Arab Academy
for Science, Technology and Maritime Transport

The International Maritime Transport and Logistics Conference

"MARLOG 14"

Conference Book

Artificial Intelligence Implementations

Towards Shaping the Future of the Digital World

14 Marlog 2025

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

23-25 Feb, 2025 - Alexandria, Egypt


14
Marlog
2025

The International Maritime Transport and Logistics Conference (MARLOG 14)

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

Deputy Prime Minister for Industrial Development

Minister of Industry and Transport

Alexandria, Egypt

23-25 Feb, 2025


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Arab Academy for Science, Technology and Maritime Transport

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A Word from the Conference Chairman

As President of the Arab Academy for Science, Technology and Maritime Transport (AASTMT) and Chairman of the International Maritime Transport and Logistics Conference, MARLOG 14, I extend to you my most sincere greetings and profound gratitude for your invaluable presence.

Since its establishment in 1972, AASTMT has steadfastly fulfilled its mandate as a leading educational institution and a pivotal technical resource for the Arab League. We have consistently striven to foster academic excellence and provide a platform for collaborative research and development across diverse fields. In this context, MARLOG stands as a testament to AASTMT's dedication to facilitating the exchange of knowledge and best practices.

MARLOG 14 serves as a paramount forum for the dissemination of cutting-edge research and the exploration of emerging trends in Maritime Transport, Logistics, Engineering, Environment, and Economics. We are deeply committed to providing a conducive environment for dialogue and collaboration, enabling participants to engage in meaningful discussions and forge lasting partnerships.

The presence of renowned figures, industry leaders, and academic experts at MARLOG 14 is a source of great honor and inspiration. Your active participation, through insightful presentations, engaging discussions, and collaborative networking, has been instrumental in ensuring the success of this conference. We are confident that the knowledge shared, and the connections formed during MARLOG 14 will contribute significantly to the advancement of our collective goals.

We trust that your experience at MARLOG 14 has been both enriching and rewarding, and we look forward to your continued engagement in future editions of this prestigious conference."

Prof. Ismail Abdel Ghafar Ismail Farag

President of AASTMT

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Preface

It was with great pleasure that I, alongside the Organizing Committee of the International Maritime Transport and Logistics Conference, MARLOG 14, extended a warm Thank you to all participants. Building upon the established legacy of MARLOG as a premier platform for knowledge exchange, we were committed to fostering an environment conducive to intellectual discourse and collaborative advancement.

MARLOG, through its successive editions, evolved into more than a mere annual gathering; it became a vital catalyst for progress within the Engineering, maritime and logistics sectors. This distinguished event served as a nexus for global experts, facilitating the exploration of innovative solutions to the challenges confronting our industries. The convergence of esteemed specialists from leading port authorities, academic institutions, and industry enterprises at MARLOG underscored its pivotal role in shaping the future of maritime transport and logistics.

MARLOG 14 Conference Proceedings proudly presented 45 meticulously selected research papers, 41 of which were presented within the conference's comprehensive technical program. The stringent double-blind peer review process and the thorough evaluation by our esteemed Technical Committee ensured the selection of papers that exemplified the highest standards of scholarship and relevance.

Finally, I wished to express my sincere gratitude to all those who contributed to the realization of MARLOG 14. In particular, I extended my appreciation to Professor Ismail Abdel Ghafar Ismail Farag, President of AASTMT and Conference Chairman, for his visionary leadership and unwavering support. We were also indebted to our generous sponsors, esteemed partners, and dedicated co-organizers, whose contributions were indispensable. The Organizing Committee, the Technical Committee, the reviewers, and our exceptional staff deserved our highest commendation for their unwavering commitment and meticulous execution.

We were confident that MARLOG 14 served as a fertile ground for the exchange of ideas, the forging of partnerships, and the advancement of our shared goals. We hope that your participation was both beneficial and joyful. We look forward to welcoming you in MARLOG15!

Prof. Akram Soliman Elselmy

Editor in Chief

Themes

- Driving Economic Growth in the Maritime Sector Using Technological Innovation
- Smart Port Solutions Through Digitalization, AI, and Sustainable Practices
- The Role of AI in Enhancing Maritime Efficiency and Sustainability A Multi-Disciplinary Approach
- Building Resilient Maritime Supply Chains The Role of AI
- Data-Driven Insights in Maritime Engineering Utilizing AI and Advanced Modeling
- AI and Sustainability in Maritime Exploring Innovations in Ports, Waterways, and Coastal Zones
- The Evolving Port Addressing Climate Change, Energy Transition, and Technological Advancements
- Sustainable Port Development in Egypt Case Studies on Green Hydrogen, Smart Port Operations, and Transportation Optimization
- Smart Energy Solutions for Maritime Growth Optimizing Port Infrastructure
- Advances in Maritime Engineering From Simulations to AI-Driven Solutions
- The Impact of AI on Society and the Maritime Sector Ethical Considerations, Leadership, and Intellectual Property
- Navigating the Next Wave AI and Industrial Shifts in the Maritime Sector
- Supply Chain Transformation Leveraging Technology for Resilience, Efficiency, and Sustainability

MARLOG 14 Organization

Conference Chairman

Prof. Ismail Abdel Ghaffar Ismail Farag

President, Arab Academy for Science, Technology and Maritime Transport, Egypt

Organizing Committee

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 Scientific Partners.

This collaborative effort is the core reason for MARLOG growing success each year.

Prof. Akram Soliman Elselmy	Head of Organizing Committee. Dean, College of Engineering and Technology, AASTMT, Alexandria.
Prof. Alaa Mahmoud Morsy	Dean, Port Training Institute and Maritime Research and Consultation Center, AASTMT.
Prof. Mohamed Mahmoud Ali	President Assistant for Technology Development, AASTMT.
Dr. Mohey Eldeen Elsayeh	Dean, College of Maritime Transport & Technology, AASTMT.
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Dr. Sandra Hadad	Vice Dean for Postgraduate Studies and Scientific Research, College of International Transport & Logistics, ASSTMT, Alexandria.

Technical Committee

Head of the Technical Committee

Prof. Yousry El Gamal

Chairman of IT Committee, National Council of Education,
Culture, and Science (UNESCO, ISESCO, ALECSO).
Former Minister of Education,
Former Head, board of Trustee, Egypt-Japan University, Egypt.

Prof. Martin Renilson	Past President, Royal Institution of Naval Architects, Australian Division, Australia.
Prof. Bojan Rosi	Former Dean, Faculty of Logistics, University of Maribor, Slovenia.
Prof. Roberto Revetria	Professor of Mechanical Engineering, University of Genoa, Italy.
Prof. Changqian Guan	Head, Department of Marine Transportation, U.S. Merchant Marine Academy, USA.
Prof. Sam Yahalom	Professor, Department of International Trade and Transport, State University of New York Maritime College, USA.
Prof. Qingcheng Zeng	Professor, School of Maritime Economics and Management, Dalian Maritime University, China.
Prof. Son "Shan" Nguyen	Department of Maritime and Logistics Management Australian Maritime College, National Centre for Ports and Shipping, University of Tasmania, Australia.
Prof. Salman Nazir	Training and Assessment Research Group (TARG), Department of Maritime Operations, Faculty of Technology, Natural Sciences and Maritime Sciences, University of South-eastern Norway, Norway.
Prof. Aristotelis Naniopoulos	Division of Transportation, Infrastructure and Regional Planning Engineering, Faculty of Engineering, Aristotle University of Thessaloniki, Greece.
Prof. Ahmed Amin	Professor, Civil Engineering Department, Suez Canal University.
Prof. Alaa A. Abdel Bary	Vice President for Graduate Studies & Scientific Research, AASTMT.
Prof. Yasser Elsonbaty	Vice President for Information and communication Technology, AASTMT.

Prof. Ehab Mahmoud El Kassas	President Assistant for Research and Consultation, AASTMT
Prof. Islam El-Nakib	Dean, College of International Transport & Logistics, AASTMT, El Alamein.
Dr. Mohammed Daoud	President consultant for maritime affair, AASTMT.
Dr. Elsenousy Balbaa	Vice President for Maritime Affairs, AASTMT.
Dr. Mahmoud El-Bawab	Dean, Maritime Education and Training Quality.
Prof. Alaa Eldin Ahmed Khalil	Vice Dean for Postgraduate and Scientific Research, College of Engineering and Technology, AASTMT.
Dr. Hyundeok Kim	Dean, College of Future Convergence, Sunchon National University, South Korea.
Dr. Babak Banijamali	Vice-Chairman of Maritime Navigation Commission (MarCom) World Association for Waterborne Transport Infrastructure, PIANC
Dr. Nikitas Nikitakos,	Professor of Shipping Informatics and New Technologies, Department of Shipping Trade and Transport, University of the Aegean, Greece Visiting professor, World Maritime University, Sweden.
Dr. Gianfranco Fancello	Professor, Department of Civil and Environmental Engineering and Architecture, Transportation sector, University of Cagliari. General Manager, Centre of Excellence for Transport of the Sardinia region, Italy.
Dr. George K. Vaggelas	Associate Professor, Department of Shipping, Trade & Transport, University of the Aegean, Greece Partner at "Ports and Shipping Advisory"
Dr. Patrizia Serra	Associate Professor, Department of Civil and Environmental Engineering and Architecture - Transportation sector, University of Cagliari, Italy
Dr.Philippe Guillaumet	International and European Projects Manager, Port of Marseille, France.
Eng. Francesc Carbonell	Head of Sector, Transport and Urban Development, Union for the Mediterranean.
Mrs. Ana Rumbeu Daviu	Training Director, Valencia Port Foundation, Port Authority of Valencia, Spain.

Session Chairs

Session 1	**Driving Economic Growth in the Maritime Sector Using Technological Innovation**

Chair

Dr. Babak Banijamali

Vice-Chairman of Maritime Navigation Commission (MarCom)

PIANC, Belgium

Session 2	**Smart Port Solutions Through Digitalization, AI, and Sustainable Practices**

Chair

Prof. Ismail Abdel Ghafar Ismail Farag

President, AASTMT. Chairman, MARLOG Conference

Session 3A	**The Role of AI in Enhancing Maritime Efficiency and Sustainability A Multi-Disciplinary Approach**

Chair

Prof. Alexandros Nikitas

Professor, Sustainable Transport Futures, Future Mobility Centre, Huddersfield Business School, University of Huddersfield, UK

Session 3B	**Building Resilient Maritime Supply Chains The Role of AI**

Chair

Mr. Pino Musolino

President, MEDPorts Association President and CEO, North Central Tyrrhenian Sea Port Authority - Ports of Rome, Italy

Session 4A	**Data-Driven Insights in Maritime Engineering Utilizing AI and Advanced Modeling**

Chair

Prof. Nikitas Nikitakos

Professor of Shipping Informatics and New Technologies,

Department of Shipping Trade and Transport,

University of the Aegean, Greece Visiting professor, World Maritime University, Sweden.

Session 4B	**AI and Sustainability in Maritime Exploring Innovations in Ports, Waterways, and Coastal Zones**
Chair **Prof. Ahmed Amin** **Professor, Civil Engineering Department, Suez Canal University.**	
Session 5A	**The Evolving Port Addressing Climate Change, Energy Transition, and Technological Advancements**
Chair **Prof. Lina Montuori** **Applied Thermodynamics Department, Polytechnic University of Valencia, Spain**	
Session 5B	**Sustainable Port Development in Egypt Case Studies on Green Hydrogen,** **Smart Port Operations, and Transportation Optimization**
Chair **Prof. Khaled Elsakaty** **Dean, College of International Transport and Logistics, AASTMT Cairo, Egypt**	
Session 6A	**Smart Energy Solutions for Maritime Growth Optimizing Port Infrastructure**
Chair **Prof. Holmer Savastano Junior** **Full Professor, University of São Paulo, Brazil**	
Session 6B	**Advances in Maritime Engineering** **From Simulations to AI-Driven Solutions**
Chair **Prof. Roberto Revetria** **Professor of Mechanical Engineering, University of Genoa, Italy.**	

Session 7A	**The Impact of AI on Society and the Maritime Sector Ethical Considerations, Leadership, and Intellectual Property**
Chair **Prof. Yousry Elgamal** **Chairman, IT Committee, National Council of Education, Culture, and Science** **(UNESCO, ISESCO, ALECSO) Former Minister of Education**	
Session 7B	**Navigating the Next Wave** **AI and Industrial Shifts in the Maritime Sector**
Chair **Dr. Mohi El Din Mohamed El Sayeh** **Dean, College of Maritime Transport and Technology MARLOG Conference Organizing Committee member**	
Session 8	**Supply Chain Transformation Leveraging Technology for Resilience, Efficiency, and Sustainability**
Chair **Prof. Sara Elgazzar** **,Dean, College of International Transport and Logistics** **Alexandria MARLOG Conference Organizing Committee member**	

MARLOG 14 Organizing Team

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MARLOG Conference Book Editors

Shehab Eldin M. Tawfik, Amira Mamdouh

MARLOG Public Relations

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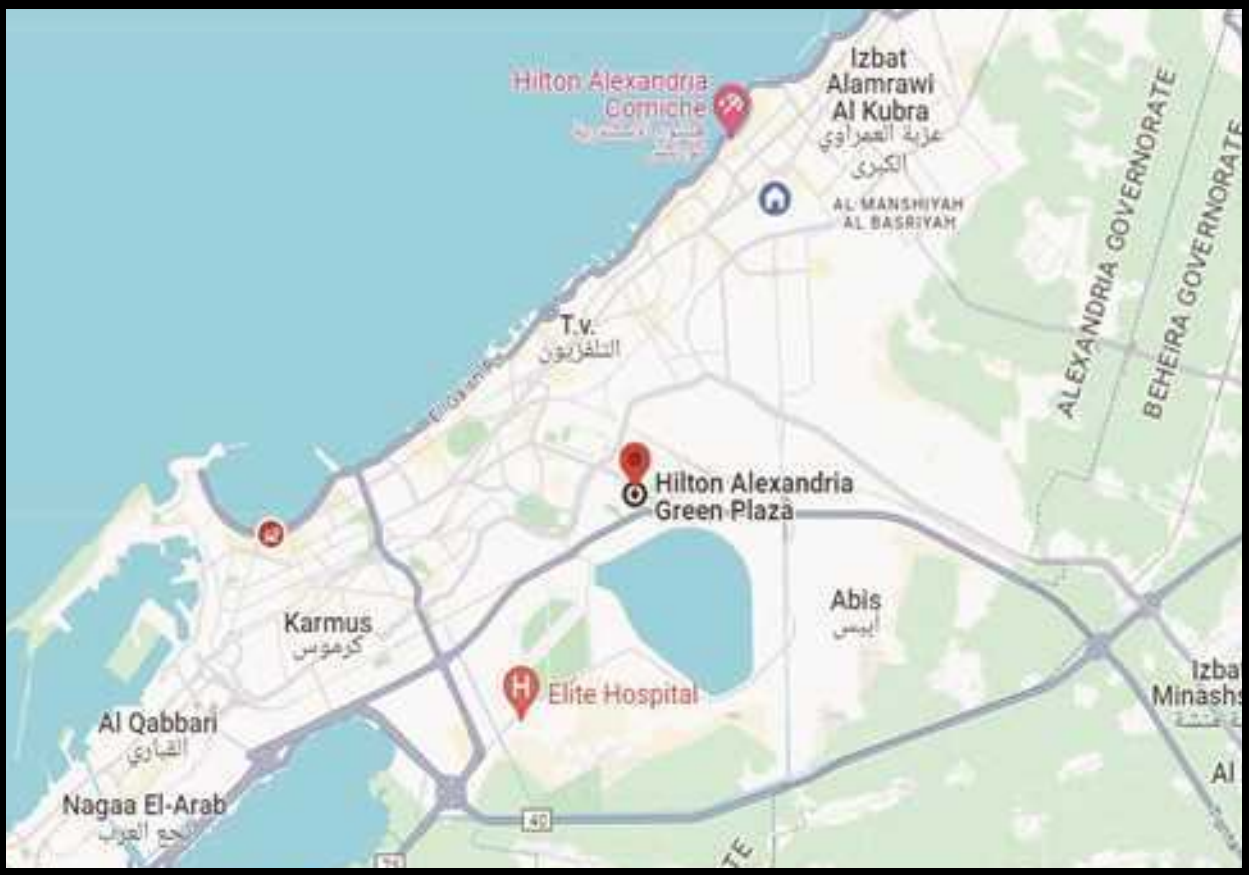
MARLOG 14

General Information

Venue

The MARLOG-14 Conference was held in

The Hilton Green Plaza Hotel, Alexandria, Egypt.



Floor Plan

Academic Partners

UNIVERSITÀ DEGLI STUDI
DI GENOVA

University of
Staffordshire

Scientific Partner

PIANC · A.D. 1885 · AIPCN
NAVIGARE NECESSE

The World Association for Waterborne Transport Infrastructure (PIANC)

MARLOG 14 Co-Organizers

Escola Europea - Intermodal Transport

MEDPorts Association

Union for the Mediterranean (UfM)

Valenciaport Foundation

Antwerp/Flanders Port Training Center

Inland Waterways International

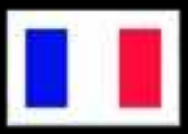
Institute of Shipping Economics and Logistics

Global Shipping Think Tank Alliance

Participating Countries

Italy

Spain



France

Egypt

Palestine

Morocco

Belgium

Bahrain

Kuwait

KSA

Romaia

Oman

Greece

Singapore

Brazil

Turkey

Germany

Libya

China

Lebanon

UK

Sudan

Holland

Jordan

Somalia

Tunisia

Iraq

Tanzania

Mauritania

Yemen

Sweden

Academic Participation

Arab Academy for Science, Technology and Maritime Transport, Egypt

World Maritime University, Sweden

Isotta Fraschini Company for Engines, Italy

Egyptian Atomic Energy Authority

Transilvania University, Brasov, Romania

National and Kapodistrian University of Athens, Greece

University of São Paulo, Brazil

University of Bremen, Germany

Institute of Shipping Economics and Shipping Logistics

Galala University

Nile Research Institute

Polytechnica University, Romania

University of the Eagan, Greece

German University of Technology, Muscat, Oman,

Military Technical College

Cairo University, Egypt

Alexandria University, Egypt

National Telecom Regulatory Authority

Polytechnic University of Bari, Italy

Damietta Comtainer and Cargo Handeling Company

University of Malta, Malta

Babeş-Bolyai University, Cluj-Napoca, Romania

University of Genoa, Italy

National University of Singapore, Singapore,

Autorità di Sistema Portuale del Mar Tirreno Settentrionale, Italy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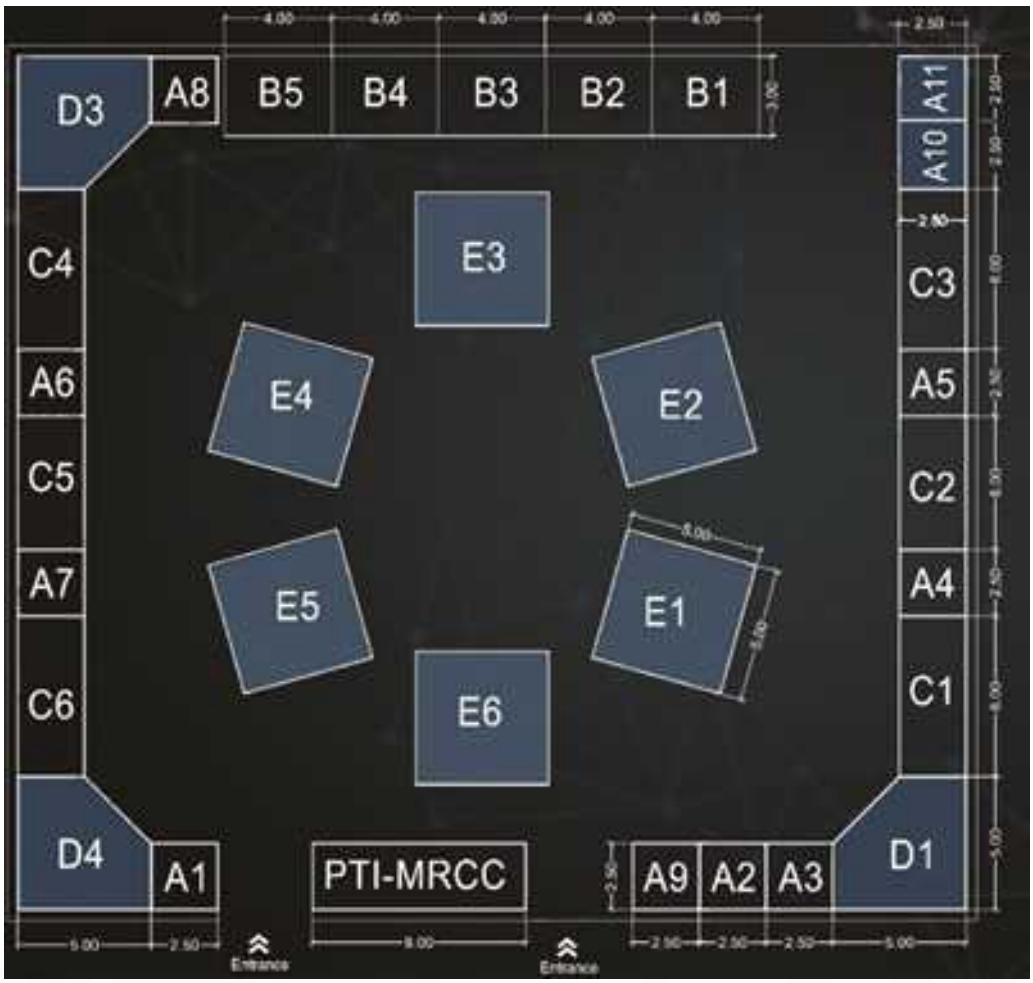
2025

MARLOG 14 Exhibition

(MarTech2025)

Exhibition Layout



MarTech2025 Exhibitors

Booth	Logo	Exhibitor
E1		Damietta Container & Cargo Handling Co.
E2-E4, B1-B5		CLICK ITS (Information Technology Solutions)
E5, D2		NextGen Communications
E6		Misurata Free Zone
D1		Youngship Egypt
D3		Systel Telecom
D4		Fixed Solutions
C1		The General Egyptian Warehouses Co.
C2		ZENITH ENTERPRISE
C3		Integrated Simulators Complex

Booth	Logo	Exhibitor
C4		Canal Harbors and Great Projects Co.
C5		Timsah Ship Building Co.
C6		Port Said Engineering Works Co.
A1		Regional Maritime Security Institute (RMSI)
A2		International Transport and Logistics Institute
A3		College of Engineering and Technology (CET), AASTMT
A4		Integrated Solutions for Ports (ISFP)
A5		AASTMT Diving Program (College of Maritime Transport and Technology)
A6		Canal Company for Ropes

Booth	Logo	Exhibitor
A7		Suez Shipyard Co.
A8		Light Strong Fast
A9		EGYGRU Import and Agencies
A10		STAR SHINE SHIPPING AND LOGISTICS COMPANY
A11		Maritime Postgraduate Studies Institute

Conference Statistics

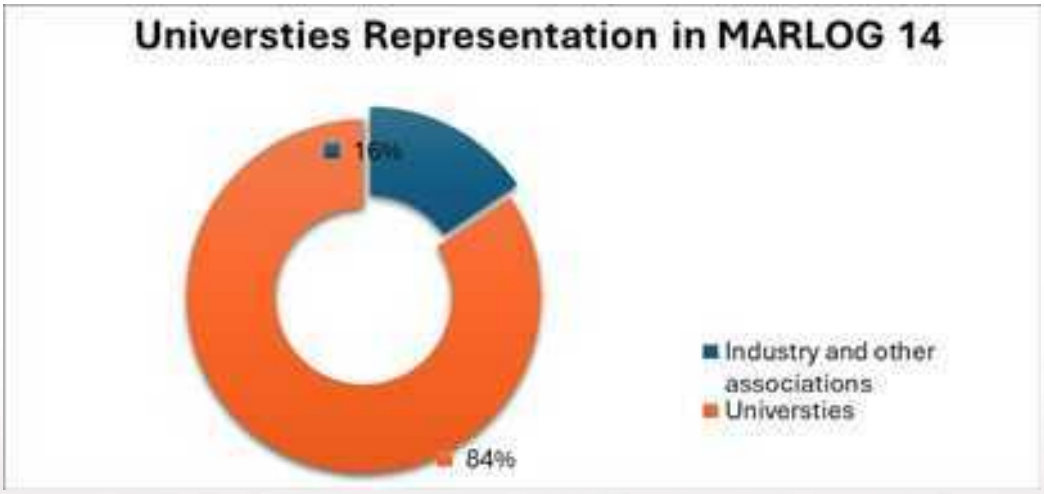
Attendance

Total Number of Participants is 787

Conference Program

- 57 Presentations
- 12 Keynote Speakers
- 13 Session Chairs
- 51 Research Papers
- 45 Accepted Research Papers and 6 Rejected

Universities' Participation



Universities Representation reached 84% this year (Last year was 70%)

MARLOG 14

Technical Program

MARLOG 14

Artificial Intelligence Implementations

Towards Shaping the Future of the Digital World

DAY 1
Sunday, 23rd February 2025

Session I

Driving Economic Growth in the Maritime Sector Using Technological Innovation

Session Chair

Dr. Babak Banijamali

Vice-Chairman of Maritime Navigation Commission (MarCom)

PIANC, Belgium

13 00	The Digital Transformation and its Impact on Maritime Transport Geoeconomy, Case study DCHC as a Hub Terminal in Damietta Port/Egypt/East Mediterranean Admiral Dr. Rafik Galal Ibrahim and Ahmed Abbas Badie Eltobshy Chairman, Damietta Container and Cargo Handling, Damietta, Egypt.
13 15	The application of AI in the Port Management The case of Algeciras Port. Mr. Gerardo Landaluce Chairman of the Algeciras Bay Port Authority, Vice President of MEDPorts Association, Spain.
13 30	Technological Innovation in Ports A Catalyst for Economic Growth" Mr. Pino Musolino President, MEDPorts Association President and CEO, North Central Tyrrhenian Sea Port Authority - Ports of Rome, Italy.
13 45	Technological Innovation and Economic Growth in the Port of Valencia Challenges and AI Projects in the Port Environment" Mr. Javier Cubas Rodriguez Senior Port Cluster Development Consultant, Valencia Port Foundation, Valencia, Spain.
14 00	**Session Discussion**
14 15	**Break**

Session 2

Smart Port Solutions Through Digitalization, AI, and Sustainable Practices

Session Chair

Prof. Ismail Abdel Ghafar Ismail Farag

President, AASTMT

14 45	The Future of Mobility Pathways to Sustainable and Smart Transport Prof. Alexandros Nikitas ,Professor, Sustainable Transport Futures Future Mobility Centre, Huddersfield Business School, University of Huddersfield, UK
15 00	Navigating Complexity Harnessing the Power of Emerging Technologies in a Port Environment ,Mr. Danny Van Dessel .Digital Transformation Manager, Port of Antwerp, Antwerp, Belgium
15 15	Envisioning Ports as Smart Grid Optimization of the Energy Infrastructure for a Sustainable Growth of the Maritime Sector Prof. Lina Montuori .Applied Thermodynamics Department of the Polytechnic University of Valencia, Spain
15 30	**Session Discussion**
16 00	**Lunch**

MARLOG 14

Artificial Intelligence Implementations

Towards Shaping the Future of the Digital World

DAY 2
Monday, 24th February 2025

Session 3 A

The Role of AI in Enhancing Maritime Efficiency and Sustainability

A Multi-Disciplinary Approach

Session Chair

Prof. Alexandros Nikitas

Professor, Sustainable Transport Futures,

Future Mobility Centre, Huddersfield Business School,

University of Huddersfield, UK

09 00	A Proposed Workflow to Fostering Academic Teaching Practices Using Generative AI Chatbots Marine Electrification as a Guide Course Example Prof. Hamdy Ahmed Ashour ,Professor, Electrical and Control Engineering Department .College of Engineering and Technology, AASTMT, Egypt
09 15	Application of AI in Logistics Training, Education, and Skill Development Mr. Eduard Rodes .Director, Escola Europea for Intermodal Transport, Spain
09 30	Empowering Maritime Training with AI How Maritime Trainer Leverages Artificial Intelligence Eng. Aashish Puri Chief Revenue Officer, Maritime Trainer Institute and Simulator Center, Tur- .key
09 45	Comparative Study for Training Using Virtual Reality Simulating and Conventional Fire-fighting Prof. Alaa Morsy, Eng. Mohamed Abdelaziz and Dr. Mona M. Awad .Head, Scientific Research Department, Port Training Institute, AASTMT
10 00	Enhancing Connectivity and Sustainability Leveraging AI in Passenger Terminals of Port Cities in Egypt Dr. Nadine Ghania, Dr. Mehmen Abdelqader, and Dr. Hagar Mohamed ,Assistance Professor, Sustainable Environmental Architecture .College of Engineering & Technology, AASTMT, Egypt
10 15	**Session Discussion**
10 30	**Coffee Break**

Session 3 B

Building Resilient Maritime Supply Chains The Role of AI

Session Chair

Mr. Pino Musolino

President, MEDPorts Association

President and CEO, North Central Tyrrhenian Sea Port Authority - Ports of Rome, Italy

09 00	AI and Technology-Enabled Supply Chain Security Prof. Puay Guan Goh, Mr. Hee Lye Jason Teo, Mr. Rong Sheng Lim and Ms. Syahirah Muyassarah Binte Aziz NUS Business School, Department of Analytics and Operations Academic Director, MSc Industry 4.0, Track Leader, Centre for Maritime Studies National University of Singapore, Singapore
09 15	Blockchain Adoption for Mitigating Maritime Supply Chain Disruptions Challenges and Opportunities Dr. Mahira Abdel-Shafie, and Dr. Yasmine Rashed Logistics and Supply Chain Management Program, College of Administrative Scienc- ,es .Galala University, Egypt
09 30	Establishment an Amazon Hub in Oman Ms. Jumana Al Hadadi, Dr. Mehdi Kamran and Dr. Khaled S Abdallah ,Department of Logistics, Tourism, and Services Management German University of Technology in Oman, Oman
09 45	Enhancing Supply Chain Resilience Through AI Chatbot Service Quality Dr. Ashrakat Osama, and Prof. Khaled Elsakaty ,Assistant Lecturer, College of International Transport and Logistics, Smart Village .Arab Academy for Science, Technology, and Maritime Transport, Egypt
10 00	**Session Discussion**
10 30	**Coffee Break**

Session 4 A

Data-Driven Insights in Maritime Engineering Utilizing AI and Advanced Modeling

Session Chair

Prof. Nikitas Nikitakos

Professor of Shipping Informatics and New Technologies,

Department of Shipping Trade and Transport, University of the Aegean, Greece

Visiting professor, World Maritime University, Sweden.

11 15	**Integrating Continuous Pollutant Measurements with Time-Lapse Photography to Evaluate Inland Vessel Surroundings' Influence on Wheelhouse Indoor Air Quality** Dr. Olivier Senjin Antwerp Maritime Academy, Antwerp, Belgium.
11 30	**A Study of Passive Flow on NATO-GD Ship Model AIRWAKE Using Computational Fluid Dynamics** Eng. Abd Elmonaim E. Arakraa, Eng. Saleholdin A. Mohamad, Dr. Ahmed S. Shehata, and Dr. Khaled Elsherbiny Assistant Professor, Marine and Offshore Engineering Department, College of Engineering and Technology, AASTMT, Alexandria, Egypt.
11 45	**Optimizing the Draft of a Quay Wall to the Anchor Length Ratio Using Finite Element Numerical Model** Eng. Omar Kamel, Prof. Tarek Mostafa, Prof. Akram Soliman, and Prof. Maysara El-Tahlawi Teaching Assistant, Building and Construction Engineering Department, College of Engineering and Technology, AASTMT Senior Geotechnical Engineer, CMC Engineering Office, Alexandria, Egypt.
12 00	**A Parametric Analysis to Investigate the Soil-Structure Interaction on Quay Walls Using Finite Element Modeling** Prof. Alaa M. Morsy, Prof. Akram Soliman Elsehmy, and Eng. Amany S. Ramadan Senior Maritime Civil Engineer, M.Sc. Student, College of Engineering and Technology, AASTMT
12 15	**Behavior of Footing Group Resting on Collapsible Soil Based on Experimental and Numerical Study** Prof. Tarek Abdelhady, Dr. Ashraf Nazir, Dr. Ahmed Ragheb, and Eng. Gehad Saad Structural Engineer, Ph.D. Student, College of Engineering and Technology, AASTMT, Alexandria, Egypt.
12 30	**Session Discussion**
12 45	**Break**

Session 4 B

AI and Sustainability in Maritime

Exploring Innovations in Ports, Waterways, and Coastal Zones

Session Chair

Prof. Lina Montuori

Applied Thermodynamics Department, Polytechnic University of Valencia, Spain

11 15	Unlocking AI Navigating Challenges in Ports and Waterways Prof. Mark Van Koningsveld Professor, Ports and Waterways, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Netherlands.
11 30	Navigating the Future of Inland Waterways Embracing Unmanned Barges and AI Technologies Mr. David Edwards-May Former President, Managing Editor, Membership Secretary, IWI, France.
11 45	Dynamics of Oscillating Turbulent Flow Over Coastal Buildings in Ports Using AI Techniques Eng. Miral Michel, Eng. Adham Eladly, Eng. Shehab Mostafa, Eng. Gerges Refaat, Eng. Belal Tarek, Eng. Mohamed Hussein Shokry, Eng. Mahmoud Ismail, Eng. Ibraheem Gamal and Dr. Ahmed S. Shehata. Marine and Offshore Engineering Department, College of Engineering and Technology, AAS-TMT, Alexandria, Egypt.
12 00	An Integrated Approach to Assess Lee Side Erosion in Rubble Mound Groin Systems A Case Study Eng. Donna Alaa Ayad Habib, Dr.Youssef Khairy and Prof. Akram Soliman Ms.c Student, College of Engineering and Technology, AASTMT. Coastal Engineering Company, Dubai.
12 15	**Session Discussion**
12 45	**Break**

Session 5 A

The Evolving Port Addressing Climate Change, Energy Transition, and Technological Advancements

Session Chair

Prof. Ahmed Amin

Professor, Civil Engineering Department, Suez Canal University

13 15	Can AI Address the Shortcomings of the Current Port Emissions Inventory Practices? Ms. Flora Zauzsanna Gulyas Research Associate, Institute of Shipping Economics and Logistics, Bremen, Germany
13 30	Digitalization of Marine Power Sources From Theory to Practice Eng. Giuseppe Gramina, Dr. Francesco Malone, Dr. Guido Malone and Dr. Paolo Lino Electronic and Telecommunication Engineer, the Innovation and Development Centre, Iveco Fraschini Motori Company, Italy.
13 45	A Comparative Analysis Between Wave and Solar Energy for Sustainability in Coastal zones; Case Study Alexandria Port, Egypt Prof.Wael A. Kamel, Dr. Youssef M. Khalil, Prof. Ahmed M.A. Moussa and Eng. Youssef A. Sheta M.Sc. Student, College of Engineering and Technology, AAST-MT Planning Engineer, MSC, Jeddah, Kingdom of Saudi Arabia.
14 00	Emission Reduction Using Ammonia/Diesel Dual Fuel for Marine Diesel Engines in Green Port Application Eng. Mustafa Ibrahim, Eng. Abdallah Ahmed, Eng. Mohamed Osama, Eng. Farida Shaaban, Eng. Abanoub Youssif, Prof. Akram Soliman and Dr. Ahmed S. Sheriata Marine and Offshore Engineering Department, College of Engineering and Technology, AAST-MT, Alexandria, Egypt.
14 15	**Session Discussion**
14 45	**Lunch**

Session 5 B

Sustainable Port Development in Egypt

Case Studies on Green Hydrogen, Smart Port Operations, and Transportation Optimization

Session Chair

Prof. Khaled Elsakty

Dean, College of International Transport and Logistics, AASTMT

Cairo, Egypt

13 15	Environmental Impact of Intelligent Transportation Schedule for Electric Vehicle in Al-Sokhna Port Dr. Shahira I. Karbouna, Dr. Noha H. El-Amary and Dr. Islam S. Elhosin Assistant Professor, College of International Transport and Logistics (CITL), AASTMT, Cairo, Egypt.
13 30	Analyzing the Implementation of Terminal Operating System on Enhancing the Efficiency of Alexandria Container Terminal Prof. Islam Elnakib and Dr. Ahmed Ismail Dean, College of International Transport and Logistics, ElAlamen. Arab Academy of Science, Technology & Maritime Transport, Egypt., AASTMT
13 45	A Proposed Technique for Producing Green Hydrogen, in a suggested Hydrogen Supply Center at Alsokhna, Gulf of Suez Dr. Ayman El – Nahrawy and Mr. Mohamed Safwat Head, Ports and Logistics Programs, Port Training Institute, Arab Academy for Science, Technology and Maritime Transport, Alexandria, Egypt
14 00	Proposing a Framework for Establishing a Green Energy Logistic Hub An Empirical Study in Egypt Capt. Shady Magdy Mahmoud, Dr. Mostafa Abdel Geliel, and Prof. Sara El Gazzar PhD student, Maritime Postgraduate Studies Institute, Arab Academy for Science, Technology and Maritime Transport, Alexandria, Egypt.
14 15	**Session Discussion**
14 45	**Lunch**

MARLOG 14

Artificial Intelligence Implementations

Towards Shaping the Future of the Digital World

DAY 3
Tuesday, 25th February 2025

Session 6 A

Smart Energy Solutions for Maritime Growth

Optimizing Port Infrastructure

Session Chair

Prof. Holmer Savastano Junior

Full Professor, University of São Paulo, Brazil

09 00	**AI-Driven Optimization of Hydrogen and Methane Fuel Strategies for Sustainable Maritime Decarbonization** Eng. Ali Salah, Dr. Adel A. Banawan, Prof. Amira Zaki, and Dr. Ahmed S. Shehata Marine Consultant, PhD Candidate, College of Engineering and Technology, AASTMT
09 15	**Seanergy Project Master Plan for Port Energy Transition** Dr. Anas Saleh Mohammad Alamoush and Dr. Fabio Ballini and Dr. Monica Canepa Research Associate, Maritime Energy Management, World Maritime University, Sweden
09 30	**Improving the Energy Efficiency of Port Facilities and Their Sustainable Development Using Solar Energy Evidence from Romania** Dr. Laura-Alexandra Dorofteiand Prof. Gheorghe Militaru Professor, Management and Industrial Engineering, University POLITEHNICA of Bucharest, Romania
09 45	**Layout Optimization for Offshore Wind Farms Construction in Egypt Achieving Maximum Energy Efficiency** Eng. Abdallah M. Gobara, Dr. Elbadr O. Elgendi, Prof. Akram S. Elsehmy, and Dr. Ahmed S. Shehata Proposals Engineer, Leading Construction Consultancy Firm Teaching Assistant at the Arab Academy for Science, Technology, and Maritime Transport, Alexandria, Egypt
10 00	**Session Discussion**
10 15	**Coffee Break**

Session 6 B

Advances in Maritime Engineering

From Simulations to AI-Driven Solutions

Session Chair

Prof. Roberto Revetria

Professor of Mechanical Engineering, University of Genoa, Italy.

09 00	The Opportunity of a Benchmarking Tool for Obstacle Avoidance in Autonomous Shipping Dr. Kuderna-Iulian Benta, and Prof. Dana-Corina Deselnicu Assistant Professor, Department of Computer Science, Faculty of Mathematics and Informatics Babes-Bolyai University, Cluj-Napoca, Romania.
09 15	Enhancing Maritime Search and Rescue (SAR) Operations Using UAV-Based Flight Control Systems Opportunities, and Challenges Capt. Eslam Ramadan Badry and Mr. Moaaz Noureldin Lecturer, Basic Nautical Studies, College of Maritime Transport and Logistics, AASTMT.
09 30	Enhancing Maritime Safety Optimizing Fairway Design Through Multi-Arc Configurations Eng. Miral Michel, Eng. Gerges Refaat Fawzy, Eng. Youssef Wael Hamed, Eng. Zeyad Eng. Ayman Soliman, Eng. Mohamed Elnegouly, Dr. Ahmed Mehanna, and Dr. Ahmed S. Shehata Student, Marine and Offshore Engineering, College of Engineering and Technology, AASTMT, Alexandria, Egypt.
09 45	Utilizations of Mobile Applications in Maritime Search and Rescue Operations Ms. Nahed Mohamed Reyad Hashesh, Mr. Mohamed Anwar Eldwaik, Dr. Karim Mohamed Aboul-Dahab, Mr. Hussein Elsherif Hussein Senior Specialist, Maritime Telecom Services The National Telecom Regulatory Authority, Egypt.
10 00	**Session Discussion**
10 15	**Coffee Break**

Session 7A

The Impact of AI on Society and the Maritime Sector

Ethical Considerations, Leadership, and Intellectual Property,"

Session Chair

Prof. Yousry Elgamal

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

Former Minister of Education

10 45	AI and Big data at Sea Their Potential Impacts on Seafarers Dr. Khanssa Lagdami and, Dr. Eslam Ramadan Badry Gad Associate Professor of Maritime Labour Law and Policy (ITF Seafarers Trust), World Maritime University, Sweden
11 00	Ethical Dilemmas of Using Artificial Intelligence for Leadership Improvement Prof. Liliana Ileana Rozorea, Prof. Florin Gîlea and Prof. Angela Repanovici Vice-Rector, Public Relations and University Image, Transylvania University of Brasov, Romania
11 15	How to Consider Industrial Property and Patents When Using Artificial Intelligence for Creation Prof. Călin Roșca and Prof. Angela Repanovici Dean, Mechanical Engineering Faculty, Transylvania University, Romania.
11 30	Industrial Property of Patents Generated by Artificial Intelligence A Scientometric and Qualitative Analysis Prof. Angela Repanovici and Ms. Gabriela Ivanus Faculty of Product Design and Environment, Transylvania University of Brasov, President, Information Literacy Section, Romanian Library Association, Romania
11 45	**Session Discussion**
12 15	**Break**

Session 7B

Navigating the Next Wave I and Industrial Shifts in the Maritime Sector

Session Chair

Dr. Mohi El Din Mohamed El Sayeh

Dean, College of Maritime Transport and Technology

MARLOG Conference Organizing Committee member

10 45	Port Industry Perception on the Use of Artificial Intelligence. The Case of Greek Ports Dr George Vaggelas and Dr Kassiani Stathaki Department of Port Management and Shipping, National and Kapodistrian University of Athens, Greece.
11 00	GenAI in Bridge's Ship Operation Prof. Nikitas Nikitakos, and Dr. Dimitrios Papachristos and Dr. Sofia Kallou Professor of Shipping Informatics and New Technologies, Department of Shipping Trade and Transport, University of the Aegean, Greece. Visiting professor, World Maritime University, Sweden.
11 15	New Challenges for a Low-Carbon Future A Materials Perspective Dr. Ana Carolina Constâncio Trindade, Dr. Adriano Galvão de Souza Azevedo, Dr. Leo Maia do Amaral, and Prof. Holmer Savastano Junior Full Professor, University of São Paulo, Brazil.
11 30	Industrial Relocation of Manufacturing Companies Prof. Dana Corina Deselnicu, Dr. Beatrice Alexandra Lupu, Prof. Frank Bezzina, and Dr. Sandra Samy George Haddad Director of the Doctoral School of Entrepreneurship, Business Engineering and Management, University POLITEHNICA of Bucharest, Romania.
11 45	**Session Discussion**
12 15	**Break**

Session 8

Supply Chain Transformation

Leveraging Technology for Resilience, Efficiency, and Sustainability"

Session Chair

Prof. Sara Elgazzar

Dean, College of International Transport and Logistics, Alexandria

MARLOG Conference Organizing Committee member

12 30	Building Resilient Maritime Supply Chains Through Mediterranean Ports Mr. Jordi Torrent Head of Strategy, Port of Barcelona, MEDPorts Association Secretary General, Barcelona, Spain.
12 45	Analyzing Vulnerabilities in the Oil and Gas Supply Chain of Oman via FMEA Dr. Waad Al Balushi, Dr. Mehdi Kamran, and Dr. Khaled S. Abdallah, Logistics and Supply Chain Management, College of International Transport and Logistics, Arab Academy for Science Technology and Maritime Transport, Cairo, Egypt.
13 00	Integrating Simulation and Optimization for Sustainability Assessment in Complex Supply Chains A Unified Framework with AI Eng. Anastasiia Rozhok, Eng. Khursheed Ahmad and Prof. Roberto Revetria, Department of Mechanical Engineering, University of Genoa, Genoa, Italy.
13 15	Unlocking the Future How Blockchain Influences Sustainable Supply Chain Performance An Empirical Study on the Maritime Industry Dr. Miran I. Hussien, Dr. Randa F. Talaat, and Dr. Ayat Y. Moustafa Business Information Systems (BIS) Department, College of Management and Technology, AASTMT, Alexandria, Egypt.
13 30	**Session Discussion**
13 45	**Break**

MARLOG 14

Best Paper Awards

3rd Place Award


Layout Optimization for Offshore Wind Farms Construction in Egypt: Achieving Maximum Energy Efficiency
Eng. Abdallah M. Gobara
Proposals Engineer, Leading Construction Consultancy Firm,
Teaching Assistant at the Arab Academy for Science, Technology, and Maritime Transport, Alexandria, Egypt
3RD

2nd Place Award

Port Industry Perception on the Use of Artificial Intelligence. The Case of Greek Ports

Dr. George Vaggelas

Department of Port Management and Shipping,
National and Kapodistrian University of Athens,
Greece.

2ND

1st Place Award

Improving the Energy Efficiency of Port Facilities and Their Sustainable Development Using Solar Energy: Evidence from Romania

Prof. Gheorghe Militaru

Professor, Management and Industrial Engineering, University POLITEHNICA of Bucharest, Romania.

1ST

MARLOG 14

Artificial Intelligence Implementations

Towards Shaping the Future of the Digital World

Abstracts

Session I

Driving Economic Growth in the Maritime Sector Using Technological Innovation

The Digital Transformation and its Impact on Maritime Transport Geoeconomy, Case study DCHC as a Hub Terminal in Damietta Port/Egypt/East Mediterranean

Admiral Dr. Rafik Galal Ibrahim
and
Ahmed Abbas Badie Eltobshy

As the global economy undergoes rapid changes with the rise of Asian and African economies, Egypt is set to play a crucial role in the future of international trading. By the year 2075, the GDP of China, India and United States shall be nearly equal, while Indonesia is predicted to come the 4th largest economy of the world by 2050. In this regard, Egyptian positioning along Suez Canal to Africa, Asia and Europe is crucial to improve its participation in the global digital economy. Egypt is set to enhance its standing in international economic arrangements such as BRICS, the Belt and Road Initiative (BRI), and the African Continental Free Trade Area (AfCFTA). Thus, the country's maritime transport sector is increasingly instrumental to realizing its economic ambitions. A key element of this transformation is Damietta Port, which is becoming increasingly important in Egypt's maritime development. On the other hand, technology upgrades at the port including an advanced Vessel Traffic Management System (VTMS) are an issue.Especially since the start of operation of the second new container terminal will make such systems indispensable. means of a case study methodology, this paper analyzes the current operational strategies and technological infrastructure of DCHC, while highlighting advancements involved in making them more efficient. In particular, it conversations about the VTMS represent the next step after the complete implementation of TOS Navis N4 to handle DCHC operations. It is also proposed to use the Portchain portal for vessel berth management. According to the paper, the efforts concerning the implementation of VTMS and the establishment of strategic alliances with globe partners, DCHC will be considerably more competitive in the global digital economy. With DCHC with better quality and advance Services. Damietta Port will be one of the main players in the advancement of Egypt's economy globally.

The application of AI in the Port Management The case of Algeciras Port.

Mr. Gerardo Landaluce

One of the main challenges in the maritime industry is to coordinate all the stakeholders involved in port operations. Traditional digital solutions allow to connect these stakeholders but one step further is needed to move from traditional cyclic planning to automatic, real time continuous planning, gaining visibility, flexibility, and agility. AI comes to help us with this challenge managing a great amount of information and providing predictive and prescriptive capabilities.

Algeciras Port applies different AI solutions, from computer vision to intelligent applications, to improve operational efficiency and increase competitiveness. It is time to demystify this disruptive technology and to know the success history at Algeciras Port.

Technological Innovation in Ports A Catalyst for Economic Growth

Mr. Pino Musolino

This presentation discussed the Transforming Maritime Ports Through Technological Innovation. The maritime sector, particularly ports, is undergoing a revolution driven by technological innovation, notably through the emergence of smart ports and the Port 4.0 framework. By integrating cutting-edge technologies such as IoT, AI, and blockchain, ports are optimizing resource allocation, improving traffic management, and enhancing supply chain visibility, significantly boosting operational efficiency and economic growth. Studies show that a mere 10% increase in maritime transport factors can lead to substantial economic gains. As the industry embraces advancements like autonomous vessels and green shipping solutions, the potential for sustainable economic development expands. Smart ports not only enhance productivity but also champion environmental sustainability through reduced carbon emissions and efficient decision-making powered by data analytics. With AI at the forefront, predictive maintenance and operational optimizations transform traditional ports into smart, resilient hubs. As these technologies evolve, they promise to further bolster the competitiveness and sustainability of the maritime industry, paving the way for a prosperous future.

Technological Innovation and Economic Growth in the Port of Valencia Challenges and AI Projects in the Port Environment”

Mr. Javier Cubas Rodríguez

This presentation explores the Port of Valencia, its strategic importance, and the role of Fundación Valenciaport in driving innovation. It will highlight key challenges faced by the port and examine how Artificial Intelligence (AI) is transforming port operations. Through real-world AI projects, the discussion will showcase practical applications and their impact on efficiency, sustainability, and logistics. The session will conclude with key takeaways on AI’s potential to shape the future of smart ports.

Session 2

Smart Port Solutions Through Digitalization, AI, and Sustainable Practices

The Future of Mobility Pathways to Sustainable and Smart Transport

Prof. Alexandros Nikitas

In a critical era of society-defining transition, where on the one hand climate crisis threatens the survival of our very planet but on the other technology provides opportunities for unprecedented levels of connectivity, sharing and intelligence, transport can be a beacon of hope or a reason for despair. This depends on how transport scholars, professionals and policy-makers decide to plan, engineer and manage the transport eco-system of the future and how users respond to the policies and measures they initiate. This paper is forecasting, with the knowledge available today, how pathways to more sustainable and smarter transport futures can be crafted. It will describe the main game-changing interventions in play, as of now, for cementing the future of mobility and the principles that need to underpin them. Decoding the winning formula to balance out connected, automated, digitised, alternatively fuelled and shared transport technologies like CAVs and MaaS with health-elevating, socially inclusive and integration-enhancing mobility policy and planning is a challenging task but one that can also make a genuine difference.

Navigating Complexity Harnessing the Power of Emerging Technologies in a Port Environment

Mr. Danny Van Dessel

We are the Port of Antwerp-Bruges. Planning the nautical chain from the North Sea to our platform in Antwerp is complex due to physical complexity and we can't change that. We can bring simplicity to the front to manage the complexity in the back.

To start, we demonstrated the power of standalone improvements with AI and digitalization.

We realized that these standalone improvements were just a first step and we needed to commit to an end-to-end approach.

The challenge was that there were many reasons to believe that our dream of full situational awareness was impossible to achieve. Legislation was inadequate, we could not find examples that had already done this on this scale,

With a team of believers, we still managed to deliver.

As we were building our vision of full situational awareness, we realized we needed an enabler that made data and information about the data available, for both insights and for new AI models.

As a next step, we have started the launch of a digital human colleague. This is not just a genAI bot but a robust future-proof framework that will enable us to bring even more simplification.

All efforts are part of a total approach, which is building the APICA ecosystem (Advanced Port Intelligence & Coördination Assistant).

Envisioning Ports as Smart Grid Optimization of the Energy Infrastructure for a Sustainable Growth of the Maritime Sector

Prof. Lina Montuori

Worldwide growing concern about the increase in total CO2 emissions due to ports and terminals activities is leading the way to adopt new sustainable strategies. The revised IMO plan on "Reduction of GHG Emissions from Ships" sets the ambitious goal of net zero emissions by 2050 in order to fight the expected rise of the CO2 emissions in the maritime sector to 130% from 2008 to 2050.

In this article, a novel methodology for the classification of the sustainable actions carried out by ports and terminals have been implemented. Moreover, new indicators have been designed to evaluate the environmental, economic and social impact of the sustainable actions undertaken.

Additionally, the most relevant projects for greenhouse emission reductions adopted by the world's largest shipping ports have been discussed, focusing on the impact of the use of on-shore powered supply in the port operation and optimization of the energy consumption during the daily operation processes by introducing novel energy balancing method as Demand response program. Finally, the main challenges that still need to be addressed have been analyzed, showing the possible future path to advance towards the sustainable development of the maritime sector.

Session 3 A

The Role of AI in Enhancing Maritime Efficiency and Sustainability A Multi-Disciplinary Approach

A Proposed Workflow to Fostering Academic Teaching Practices Using Generative AI Chatbots Marine Electrification as a Guide Course Example

Prof. Hamdy Ahmed Ashour

This paper proposes a systematic workflow for integrating generative AI Chatbots into academic teaching practices. The "Marine " course has been employed as an example guide to verify the generic framework and then explore this integration's potential benefits and challenges. The proposed workflow is divided into four sub- frames; Before- Teaching, During- Teaching, After-Teaching and finally Keep-Connecting. For each frame, guided prompt examples are demonstrated; facilitating the effectiveness of this approach not only in the context of the given course but also can be tailored for any other academic courses. A list of suggests guidelines for educators to leverage the proposed approach is also introduced. This work aims to contribute to the recent development of best practices to utilize generative AI to provide insights into effective pedagogical approaches to enhance academic staff teaching experiences.

Application of AI in Logistics Training, Education, and Skill Development

Mr. Eduard Rodes

This presentation explores the role of AI in logistics training, focusing on the Escola Europea's Port Virtual Lab (PVL). AI-driven tools like simulations, digital twins, and predictive analytics enhance problem-solving and decision-making skills in port logistics. By integrating automation, robotics, and blockchain, PVL prepares professionals for the evolving industry. The session highlights key challenges, essential skills, and AI's impact on sustainable and innovative logistics training.

Empowering Maritime Training with AI How Maritime Trainer Leverages Artificial Intelligence

Eng. Aashish Puri

This presentation explores how Maritime Trainer leverages AI to revolutionize maritime training. By integrating AI into training design, delivery, and operations, it enhances safety, efficiency, and personalized learning. Key innovations include adaptive learning, AI-driven behavioral assessments, and mental health support through the MT Care Module. AI-powered tools like voice recognition, vision analytics, and predictive analytics optimize skill development and operational decision-making. The presentation highlights AI's role in preparing a future-ready maritime workforce through continuous learning, well-being initiatives, and data-driven insights.

Comparative Study for Training Using Virtual Reality Simulating and Conventional Firefighting

Prof. Alaa Morsy, Eng. Mohamed Abdelaziz and Dr. Mona M. Awad

Ports are critical hubs for global trade, and the complex environments they encompass present unique fire hazards due to the presence of flammable materials, large machinery, and congested spaces. Effective firefighting preparedness among port workers is essential to ensure rapid response to emergencies and minimize damage. Traditional firefighting training methods, while valuable, often come with limitations such as safety concerns, high costs, and limited scenario variety.

The fire safety skills training content is too large and complex, due to many problems in the actual training which requires varies and integrated training techniques such as simulation training systems. Virtual seaport firefighting training system based on virtual reality (VR) which plays is an important role in building capacities and enhancing port-workers skills.

This study investigates the impact of virtual reality (VR) firefighting simulations on enhancing the firefighting capabilities of port workers. VR technology provides an immersive, risk-free environment where workers can experience realistic fire scenarios tailored to the specific challenges of port environments. These simulations offer dynamic training modules that replicate various fire hazards—such as fuel spills, container fires, and shipboard emergencies—allowing port workers to practice their response strategies, decision-making, and teamwork under pressure.

The research examines how VR simulations improve key firefighting skills such as hazard recognition, risk assessment, and the effective use of firefighting equipment. By providing frequent and varied training opportunities without the logistical challenges of traditional methods, VR simulations have shown to significantly enhance port workers' readiness for emergency situations. Additionally, the study highlights the benefits of cost efficiency, safety, and scalability of VR-based training.

The findings demonstrate that VR firefighting simulations are a powerful tool for improving the firefighting preparedness of port workers, equipping them with the necessary skills to handle high-risk situations more effectively, thereby contributing to a safer port environment.

Furthermore, the study provides a case study represented in an effective platform for firefighting training system in ports, as well as a comparative study between firefighting training using VR Simulation Techniques and Hands-on Training for Port Community is proposed in this research.

Enhancing Connectivity and Sustainability Leveraging AI in Passenger Terminals of Port Cities in Egypt

Dr. Nader Gharib, Dr. Mo'men Abdelqader, and Dr. Hager Mohamed

Port Said and Alexandria are two of the most important Egyptian port cities, but their passenger terminals suffer from multiple problems including the quality of infrastructure and communication systems. They have all had negative repercussions on the traveler experience and perception. The core problem is based on the traditional management techniques used in these terminals, which creates isolated and segmented environments. Moreover, the terminals are not designed to incorporate natural elements and sustainable aspects into their design; therefore, the disparities between the port terminals and their surrounding urban environments are striking. This study will thus, seek to improve Egyptian port passenger terminals by focusing on the incorporation of artificial intelligence (AI) in a novel way. The primary goals and objectives include enhancing information and communication technologies in terminal spaces to support use and occupancy and designing intelligent environment that comprises of natural elements for growth of sustainable structure. These goals target the current problems concerning port terminal operations and are in compliance with current environmental objectives. The adopted research method is analytical-descriptive, collecting both qualitative and quantitative data to evaluate the current terminal operations and facilities. In this respect, performance evaluation methods from an infrastructure point of view are used to establish some areas that need to be upgraded to incorporate larger ships and capacity to transport more passengers. Also, some case analyses are used in the research with the purpose to demonstrate the usefulness of implemented AI tools in order to improve operation productivity and more permanent sustainability performance indicators of certain passenger terminals. This best practice combines the analysis of concerns and feedback of passengers with detailed reports on how terminals function and what their physical structures look like, with the aim of optimizing wayfinding and passengers' movements. The results highlight the positive impact of AI integration especially in the areas of improving the operation efficiency and improving the experience of the users in port passengers' circulation and terminal interconnectivity and environmentally responsible environments. The integration of AI technology strategically improves efficiency and sustains the relations between the different zones and develops the Egyptian port terminals as integrated transport zones. The study proposes specific recommendations for improvement implementing smart communication systems, adopting sustainable design strategies, and developing a comprehensive AI framework for

port operations. These strategic enhancements are expected to create efficient, sustainable terminals while promoting the development of urban waterfront areas. The research underscores the potential of AI technologies as a transformative solution for the challenges faced by Egyptian port passenger terminals, paving the way for a more integrated and sustainable future.

Session 3 B

Building Resilient Maritime Supply Chains
The Role of AI

AI and Technology-Enabled Supply Chain Security

Prof. Puay Guan Goh, Mr. Hee Lye Jason Teo, Mr. Rong Sheng Lim and Ms. Syahirah Muyassarah Binte Aziz

Supply chain security encompasses different areas, such as damage, theft, fraud, and counterfeits. Cargo security has always been an important factor in international trade, especially with ongoing maritime and supply chain disruptions. In consumer products, companies and consumers also have to deal with fake products and fake vendors. We will look at case studies and examples of how AI can be used in cargo tracking and routing, as well as the use of AI to detect fraud and counterfeits.

Blockchain Adoption for Mitigating Maritime Supply Chain Disruptions Challenges and Opportunities

Dr. Mahira Abdel-Shafie, and Dr. Yasmine Rashed

The global maritime supply chain is prone to disruptions as well as innovations, affecting international trade. Businesses, structures, and organizations continually seek approaches to enhance productivity, reliability, and sustainability. Conversely, Supply chain disruptions are seen as a vulnerability that affects interconnected systems. Geopolitical threats, bottlenecks, labor conflicts, and shortages are major factors in disruptions, leading to increased costs and reduced reliability. While ports have been stable performance indicators, new challenges are pressuring their roles in the supply chain. In this research, blockchain technology (BT) is put forward as a means to mitigate and reduce maritime supply chain disruptions. BT can provide trust, transparency, and alliance in the maritime industry. However, limited research has been conducted on its feasibility and potential limitations. Therefore, the paper offers a conceptual investigation of the impact of BT on managing disruptions and addresses the key determinants and obstacles of its application.

Establishment an Amazon Hub in Oman

Ms. Jumana Al Hadadi, Dr. Mehdi Kamran and Dr. Khaled S Abdallah

The establishment of a major logistics hub, such as an Amazon facility, in Oman presents significant economic opportunities and logistical advantages. However, this venture is complex and requires careful consideration of various factors. This research investigates the feasibility of establishing an Amazon Logistics Hub in Oman by examining the strengths and weaknesses of Oman's logistics infrastructure, evaluating relevant regulations, and assessing regional market potential for Amazon products. The study employs a mixed-method approach, utilizing surveys, interviews, SWOT analysis, and comparative analysis with existing hubs, such as Jebel Ali in Dubai. Key findings show that while Oman's advantageous position and advanced infrastructure offer substantial advantages, a number of issues still need to be resolved. These include market demand, competitive dynamics within the region, and regulatory compliance. Although the logistics industry in Oman is changing, a world-class logistics hub must be supported by advancements in technology and infrastructure. The study comes to the conclusion that strategic investments and organizational changes could enable the establishment of an Amazon logistics center in Oman. There are a lot of potential advantages, including increased supply chain efficiency, job development, and economic diversification. But getting past legal obstacles, improving infrastructure, and strategically entering the local market are all necessary for success. This report offers stakeholders and policy makers a strategic framework by shedding light on the prospects and challenges of creating a logistics hub in Oman.

Enhancing Supply Chain Resilience Through AI Chatbot Service Quality

Dr. Ashrakat Osama, and Prof. Khaled Elsakaty

This study develops a methodology to investigate how consumer perceptions of supplychain resilience--with a particular emphasis on agility and responsiveness-relate to AI Chatbot usability and responsiveness. In order to extract important themes and constructs, the process is predicated on a thorough literature review, which methodically finds and analyzes pertinent academic articles, conference papers, and scholarly publications. According to the research, better AI Chatbot usability and responsiveness can increase client loyalty and happiness, which strengthens the supply chain. This demonstrates how AI Chatbots may promote responsiveness and agility, two essential components of supply chain resilience. The study is constrained by its conceptual nature, though, as it serves as the foundation for the empirical validation of the suggested framework. Future studies should use both quantitative and qualitative approaches to evaluate and improve the framework empirically in order to gain a better understanding of the relationships between supply chain resilience and AI Chatbot interactions. This study's practical implications include giving businesses strategic insights into using AI Chatbots to boost supply chain efficiency and customer engagement. In particular, companies can utilize the framework to create chatbot functionalities that enhance customer experiences in the event of supply chain interruptions, hence augmenting overall resilience. Additionally, this study fills in gaps in the literature by providing a methodical framework for comprehending how supply chain resilience and AI-driven customer service interact. It encourages businesses to use AI technology into their operations in order to successfully manage supply chain uncertainties and satisfy changing customer expectations by providing a theoretical framework for future study and implementation.

Session 4 A

Data-Driven Insights in Maritime Engineering Utilizing AI and Advanced Modeling

Integrating Continuous Pollutant Measurements with Time-Lapse Photography to Evaluate Inland Vessel Surroundings' Influence on Wheelhouse Indoor Air Quality

Dr. Olivier Schalm

The monitoring campaign assessing indoor air quality in the wheelhouse of an inland tanker revealed peaks of pollutants such as NO2, O3, CO, TVOC, and PM2.5 on a fluctuating baseline, likely from exhaust emissions infiltrating through the ventilation system. A time-lapse camera capturing the ship's front view was used to explore the synchrony between pollution peaks and activities from nearby industries or passing vessels. The findings suggest that indoor air quality is governed by an interconnected network of hazards, where changes in one factor cascade through the entire system.

A Study of Passive Flow on NATO-GD Ship Model AIRWAKE Using Computational Fluid Dynamics

Eng. Abd Elmenaim H. Alaktaa, Eng. Salaheldin A. Mohamad, Dr. Ahmed S. Shehata, and Dr. Khaled Elsherbiny

This study focuses on numerically analysing the passive flow control method for manipulating air wakes on the NATO-GD ship model using detached eddy simulation (DES). The numerical techniques are verified through comparison with experimental data obtained from the NATO-GD baseline. To develop the flow control model, the hanger base of the original NATO-GD ship model is altered by incorporating a curved roof edge. The findings indicate distinct performances in vortex structure on the flight deck between the two cases, along with variations in turbulent characteristics. Specifically, the results demonstrate that the curved roof edge directs flow more effectively towards the low-speed area (LSA) on the deck, leading to improved reduction of flow recirculation and enhanced recovery of streamwise velocity. How-ever, this modification also results in higher levels of turbulent kinetic energy (TKE) in the air wake.

Optimizing the Draft of a Quay Wall to the Anchor Length Ratio Using Finite Element Numerical Model

Eng. Omar Kamel, Prof. Tareq Mostafa, Prof. Akram Soliman, and Prof. Maysara El-Tahhan

This research studied the effect of varying the distance between the front wall and the back anchor of a quay wall located in Abu Qir, Alexandria, Egypt. The quay wall was built to serve as a multipurpose terminal, the front wall is a combined wall system (tubular steel pipes connected by intermediate sheet piles) and the back (deep) anchor is a barrette pile. Researchers often study quay wall optimization and how various structural and operational changes could affect an existing quay wall's performance. However, the relation between a quay wall's draft and the back anchor length using pile anchors was not studied previously. The added value of this research is providing several ratios between the quay wall draft and the back anchor length. The analysis was performed by varying the distance of the barrette piles, bringing them closer to and further apart from the front wall to conclude how this variation affects the quay wall elements. The numerical model was calibrated and verified using previous numerical models in two separate locations with different structure systems prior to conducting this research. The analysis was performed by conducting a three-dimensional numerical model using PLAXIS 3D V21 which is a finite element analysis software that models soil/structure interface. The results revealed that as the distance between the front wall and the back anchor increases, the moment increases on the combined wall while decreasing on the barrette, meanwhile, the front wall deflection decreases. The decrease in deflection is limited by the at rest and active plane of failures. It was concluded that the decrease in the front wall's deflection becomes minimal after a draft to anchor length (d/L) ratio of 0.71 aid the effect varying the d/L. ratio has an immensely greater effect on the back anchor than on the front wall.

A Parametric Analysis to Investigate the Soil-Structure Interaction on Quay Walls Using Finite Element Modeling

Prof. Alaa M. Morsy, Prof. Akram Soliman Elselmy, and Eng. Amany S. Ramadan

Structural strengthening is an effective and feasible approach for preserving the functionality of degraded structures safely and reliably while also upgrading their capacity to sustain extra loads. As a cost-effective and practical solution necessitates the development of methodologies that simulate the real conditions to assess the soil structure interaction, additional loads, and their impact on structures, as well as to evaluate the strengthening system properly. The overall aim of this research is to develop finite element models using PLAXIS 3D to investigate the influence of various material models on an existing quay wall with diverse soil profiles, along with a parametric analysis to evaluate the impact of extra loads. A case study in Port Said East Port, the diaphragm quay walls of the container terminal operated by Suez Canal Container Terminal (SCCT), which is located to the north of Egypt on the Mediterranean Sea, was chosen in this regard. For the purpose of verification, two case studies were chosen The Deep-Sea quay wall at Rotterdam, which provides essential field results and a 3D PLAXIS finite element model, along with the diaphragm quay wall of the Port Said East Port container terminal, which provides 3D PLAXIS finite element models. Most comparisons between the author's models and the three referenced cases show a percent error of less than 10%, indicating an acceptable margin of error. A comparative study of two soil profiles employing two material models was conducted, revealing that the Mohr-Coulomb material model is more conservative than the Hardening Soil model, since it yields higher results. A parametric analysis was performed on the effects of increased crane loads and deepening in front of the quay wall, revealing that deepening has a greater influence than the increment of crane loads, especially for horizontal displacement.

Behavior of Footing Group Resting on Collapsible Soil Based on Experimental and Numerical Study

Prof. Tareq Abdelaziz, Dr. Ashraf Nazir, Dr. Ahmed Ragheb and Eng. Gehad Saad

This study deals with identifying the behavior of contiguous square footing groups subjected to rainfall water. A variety of parameters were represented in order to study the effect of these parameters on the behavior of the footing group. The tests were conducted in a wide tank with collapsible soil and models of square footing groups. Using the experimental model to investigate the collapse settlement due to the infiltration of rainfall water through collapsible soil beneath contiguous square footing. In addition, the distribution of water content and the depth of wetting were measured. Moreover, numerical models were carried out by PLAXIS 3D V21 to simulate experimental models. From the test results, it was noticed that increasing the number of footings in a group causes a decrease in settlement.

Unlocking AI Navigating Challenges in Ports and Waterways

Prof. Mark Van Koningsveld

With the advent of AI port practitioners worldwide are seeking to leverage its potential to improve port design and operations. But what are potential fields of application, where these new techniques can be of service? In his presentation professor Van Koningsveld sheds light on this question by highlighting several recent developments he and his group have been working on.

Navigating the Future of Inland Waterways Embracing Unmanned Barges and AI Technologies

Mr. David Edwards-May

This presentation explores the evolving role of inland waterways in enhancing efficiency, sustainability, and tourism, with a particular focus on unmanned barges and artificial intelligence (AI). It provides insights into infrastructure development, PIANC working groups, and the potential of AI in modernizing waterways. Key topics include AI-driven freight transport, passenger mobility, and the construction of new waterways. The presentation also highlights the operational modes of the Hyke Ferry and advocates for an increased role of inland water transport in sustainable logistics and tourism.

Dynamics of Oscillating Turbulent Flow Over Coastal Buildings in Ports Using AI Techniques

Eng. Miral Michel, Eng. Adham Eladly, Eng. Shehab Mostafa, Eng. Gerges Refaat, Eng. Belal Tarek, Eng. Mohamed Hussein Shokry, Eng. Mahmoud Ismail, Eng. Ibraheem Gamal and Dr. Ahmed S. Shehata.

Time- dependent CFD models were used to simulate the flow structures over a square cylinder in oscillating flow. Two- dimensional models were used to study the hydrodynamic forces under sinusoidal flow boundary conditions that were predicted by machine learning algorithms. The study also examines the specifications of the caused entropy around a square cylinder under various conditions, as well as the examination of the second law. It is found that the flow structures and forces values were sensitive to any change in input flow parameter and rotation angle. Furthermore, it is found that the angle 10 degree of rotation object, gives best result for entropy generation in this work.

Planning in the Face of Artificial Intelligence Towards an Innovative Methodological Approach

Dr. Francescalberto De Bari, Dr. Mohi-Eldin Elsayeh, Dr. Matteo Paroli, Dr. Antonella Querci, Dr. Francesco Papucci, Dr. Francesco Meini, Dr. Michele Bonistalli and Dr. Manuela Scarsi

This paper explores the transformative role of Artificial Intelligence (AI) in port planning, focusing on its integration with Digital Twin technologies to enhance decision-making processes. From the perspective of a Port Authority, the study highlights AI's capacity to improve data integration, harmonization, and predictive analytics, addressing challenges related to the heterogeneity of datasets across institutional and territorial contexts. AI enables the transition from fragmented data to a coherent, standardized knowledge framework, facilitating scenario analysis and strategic planning, which are essential for effective port governance. AI supports infrastructure investments, operational resilience, and sustainable development by optimizing connectivity, forecasting cargo flows, and improving intermodal logistics. Additionally, AI enhances simulations for long-term resilience planning, particularly in response to climate change and evolving trade dynamics. The paper also examines AI's role in aligning port planning with European-level platforms such as TEN-TEC, the Ocean Digital Twin, and the ESPON program. These frameworks provide essential tools for evidence-based policymaking and territorial cohesion, reinforcing the integration of AI-driven spatial analysis into strategic port planning. By leveraging AI, Port Authorities can transition from reactive governance to proactive, data-driven decision-making, ensuring efficiency, competitiveness, and resilience in modern port management.

An Integrated Approach to Assess Lee Side Erosion in Rubble Mound Groin Systems A Case Study

Eng. Donna Alaa Ayad Habib, Dr.Youssef Khairy and Prof. Akram Soliman

Coastal erosion along Egypt's Northern Mediterranean coast presents a persistent challenge, particularly near the Kitchener Drainage, where human activities, such as infrastructure development and agriculture, have intensified shoreline retreat. Groynes have been widely used to stabilize the coastline by trapping sediment on the updrift side. However, their application has induced significant downdrift erosion, leading to sediment depletion, beach narrowing, and alterations in the shoreline profile. This study aims to assess the long term effects of groyne construction in the Baltim region between 2007 and 2020, with a focus on shoreline evolution and downdrift erosion. Numerical modeling was conducted using the one-line model LITPACK, incorporating 31 years of wave data (1993–2023) from the Copernicus Marine Service and bathymetric surveys performed by Archimarine in 2020. Historical shoreline positions were derived from satellite imagery and field measurements to evaluate morphological changes. A brief discussion on mitigation measures and future studies is mentioned. The LITPACK one-line model successfully simulated shoreline evolution, capturing 20m per year erosion rates east of Kitchener Drainage from 2007 to 2013, with model standard deviation of 7m. The model also accounted for the 16 groynes constructed in 2020, where maximum downdrift erosion reached 195 meters, with 100,000 m^3/ year of sediment loss near the final groyne. The modeling results confirm that continued groyne extensions have not fully mitigated erosion but have shifted the problem further eastward.

Can AI Address the Shortcomings of the Current Port Emissions Inventory Practices?

Ms. Flóra Zsuzsanna Gulyás

The creation of air emission inventories (EIs) in seaports has proven to be a valuable method providing a quantitative basis to meet increasingly stringent regulations and ambitious emission reduction targets. These inventories are essential for implementing and monitoring necessary measures. However, despite their significance, EIs are often unpublished or not regularly updated, obscuring the ports' contributions to emissions. Key reasons for this include data security issues, accuracy problems, and the substantial effort required to obtain and analyze the necessary emission data. Recent advancements in artificial intelligence (AI) offer promising solutions to reduce this effort and enhance the accuracy of these inventories. Based on a systematic literature review of 13 relevant articles, this study examines the potentials and barriers of AI and machine learning (ML) techniques. The findings reveal the AI/ML techniques considered in the context of EIs, pinpoint the barriers that can be overcome using AI/ML, and highlight the improvements needed for the further application of these technologies. The proposed future research agenda aims to incorporate practical evidence from port authorities, providing a comprehensive understanding of how AI can be effectively leveraged for improving the accuracy and relevance of emission inventories.

Digitalization of Marine Power Sources From Theory to Practice

Eng. Giuseppe Giannino, Dr. Francesco Maione, Dr. Guido Maione and Dr. Paolo Lino

The maritime industry is undergoing a transformative shift driven by the twin imperatives of sustainability and operational efficiency. Hybrid power generation systems, combining renewable energy sources are emerging as a cornerstone of this evolution. These systems not only reduce greenhouse gas emissions but also optimize fuel consumption, aligning with stringent international regulations like the IMO's decarbonization targets. Simultaneously, digital transformation is revolutionizing maritime operations. Advanced technologies like the Internet of Things (IoT), big data analytics, and Artificial Intelligence (AI) enable real-time monitoring, predictive maintenance, and efficient energy management. Digital platforms enhance decision-making by providing actionable insights into fuel efficiency, route optimization, and system diagnostics, while also improving compliance with environmental standards. The convergence of hybrid power generation and digital technologies is paving the way for smarter, greener maritime operations. The synergy between clean energy and digitalization is not just an opportunity but a necessity for the maritime industry to remain resilient and competitive in a rapidly evolving global landscape. However, challenges such as high initial costs, cybersecurity risks, and interoperability with legacy systems must be addressed. Collaborative efforts among stakeholders, including shipowners, technology providers, and regulatory bodies, are critical to overcoming these barriers. This paper explores the role of hybrid power systems and digital transformation in achieving sustainable maritime operations, highlighting innovations, challenges, and future directions. A real case study involving these topics is also presented by the authors.

A Comparative Analysis Between Wave and Solar Energy for Sustainability in Coastal zones; Case Study Alexandria Port, Egypt

Prof. Wael A. Kamel, Dr. Youssef M. Khairy, Prof. Ahmed M. A. Moussa and

Eng. Youssef A. Ebeid

The growing impact of carbon emissions, including rising sea levels and extreme weather, underscores the need for sustainable energy solutions, especially in coastal areas. This study compares solar and wave energy in Alexandria, Egypt, evaluating their costs and environmental feasibility. Utilizing Alexandria's high solar irradiance and promising wave energy potential, Solar Photovoltaic (PV) systems and Oscillating Water Column (OWC) wave energy systems are assessed. HOMER PRO software was used for solar modeling, while empirical formulas and MATLAB estimated wave energy production. Results show solar PV systems are more cost-effective, with a Levelized Cost of Energy (LCOE) of $0.01165/kWh and a CO, reduction of 23.5 million kg annually. In contrast, wave energy offers more consistent production and a larger environmental benefit (55 million kg CO, reduction per year), but with higher initial costs and an LCOE of $0.0472/kWh. The study concludes that while solar energy is more cost-effective, wave energy holds significant potential for long-term development in coastal zones like Alexandria.

Emission Reduction Using Ammonia/Diesel Dual Fuel for Marine Diesel Engines in Green Port Application

Eng. Miral Michel, Eng. Abdallah Ahmed, Eng. Mohamed Omran, Eng. Farida Sharkas, Eng. Abanoub Youssif, Prof. Akram Soliman and Dr. Ahmed S. Shehata

The utilization of green energy can significantly reduce emissions generated in ports using diesel fuel in vehicles, machinery, and ships. Emission reduction strategies are constantly being researched to replace older engines and install zero-emission power systems through the investigation of cleaner trends that can be employed in ports and surrounding areas. The continuous development of international trade and the increasing number of ships at ports lead to the extensive development of ports which will result in the use of more diesel engines contributing to environmental pollution by their emissions. Ammonia has gained great attention for its use in ICEs leading to their decarbonization and the reduction of GHG emissions. It is a liquid energy source that can be stored and transported safely. This paper studies the effectiveness of using ammonia and hydrogen as clean fuels for marine dual fuel engines. A computational analysis using Aspen Plus software is carried out to investigate the combustion process as well as the resulting pollutants including GHGs. The results show that the suggested dual fuel methods reduce CO, emissions by 59.68%, and SO, emissions by 60%.

Session 5 A

The Evolving Port Addressing Climate Change, Energy Transition, and Technological Advancements

Can AI Address the Shortcomings of the Current Port Emissions Inventory Practices?

Ms. Flóra Zsuzsanna Gulyás

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system diagnostics, while also improving compliance with environmental standards. The convergence of hybrid power generation and digital technologies is paving the way for smarter, greener maritime operations. The synergy between clean energy and digitalization is not just an opportunity but a necessity for the maritime industry to remain resilient and competitive in a rapidly evolving global landscape. However, challenges such as high initial costs, cybersecurity risks, and interoperability with legacy systems must be addressed. Collaborative efforts among stakeholders, including ship owners, technology providers, and regulatory bodies, are critical to overcoming these barriers. This paper explores the role of hybrid power systems and digital transformation in achieving sustainable maritime operations, highlighting innovations, challenges, and future directions. A real case study involving these topics is also presented by the authors.

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Session 5 B

Sustainable Port Development in Egypt Case Studies on Green Hydrogen, Smart Port Operations, and Transportation Optimization

Environmental Impact of Intelligent Transportation Schedule for Electric Vehicle in Al-Sokhna Port

Dr. Shahira I. Karbouna, Dr. Noha H. El-Amary and Dr. Islam S. Elhosin

Intelligent transportation systems and the use of electric vehicles in ports can have a positive impact on the environment by reducing emissions and promoting sustainability. It is important to note that the specific environmental impact would depend on various factors, including the scale of implementation, the efficiency of the charging infrastructure, and the overall energy mix used for electricity generation in the region. This paper examines the environmental effects of optimizing the transportation scheduling of Electric Vehicles (EVs) at Al- Sokhna port. It employs the Discrete Water Cycle Optimization Algorithm (DWCOA) to establish the best schedule, capacity, and routs for EVs. The mathematical modeling of the systems is detailed, covering its objective function, boundary values, conditions, limitations, and constraints. The optimization algorithm and system are implemented using Matlab. The study, focused on Al- Sokhna port, reveals several significant outcomes, including a reduction in emissions, decreased noise pollution, improved energy efficiency, enhanced integration of renewable energy, and a shift in transportation modes.

Analyzing the Implementation of Terminal Operating System on Enhancing the Efficiency of Alexandria Container Terminal

Prof. Islam Elnakib and Dr. Ahmed Ismail

Purpose A Terminal Operating System (TOS) is essential for efficient and productive terminal operations, as it supports planning, scheduling, and equipment control, Increasingly, functions within the TOS are being automated to enhance overall performance and streamline processes. Container Terminal Operating System stands for Terminal Operating System, a computer-based system used in ports to manage and optimize various terminal operations. Therefore, this research aims at investigating and analyzing the challenges encountered during the implementation of the CTOS at Alexandria Cargo Handling and Container Company, and to propose recommendations for overcoming these challenges and improving the implementation process.

Research approach This research will follow a deductive approach to achieve research aims and objectives through applying SWOT analysis. In addition, it will analyze the impact of implementing CTOS on the efficiency of Alexandria container terminal during the last years from 2019 to 2023 by using Data Envelopment Analysis (DEA).

Research Originality The research is considered the first empirical study that identifies challenges encountered during the implementation of the CTOS at Alexandria Cargo Handling and Container Company using SWOT analysis and evaluate the efficiency of the company's terminal.

Research impact This research will determine the challenges encountered during the implementation of the CTOS at Alexandria Cargo Handling and Container Company's terminals. In addition, this research will propose procedures to measure the efficiency of container ports which can be applied to other container ports using Data Envelopment Analysis (DEA) for the period from 2019 to 2023

Practical impact. The analysis can help Alexandria Cargo Handling and Container Company's management to increase the efficiency score through identifying challenges encountered during the implementation of the TOS.

A Proposed Technique for Producing Green Hydrogen, in a suggested Hydrogen Supply Center at Alsokhna, Gulf of Suez

Dr. Ayman El – Nahrawy and Mr. Mohamed Safwat

The International Maritime Organization (IMO) is encouraging global shipping sectors, and seaports to reduce their global warming impacts, by using green fuels, instead of using conventional fossil fuel.

This research suggests new green ecological system for generating green hydrogen from seawater, the research aims to using a Reverse Osmosis (RO) desalinated plant at Al-Sokhna area, combining with a suggested Alkaline electrolysis system, to generate green hydrogen from seawater, where ALK electrolysis is one of the most efficient hydrogen generating tools.

The research methodology used different corrosion indexes to evaluate the suitability of Al-Sokhna seawater region for using as a source of regenerating hydrogen, to avoid any corrosive impacts on both RO and Alkaline electrolysis units.

The research results showed an increase in the calculated corrosion indexed values, which mean that there will be some corrosive impacts on the suggested RO and Alkaline electrolysis systems.

The research recommended using of debris filter combined with the injection of different anticorrosion chemical agents (polyphosphates) before the inlet of the suggested RO and alkaline electrolysis units, to avoid any fouling and corrosive impacts may be occurring. It also recommended applying different economic evaluation techniques, used for the proposed RO and Alkaline electrolysis units.

Proposing a Framework for Establishing a Green Energy Logistic Hub An Empirical Study in Egypt

Capt. Shady Magdy Mahmoud, Dr. Mostafa Abdel Geliel, and Prof. Sara El Gazzar

The International Energy Agency (IEA) has emphasized the opportunity to create "hydrogen hubs" to reduce costs associated with low-carbon hydrogen pathways. A "hub" is a region capable of aggregating hydrogen demand, typically found in coastal industrial clusters or near ports. The development of these hubs is seen as a vital step toward expanding the hydrogen economy. This research aims proposing a framework for establishing a green energy logistic hub in Egypt. The suggested Framework is developed based on the Australian Hydrogen Hubs Study (ARUP 2019) [1], which has identified seventeen critical variables for establishing a hydrogen hub. The main focus of this paper is to analysis each variable based on the previous theoretical and empirical studies and map this analysis on Egyptian context through carrying out some technical interviews with Egyptian experts in the energy sector. The main outputs of these studies and the interviews lead to the development of a conceptual framework that includes assessment criteria to support decision-making. The developed conceptual framework will be used to study the feasibility of establishing Hydrogen Hub in one of the Egyptian ports in particular Gargoup Port.

Session 6 A

Smart Energy Solutions for Maritime Growth
Optimizing Port Infrastructure

AI-Driven Optimization of Hydrogen and Methane Fuel Strategies for Sustainable Maritime Decarbonization

Eng. Ali Salah, Dr. Adel A. Banawan, Prof. Amira Zaki, and Dr. Ahmed S. Shehata

This study investigates the potential of integrating artificial intelligence (AI) with experimental analysis to optimize fuel mixtures in internal combustion engines for green port applications. By evaluating the efficiency and emission reduction capabilities of hydrogen-oxygen (HHO) gas and methane as alternative fuels, the research explores a dual-fuel conversion approach for conventional internal combustion engines. The AI-driven methodology employs Random Forest Regression (RFR) to analyze experimental data and determine the most efficient fuel mixture settings. The results indicate that NaOH at a 10% concentration achieves maximum fuel savings, while KOH at 12% concentration provides the best COx reduction. Methane injection demonstrates moderate fuel savings and emission reductions, highlighting its viability as an alternative fuel. The AI optimization process determined the optimal fuel mixture settings, enhancing efficiency, reducing emissions, and accelerating the transition to cleaner maritime energy solutions. These findings reinforce the effectiveness of AI-based optimization in advancing sustainable fuel strategies and promoting cleaner energy solutions for port operations and energy management.

Seanergy Project Master Plan for Port Energy Transition

Dr. Anas Saleh Mohammad Alamoush and Dr. Fabio Ballini and Dr. Monica Canepa

The SEANERGY Master Plan (MP) for Port Energy Transition, developed under the Horizon Europe SEANERGY project (grant agreement number 101075710), represents the project's Deliverable D3.1. It provides a comprehensive framework for guiding European ports in adopting sustainable energy practices and achieving carbon neutrality. Ports are vital players in the global logistics network and are pivotal in advancing decarbonization and energy transition. This deliverable outlines a structured three-phase approach — High-Level Vision, MP Development, and Review and Implementation — to enable ports to transition to renewable energy while maintaining efficiency. By integrating stakeholder insights, innovative technologies, and policy alignment, the SEANERGY MP sets a new standard for sustainable port operations. This study charts a dynamic roadmap for aligning port operations with the EU's and international climate neutrality goals, ensuring that ports emerge as leaders in the green energy transition.

Improving the Energy Efficiency of Port Facilities and Their Sustainable Development Using Solar Energy Evidence from Romania

Dr. Laura-Alexandra Doroftei and Prof. Gheorghe Militaru

The purpose of this paper is to find solutions for improving the energy efficiency of port facilities and operations to reduce carbon footprint and achieve sustainable development. Ports are important gateways for international commerce, and they are a vital part of the global transportation network. However, there is a notable deficiency in terms of improving energy efficiency and integrating renewable energy into port facilities and operations. It is found that port authorities in the maritime domain face major challenges in reducing electricity consumption and carbon footprint by supporting increased resilience and energy efficiency. This study provides solutions for port authorities regarding the implementation of solutions to increase the energy efficiency of port buildings. This paper aims to summarize the application of EDGE platform to identify different solutions using photovoltaic panels and different measures that were simulated with the aim of improving the energy efficiency of the port facilities. The data and model used targeted the port of Constanta in Romania. The use of solar energy as a renewable energy source for the port of Constanta is based on the location of this facility in an area with high solar radiation. The research results indicate a payback of the investment from the revenues generated from the sale of energy produced by the PV plant in less than 9 years and a carbon footprint reduction of 197.2 tCO_2/year. The use of batteries for electrical energy storage contributes significantly to a better integration of renewable sources in port facilities and operations. The research results show that there is great potential for ports to increase the energy efficiency of their facilities and operations, offering such future research opportunities.

Layout Optimization for Offshore Wind Farms Construction in Egypt Achieving Maximum Energy Efficiency

Eng. Abdallah M. Gobara, Dr. Elbadr O. Elgendi, Prof. Akram S. Elselmy, and

Dr. Ahmed. S. Shehata

Offshore wind farms are becoming increasingly widespread due to the vast ocean coverage and their potential for efficient energy generation in unobstructed areas. They represent a promising renewable energy source with minimal environmental impact, addressing global energy demands, climate change, energy supply challenges, and rising costs. A numerical study, employing a two-dimensional unsteady simulation, was conducted for an offshore wind farm along the Egyptian Mediterranean coast to determine the optimal spacing between turbines for maximum efficiency. The findings indicate that the enhanced model, with a layout of 4.8 rotor diameters along the x-axis and 3.2 rotor diameters along the y-axis, achieved an optimal configuration. This layout resulted in a performance increase of approximately 3% and a reduction in surface area occupancy by 16.3% compared to an existing offshore wind farm.

Session 6 B

Advances in Maritime Engineering
From Simulations to AI-Driven Solutions

The Opportunity of a Benchmarking Tool for Obstacle Avoidance in Autonomous Shipping

Dr. Kuderna-Iulian Benta, and Prof. Dana-Corina Deselnicu

Due to the increasing interest in the Autonomous Driving research domain, we are following this approach to showcase the use of previous work when infused into the maritime industry. The opportunity of a modular and customizable solution to compare algorithms in Autonomous Shipping, in particular object avoidance, is analyzed based on scientometric data. We gradually narrow down the research domain of Autonomous Shipping to meet Artificial Intelligence based solutions and then to find research gaps when dealing with Object Avoidance and then we comparatively yield a conceptual map to show the need for a benchmark tool in this area. Some of the key criteria for the proposed benchmarking tool are safety, performance, efficiency, and scalability.

Enhancing Maritime Search and Rescue (SAR) Operations Using UAV-Based Flight Control Systems Opportunities, and Challenges

Capt. Eslam Ramadan Badry and Mr. Moaaz Noureldin

The number of maritime accidents has been generally in decline in recent years, but maritime incidents still pose an important threat to human life, with optimization of search strategies and efficient use of resources hence being a high priority. In this regard, this study employed a mixed-methods approach by carrying out a Python-based simulation in the modeling of UAV-supported SAR missions and semi-structured interviews with professionals in the areas of maritime SAR and experts in drone technology.

This study aims to explore how UAVs may enhance the effectiveness of maritime SAR by employing both quantitative simulations and qualitative insights from expert viewpoints. The research investigates the potential of UAVs in optimizing search patterns, detecting persons in water (PIW), and delivering life-saving equipment under various conditions.

Besides the quantitative analysis through a Python-based simulation modeled UAV-supported SAR missions, semi-structured interviews provided practical insights into operational challenges. Many practitioners recognized the potential of UAVs for faster observations and interventions, but they expressed concerns about their vulnerability to bad weather conditions, regulatory restrictions, and also limited payload capacities.

The interviewees mentioned the greater strength and weather resistance given to drones, improved sensorial advances like thermal imaging, Lidar, and further action in terms of algorithms within autonomous navigation. Again, participants stressed that availability is related to specialized training for this type of SAR team with high-performance UAV systems. These results have proved that UAVs indeed provide a quantifiable advantage under maritime SAR situations, precisely in terms of speed and area covered, real-time situational awareness. The significant hurdles will be overstepped before UAVs can be fully integrated into normal SAR operations. Better long-enduring drones, up-to-date sensors for further detection, refined flight stabilizing controls, and easier regulatory frameworks-when that matures with the technology, UAVs will find their rightful place as invaluable tools bound to go a long distance in increasing the chances of survival during maritime disasters.

Enhancing Maritime Safety Optimizing Fairway Design Through

Multi-Arc Configurations

Eng. Miral Michel, Eng. Gerges Refaat Fawzy, Eng. Youssef Wael Hamed, Eng. Zeyad Eng. Ayman Soliman, Eng. Mohamed Elnegouly, Dr. Ahmed Mehanna, and Dr. Ahmed S. Shehata

The growing parameters of ships entail the necessity for port infrastructure which depends mainly on the size of ships and various weather conditions. One of the major problems in marine traffic engineering is to determine the safe parameters of fairways, i.e., safe depth and width at the bottom in bends of the fairway. While examining the velocity component of bends, the helical flow formed by secondary currents was observed. A secondary current occurs due to imbalance between centrifugal forces and pressure gradient at surface. In other words, close to the inner bank and at channel bed, pressure gradient exceeds centrifugal forces and conveys water in transverse direction toward the inner bank. At free surface, centrifugal forces drive flow (secondary current) to the outer bank. The aim of this research is to replace fairway bends that have a single arc with multiple separate arcs to reduce the curvature effect of fairways on ships during manoeuvring. This is achieved by performing CFD methods for fairway bends, with a single arc shape and with multiple separate arcs, under different flow conditions. Multiple arcs will reduce the effect of helical flow with the objective of minimizing grounding risk, loss of steering, or ships collision.

Utilizations of Mobile Applications in Maritime Search and Rescue Operations

Ms. Nahed Mohamed Reyad Hashesh, Mr. Mohamed Anwar Eldwaik,

Dr. Karim Mohamed Aboul-Dahab, Mr. Hussein Elsherif Hussein

Maritime transportation forms a fundamental pillar of international trade and the global economy. More than 80% of goods trade in the world is carried out using sea transport, with that percentage being a bit higher for developing countries. In this regard, the various operational aspects applying to ship operators and technical managers in their respective duties are extremely complex and continually changing, such as the effective management of timeliness inspection and inventory management.

Mobile applications have contributed to significant improvements in efficiency and effectiveness in maritime search and rescue (SAR) operations. They provide a platform for coordination and information exchange among different authorities designated, following the relay of a distress message to make for prompt efficient response within inshore areas and territorial waters.

The main aim of this study is to investigate the adoption of mobile applications in the maritime industry, with priority focus on search and rescue (SAR) operations. The study uses a qualitative approach to evaluate the existing gaps in SAR practices within the territory of Egypt. In addition, the study advocates making a collaborative mobile application and network coverage within local mobile operators to be used together by concerned authorities and individuals in distress.The suggested mobile application is expected to have considerable impact in terms of responsiveness and effectiveness of SAR operations.

Session 7 A

The Impact of AI on Society and the Maritime Sector

Ethical Considerations, Leadership, and Intellectual Property

AI and Big data at Sea Their Potential Impacts on Seafarers

Dr. Khanssa Lagdami and, Dr. Eslam Ramadan Badry Gad

With the integration of Artificial Intelligence (AI), Big data, and advanced navigation systems, the shipping industry is revolutionizing in ways that offers advanced maritime safety and security, improvement of energy consumption, maintenance, and efficiency of voyages. This wave of technological advancement brings with it a sense of optimism. At the same time, however, it opens up questions about what these technologies mean in terms of the working conditions and Occupational Safety and Health of Seafarers (OSH). This research paper discusses the increased application of AI and Big Data in the maritime sector, and it explicitly explores their possible application to monitor and surveil seafarers at sea. The paper examines what the potential consequences of deploying such advanced technologies might be in order to oversee and regulate the work of seafarers within an environment where boundaries between work and private life are often blurred. It is in-depth research into the current application of AI in maritime operations with regard to tracking and surveillance, optimization, and safety, therefore giving a proper understanding of the subject. However, despite the fact that there is no documented evidence of AI and big data being used against seafarers, the authors have gone further to discuss how this could be possible, making use of the Voyage Data Recorder (VDR) as an example of collecting data onboard vessels. VDR can be taken as the closest existing technology to AI applied on board ships. Such a tool, as discussed by the authors, can monitor several features of a ship operating at sea navigation, the performance of the machinery, and human activities. It is this possible use of information against the seafarers themselves in the case of accidents or any other incidents that occur at sea that scares them. Apart from being exciting, there are significant issues around privacy, ownership of data, and perhaps impacting on the rights and responsibilities of the seafarer. This paper contributes to this debate now current with its examination of technology advancements and outcomes in trying to reach balance between technological advance with the well-being and rights of seafarers within this ever-changing automatised Maritime Industry. This is a conversation that needs to be shared among all the stakeholders, from the players in the maritime industry to the policymakers and academics, in order to come up with an evolved consensus on what that future should be.

Ethical Dilemmas of Using Artificial Intelligence for Leadership Improvement

Prof. Liliana M. Rogozea, Prof. Florin G Leașu, and Prof. Angela Repanovici

Background Artificial intelligence (AI) is not only a new way to approach technology, to revolutionize the industry, but also a way to change the relational system and especially to improve the leadership of organizations.

Data Sources A literature search was conducted through Google Scholar, Scopus, andWeb of Science (2014-2024) using keyword combinations including AI, leadership plus ethical dilemma, and in the WOS program the search was performed only in WEB of Science The official documents of decision-making structures at European or global level were also consulted.

Results The ethical analysis of the problems raised by the use of AI in the field of development of an organization is a useful approach for any organization, whether it is one in the field of business, industry, medico-social or education.

Ethical dilemmas are related, on the one hand, to the introduction of AI in decision-making (which can lead to the perpetuation of prejudices depending on the data on which they have been trained), to elements related to the respect of the confidentiality of the data included in the analysis, but, on the other hand, to the replacement of human decision-making by that taken with the help of AI (the morality of the decisions taken, responsibility for the decisions taken) or by the integration of the principles of non-maleficence and beneficence in the decision-making activity, respectively by the ability versus inability to detect the correctness versus the incorrectness of some decisions.

Conclusions The research provides information on the ethical approach to the use of artificial intelligence in AI, with a focus on understanding the need to use AI responsibly and assumed and the impact of both positive and negative use of AI, being able to be a tool in understanding the potential of using AI in current practice, in understanding the priorities induced by the use of AI responsibility, efficiency, success in the context of protecting team members and society as a whole, developing governance regulations based on ethics, empathy, cooperation and interdisciplinarity.

How to Consider Industrial Property and Patents When Using Artificial Intelligence for Creation

Prof. Călin Roșca, and Prof. Angela Repanovici

The integration of Artificial Intelligence (AI) in the creation of industrial property and patents has raised critical questions regarding intellectual property rights, ownership, and the legal frameworks that govern these domains. As AI technologies become increasingly sophisticated, they are capable of generating inventions that challenge traditional notions of inventorship and ownership. This paper delves into the implications of AI-generated inventions on industrial property, with a particular focus on the patentability criteria established by current legal systems. It examines the challenges associated with attributing inventorship to AI systems, as traditional legal frameworks typically recognize only human inventors. Furthermore, the discussion highlights the urgent need for updated legal frameworks that can adequately address the complexities introduced by AI in the innovation process. By analysing case studies and recent developments in patent law, this paper aims to provide insights into how policymakers and legal experts can navigate the evolving landscape of intellectual property in the AI age, ensuring that inventors' rights are protected while fostering innovation.

Industrial Property of Patents Generated by Artificial Intelligence A Scientometric and Qualitative Analysis

Prof. Angela Repanovici, and Ms. Gabriela Ivanus

The context of the topic is to present briefly the importance of patents in the context of technological innovation and the role of artificial intelligence in generating inventions. The objectives of the article were to explore the existing literature, identify the most cited authors and research directions, and analyze students' perspectives on issues related to the industrial property of patents generated by AI. The aims were to explore the current landscape of patent law as it pertains to AI-generated inventions through a dual approach a scientometric analysis of the relevant literature and a qualitative study based on semi-structured interviews with master's students. By identifying key research directions and gathering insights from emerging professionals in the field, this study seeks to contribute to the ongoing discourse on the intersection of AI and intellectual property rights. The findings will not only highlight the current state of research. Still, they will also provide a deeper understanding of the implications for future policy and legal frameworks in the realm of industrial property.

Session 7 B

Navigating the Next Wave
AI and Industrial Shifts in the Maritime Sector

Port Industry Perception on the Use of Artificial Intelligence. The Case of Greek Ports

Dr George Vaggelas and Dr Kassiani Stathaki

The port industry is considered a latecomer in the Artificial Intelligence era, among others, due to the nature of port operations, the inner ort environment characteristics, the numerous players operating the port area, etc. Despite that, several actions towards adopting AI solutions in the port industry have been taken in the last few years, seeing as the next step (or the complimentary step) following port and terminal automation. AI can provide solutions and increase the efficiency of port processes, leading to reduced costs, better optimization of port operations, decreased emissions, etc., which can increase port users' satisfaction. On the other hand, AI comes with a price. Significant investments are needed to adopt AI solutions in port operations, which might prevent medium- and small-size ports from moving fast in the AI era. Also, there are significant challenges for ports related to the potential scarcity of qualified personnel and the need for port workforce transformation. Leading ports such as Rotterdam, Hamburg, and Singapore have adopted AI solutions as part of their smart-port strategy, but the applications of AI in ports are still limited. The paper tries to shed light on the issues affecting the potential of AI in the port industry by examining the perceptions of ports regarding the expectations, challenges, and pros and cons of AI in ports. Towards this, the paper proceeds with field research using a structured questionnaire in the major Greek ports operating as Societe Anonymes. The research results will provide valuable insights regarding the lack of AI adoption by the port industry that can be used to form relevant strategies and policies that will tackle the still low penetration of AI in ports.

GenAI in Bridge's Ship Operation

Prof. Nikitas Nikitakos, and Dr. Dimitrios Papachristos and Dr. Sofia Kallou

Generative artificial intelligence (GenAI) tools are an emerging class of new-age artificial intelligence algorithms capable of producing novel content — in varied formats such as text, audio, video, pictures, and code — based on user prompts. This key technology has demonstrated remarkable flexibility in analysing and structuring data and text into accessible information, vital for integrating humans, data, and systems. This paper presents its applications in the management of the ship's bridge, revealing the great potential of this new technology and the great potential for improving the operations and resource management of the bridge. It is a theoretical - bibliographical study of the subject of GenAI with a focus on the shipping industry and especially in Ship's Bridge Operation. It was found that the development of GenAI is rapid, and there are many areas of application in shipping and ship's bridge management. It provides greater flexibility, reliability and reduces the workload of Officers. However, not enough commercial applications were found, indicating that there is a large scope for future development.

New Challenges for a Low-Carbon Future A Materials Perspective

Dr. Ana Carolina Constâncio Trindade, Dr. Adriano Galvão de Souza Azevedo, Dr. Leo Maia do Amaral, and Prof. Holmer Savastano Junior

Materials engineering plays a pivotal role in addressing the urgent need for low-carbon solutions to mitigate CO_2 emissions. This study explores innovative material strategies tailored to the socio-economic and environmental contexts of developing regions. It highlights four key areas cementitious materials, clinker-free binders, lignocellulosic fibers, and bamboo. Supplementary cementitious materials (SCMs), such as fly ash and sugarcane bagasse ash, reduce carbon footprints, while alkali-activated and calcium sulfoaluminate cements leverage regional mineral resources. Renewable lignocellulosic fibers, including sisal (Agave sisalana), improve performance and support local economies, despite challenges in bonding and durability. Bamboo, with its exceptional mechanical properties, offers sustainable solutions for various applications. This paper underscores the need for interdisciplinary collaboration, advanced material research, and supportive policies to overcome technical barriers. By aligning global sustainability trends with local resource utilization, materials engineering can drive low-carbon technologies, foster regional development, and contribute to global climate goals.

Industrial Relocation of Manufacturing Companies

Prof. Dana Corina Deselnicu, Dr. Beatrice Alexandra Lupu, Prof. Frank Bezzina, and Dr. Sandra Samy George Haddad

The paper examines the phenomenon of industrial relocation, exploring its theoretical framework and presenting a case study on Romanian manufacturing companies. The study reveals a limited interest in relocation among these companies, both currently and over the past five years, indicating a stable and favorable business environment in Romania. The research identified cost optimization as a primary reason for relocation. As key factors for relocation, reputational risk and sustainability strategies were also identified. The case study used qualitative methodology and the interview method and involved 12 prominent Romanian manufacturing companies to assess their relocation behavior. The results revealed that cost reduction remains the most significant motivator. However, the fear of reputational damage and a strong commitment to sustainability could outweigh the potential benefits of relocating abroad. This suggests a shift towards a more holistic approach to strategic decision-making that takes into consideration more than financial considerations. The paper ends by highlighting the complex interplay of cost, reputation, and sustainability in shaping relocation decisions for Romanian companies, emphasizing the increasing importance of responsible business practices in the globalized economy.

Session 8

Supply Chain Transformation Leveraging Technology for Resilience, Efficiency, and Sustainability”

Building Resilient Maritime Supply Chains Through Mediterranean Ports

Mr. Jordi Torrent

Nowadays, building resilient maritime supply chains includes risk management, sustainability, and collaboration among stakeholders to ensure seamless, adaptive, and robust logistics networks, handling disruptions effectively and promoting regional economic growth. We will learn from best practices in this field in Mediterranean ports.

Analyzing Vulnerabilities in the Oil and Gas Supply Chain of Oman via FMEA

Dr. Waad Al Balushi, Dr. Mehdi Kamran, and Dr. Khaled S. Abdallah,

The complex nature of operations in the oil and gas sector makes it highly exposed to risks that might impact its overall performance. Maintaining the industry's competitive edge and ensuring the efficiency of supply chain operations requires proper risk identification and management. This paper focuses on the study of the risks associated with the oil and gas supply chain in Oman. This study uses the Failure Mode and Effects Analysis (FMEA) approach to evaluate the risks associated with several stages of the supply chain in Oman's oil and gas sector, such as exploration, drilling, production, transportation, storage, refinement, and distribution. As a structured methodology for mitigating risks and improving supply chain reliability, FMEA systematically identifies and prioritizes potential failure modes. To do this, interviews were conducted with four experts from two distinct Omani-based oil and gas companies, utilizing their knowledge and experience with supply chain operations and associated risks. According to the results obtained, drilling and transportation emerge as the riskiest activity in the Omani oil and gas supply chain, while exploration is rated the least risky. This study advances the knowledge of supply chain risk management in the oil and gas sector by demonstrating the effectiveness of the FMEA technique for detecting and mitigating supply chain hazards. The study's findings are important for supply chain managers and industry experts in Oman's oil and gas industry, as they can help improve risk mitigation approaches and overall supply chain efficiency.

Integrating Simulation and Optimization for Sustainability Assessment in Complex Supply Chains A Unified Framework with AI

Eng. Anastasiia Rozhok, Eng. Khursheed Ahmad and Prof. Roberto Revetria

The increasing complexity of global supply chains and the rising emphasis on sustainability require innovative methodologies to assess and optimize operational performance. This paper introduces a unified framework integrating simulation, optimization, and artificial intelligence (AI) to evaluate and enhance the sustainability of complex supply chains. The framework leverages AnyLogistiX's simulation (SIM) and optimization (OPT) modules to model existing supply chain configurations, calculate sustainability indices, and identify improvements through AI-generated scenarios. The proposed approach begins with a detailed examination of the current state of supply chains, emphasizing the predominance of road transport and centralized logistics. It then integrates the sustainability index, derived from a previous study, as a key metric for performance evaluation. AI's capabilities are harnessed to generate innovative scenarios that address sustainability challenges, such as reducing carbon emissions, traffic congestion, and dependency on centralized hubs. This study applies the framework to a European distribution supply chain, comparing an AS-IS scenario with an AI-generated TO-BE configuration. The TO-BE scenario features the integration of ro-ro shipping and intelligent replenishment systems, showcasing significant improvements in sustainability metrics. The comparative analysis underscores the transformative potential of AI-driven solutions in achieving sustainable supply chain operations.

Unlocking the Future How Blockchain Influences Sustainable Supply Chain Performance An Empirical Study on the Maritime Industry

Dr. Miran I. Hussien, Dr. Randa F. Talaat, and Dr. Ayat Y. Moustafa

Today, the digital world is seeing great technological advancements. Although block chain appears to be an emerging trend, it is still in its early stages in Egypt, particularly in the maritime supply chain. The purpose of this study is to investigate the adoption of block chain as a disruptive technology in sustainable supply chain performance by taking sustainable development goals (SDGs) as a moderator and sustainable competitive advantage as a mediator. An online survey was utilized as a technique to gather data in a quantitative manner. A total of 312 participants from the Egyptian maritime transport industry participated through convenience sampling. Using SPSS20.0, the survey is analyzed using regression analysis. Results showed a significant impact of the adoption of blockchain technology (BCT) on the sustainable supply chain performance (SSCP) through the partial mediation of the Sustainable Competitive Advantage (SCA), furthermore a positive moderation role of Sustainable Development Goal (SDG) of the UN was found catalyzing the relationship. The study contributes to increasing literature on Block chain technology in general, and fills a gap on the Egyptian maritime context in particular. Finally, it provides decision makers at maritime with useful guidelines on how to optimally promote Block chain applications among employees.

MARLOG 15

Theme and Date


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