic growth. However, the rapid expansion of this sector has led to significant environmental impacts, including increased greenhouse gas emissions, resource depletion, and pollution. In order to address these challenges and achieve sustainable development in logistics, a comprehensive approach is necessary that considers both environmental and economic efficiency. This article explores the concept of sustainable development in logistics and its underlying principles. It first examines the environmental challenges associated with the logistics sector, highlighting the need for reducing emissions, minimizing waste generation, and conserving resources. The economic benefits of sustainable logistics are also discussed, including cost savings through energy efficiency, improved resource management, and increased competitiveness in the global market. The aim of the article is to identify solutions that can contribute to achieving the concept of sustainable development in the context of the logistics industry. The article tries to answer the question: what solutions and strategies can be used in the logistics industry to achieve economic efficiency and reduce the impact on the environment? Overall, this article provides a comprehensive overview of the challenges and strategies for achieving sustainable development in logistics. It underscores the pivotal role of logistics in achieving sustainable development goals through environmentally friendly practices and a holistic approach to economic and environmental efficiency.

Session 7B

Embracing Innovation: Ship Design and Operation

A NOVEL DYNAMICAL ROUTE OPTIMIZATION METHOD TO IMPROVE SHIP'S VOYAGE TIME: TIME BOUNDARY SEMICIRCLES

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ABSTRACT: Energy conservation, emission reduction and voyage time savings have garnered considerable attention within the maritime industry. Optimizing a ship's energy efficiency and sailing time holds the potential to effectively reduce both energy consumption and $CO2$ emissions. However, existing studies predominantly concentrate on either sailing speed or route optimization, with limited exploration of the interaction between speed and route under continuous time-varying weather conditions. These studies often rely on assumptions that introduce drawbacks, compromising the precision and quality of optimized routes. This paper introduces a novel Time Boundary Semicircles (TBS) Algorithm to address and fill the gaps identified in prior research, presenting a more precise and high-quality optimization model centered on involuntary speed reduction. The algorithm utilizes a mathematical model to calculate involuntary speed reduction based on weather conditions acquired from the Copernicus Marine Environment Monitoring Service (CMEMS), constrained by deterministic time boundaries. A hypothetical case study is conducted to compare between SIMROUTE software based on A* Algorithm which is used in weather routing with TBS to show its effectiveness in route optimization. The results confirmed 27.25 % time saving through TBS implementation.

AUTONOMOUS SHIPS IN CONFINED AREAS

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Keywords: Autonomous shipping, Simulation, AI.

ABSTRACT: Autonomous shipping is gaining traction around the world. These ships eventually meet confined waters (channel, lock,…), representing a complex navigational task. Artificial agents should be able to cope with these conditions. Shallow water manoeuvring models can be used to feed ship controllers; promising results have been achieved in scale model and simulator environments. Some stakeholders have raised concerns that building manoeuvring models takes time, resources and skilled mathematical modelers. Organic learning through use of data-driven AI could provide a solution here. On top of this, ship owners looking into the direction of autonomous shipping also move towards clean shipping, requiring new standards for analysing shallow water propulsion efficiency.

INCORPORATING SHIP GREEN RECYCLING REGULATIONS INTO THE DESIGN EARLY STAGES

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Keywords: Green Ship Recycling Industry, Hong Kong International Convention, European Union Ship Recycling Regulations, Early Design Stages.

ABSTRACT: The ship recycling industry is a vigorous market which offers a huge profit to a range of stakeholders including ship owners, ship brokers and cash buyers from selling ships as scrap. The main aim of this research is to investigate the ship recycling challenges in light of Hong Kong International Convention (HKC) for the Safe and Environmentally Sound Recycling of Ships, 2009 and European Union Ship Recycling Regulations (EU SRR), 2013. The implementation cost of international conventions requirements is high, and therefore this may lead to shipowners fleeing to scrap their ships outside the framework of the law, where the cost is lower. A literature survey is carried out by using bibliometric analysis for thirty ship recycling legal published papers and for each the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, IMO resolutions and the European union ship recycling regulations in order to analyze the gap in the published papers and the convention articles and indicate the better insights in the convention, resolutions and regulations. Before beginning to build any new ships, it is possible to verify that both the design and the scrapping standards are met by researching the possibility of generating some suggested articles that incorporate the requirements of the scrapping phase inside the early design stages. Finally, in view of the laws it is noticed that there is a gap in an important part of the ship's lifespan which is the recycling process and it is not taken into account at the early design stage.

ANALYSING THE IMPACT OF VARIOUS GEOMETRIES ON THE OPERABILITY OF CREW TRANSFER VESSELS

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Keywords: Ship Operability, Crew Transfer Vessels, Seakeeping, Strip Theory.

ABSTRACT: The rapid growth of the renewable energy sector, particularly offshore wind farms, has heightened the demand for Crew Transfer Vessels (CTVs). Ensuring the efficiency, safety, and comfort of these vessels is paramount, given their mission of transporting wind farm technicians and personnel to and from offshore sites. This research project explores the operability of eight different CTV geometries to identify the optimal design.

Utilising Maxsurf Modeller for geometry creation and ShipX for operability analysis through Strip Theory, comprehensive simulations were conducted to determine the ideal CTV configuration for optimal performance in the challenging conditions of the North Sea.

The study's findings explicitly reveal that a 20-metre CTV stands out as the optimal length choice for enhanced operability in North Sea operations. The implications of this research extend to the wider industry, offering a valuable framework for calculating the optimal geometry for CTVs with similar missions. This, in turn, has the potential to generate significant cost savings and streamline research efforts. By adopting more economical vessel designs, companies can maximise their profits and enhance the productivity of technicians, ensuring smoother and more efficient operations in the offshore wind energy sector. This research signifies a crucial step toward achieving greater efficiency and sustainability in the renewable energy industry.

THE READINESS OF MENA SHIPYARDS TO ADOPT AN INTEGRATION OF LEAN MANUFACTURE WITH DIGITAL TECHNOLOGY IN SHIP REPAIR.

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Keywords: Ship Repair- Lean Manufacturing- Leagile- Digital Transformation- Shipyard- Last Planner-Waste Assessment Model.

ABSTRACT: Shipping is vital for world trade and specifically to the Middle East and North Africa (MENA) region, this permits the related SME shipyards in this region to play an essential role in the economic growth of MENA countries. The cost, schedule, and quality of ship repair facilities minimize the waste and bring value to the client, making it more attractive for the shipping companies to stop for repair in this area while they are chartering. The challenge of upgrading the ship repair production system is that it is irregular compared to shipbuilding. This is due to unforeseen factors that represent a high percentage and influence the production planning of any yard. Thus, this study commences adopting lean digital approach in the operation management of ship repair. However, the first step is to determine the yard's readiness for such transformation, which is crucial to the level of change required. This research is about determining the readiness factor and the first steps as a road map for lean digital transformation for the Small to Medium Enterprises- SME ship repair facilities in the MENA region. Follow by another study focus on the combination of leagile in ship repair.

Session 8

Optimizing Maritime Operations Through AI and Technology

INTEGRATING ARTIFICIAL INTELLIGENCE AND GEOSPATIAL TECHNOLOGIES FOR SUPPLY CHAIN OPTIMISATION

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ABSTRACT: This paper investigates the integration of Artificial Intelligence (AI) and geospatial technologies in optimizing supply chain operations, emphasizing enhanced sustainability and operational efficiency. It addresses the increasingly important role of AI in predictive demand analysis and the utilization of geospatial data for strategic route optimization, particularly in maritime logistics. The research examines the impact of these technologies on supply chain visibility and warehouse management, revealing improvements in real-time tracking, inventory management, and eco-friendly operations. The study explores the technical challenges, investment considerations, and environmental implications of adopting these advanced technologies. By analyzing current applications and potential developments, the paper contributes to a deeper understanding of how AI and geospatial integration can lead to more resilient, efficient, and sustainable supply chains in the face of global economic and environmental challenges.

REAL-TIME PORT PERFORMANCE MONITORING SYSTEM AND ITS APPLICATION

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Keywords: Automatic Identification System (AIS), Innovation, Port Performance.

ABSTRACT: Traditionally, port-related statistics are issued on a monthly, quarterly, or yearly basis. They can be heterogeneous, delayed, and not easily accessible. By leveraging the Automatic Identification System (AIS), we have developed a set of innovative methods to generate port statistics at high frequencies and on a global scale. Our efforts have led to the creation of a real-time port-performance monitoring platform that provides insights into the current status of ports worldwide. This platform encompasses various aspects, including congestion levels, operational efficiency, connectivity, service disruptions, and resilience.

DEVELOPMENT OF PROACTIVE MAINTENANCE PLAN FOR IDENTIFICATION OF SHIP'S MAIN ENGINE FAILURES

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ABSTRACT: Ocean shipping is the primary means of transportation for international trade since 90% of traded products are transported over the seas. Accordingly, ensuring that ships operate in an energy-efficient manner is crucial to ensuring that global transportation becomes more efficient, and that financial savings are realized. One of the more potent remedies in this area is achieved by producing the ship's efficient maintenance plan for the engine room. This reduces operating costs while increasing system reliability and operational safety. To achieve this, the proposed research employs a modern maintenance approach, namely the proactive maintenance strategy. A small marine diesel engine is employed in this study, and its operational characteristics are collected to assist in the creation of a condition-based maintenance plan. In addition, machine learning-based models are experimented with, trained, and tested to forecast engine performance using diesel engine data. As a result, applying the suggested model to any engine that is being studied yielded a better maintenance schedule and ensured more effective fault identification with an accuracy of 89.1%.

PILOT-ASSISTED UNDERWATER ACOUSTIC CHANNEL ESTIMATION FOR MIMO OFDM SYSTEMS USING SPARSE BAYESIAN LEARNING ALGORITHM

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Keywords: channel estimation, sparse signal, Sparse Bayesian Learning, compressed sensing.

ABSTRACT: The field of underwater acoustic communication (UWA) has many industrial and maritime applications. This study focuses on cutting-edge channel estimation algorithms for UWA communications based on compressed sensing (CS). Since underwater channels involve sparse multipath, this investigation scrutinizes the process of channel estimation in systems employing multiple-input multiple-output (MIMO) technology with orthogonal frequency division multiplexing (OFDM). It interprets the utilization of pilot tones within the framework of a compressive sensing challenge. The performance of Compressive Sampling Matching Pursuit (CoSaMP) and Sparse Bayesian Learning (SBL) algorithms is compared with the conventional least square (LS) estimation algorithm by simulation.

The research infers that, methodologies rooted in compressed sensing yield superior channel estimation compared to the conventional LS algorithm for underwater communication systems utilizing MIMO-OFDM. For CS algorithms the simulation shows that SBL algorithm outperforms CoSaMP algorithm. Mean square error (MSE) and bit error rate (BER) are used to quantify this superiority when signal-to-noise ratio (SNR) conditions vary, employing both uniform and dispersed pilot configurations.

HEADING ACCURACY BY DUAL ANTENNA GNSS USING DIFFERENTIAL AND REAL-TIME KINEMATIC TECHNIQUES COMPARED TO GYROCOMPASS.

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Abstract: Vessel heading is the direction in which ships are moving at any specific moment. Vessel heading is crucial for navigation as it helps in determining the vessel's course, making steering decisions, and ensuring the vessel follows a desired path. In maritime history, heading has always been a myth that needs to be figured out by all sailors at all time. In ancient times, celestial bodies were used to acquire destinations referred to true north. The accuracy of vessel heading is essential for safe and precise navigation, especially in challenging maritime conditions. Vessel heading instruments, have undergone evolution starting from lodestones as the earliest natural magnetic compass to modern-day gyrocompasses, laser gyros, and inertial systems. With the advent of satellite technology and global navigation satellite systems (GNSS) on board vessels, there has been a paradigm shift in calculating courses over ground, driven by the limitations and errors associated with magnetic compasses, such as variation and deviation in addition to the high costs of gyrocompasses. In response to the challenges posed by the drawbacks, this paper delves into two alternative techniques and systems for acquiring vessels' true heading. The first method employs real-time kinematics (RTK) with dual antennas, while the second utilizes a differential global positioning system (DGPS) with dual antennas also. This paper aims to check if these novel techniques are accounted for, to provide a reliable alternative to traditional heading acquisition from compasses. To assess the effectiveness of these new techniques, a correlation analysis was conducted comparing headings obtained from the gyrocompass with the heading from both RTK and DGPS, in both static and dynamic modes. The results revealed a remarkably strong correlation of 0.9 between the gyrocompass and both RTK and DGPS receivers, with a negligible standard deviation of ±0.1° in static and ±0.18° in dynamic. This comparative study underscores the potential of the proposed GNSS-based methods as accurate and cost-effective alternatives for acquiring vessel headings, showcasing their reliability in both static and dynamic conditions. The comparison of different heading acquisition techniques is important in determining which method provides the most accurate and reliable results in different conditions. This involves implementing redundant or complementary methods to ensure reliability in critical applications.

IMPROVING THE EFFICIENCY OF CONCENTRIC HEAT EXCHANGER USING NANO PARTICLES IN THE FLUID AND TRANSITIONING

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Keywords: Heat Exchanger, Nano Particles, Heat transfer Cofficient, parallel flow, Counter flow

ABSTRACT: Nanofluids, due to their superior thermal and rheological properties, can be used to increase the shell and tube heat exchanger performance and efficiency. Both parallel and counter flows of acting will be are studied using rotating the inside tube at speed range from 0 to 1500 rpm. The results show a significant improvement in the heat transfer rate due to the swirl effect created by the the turbulence acting as a catalyst. The heat transfer coefficient is enhanced by using the nanoparticles by up to 25% when compared to the base fluid.

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