Ports of the Future as a part of a multimodal transport system: Challenges and Innovations

4th ITS Hellas Conference

ICCS
COREALIS: The Port of the Future

**VISION**
- Embrace circular economy models in the port strategy and operations.
- Reduce the port’s total environmental footprint.
- Encourage ports to become an innovation hub of the local industrial & urban space.
- Optimise yard capacity and improve safety without major infrastructural investments.
- Streamline cargo flows in favour of green transport modes.
- Improve port-city stakeholder collaboration for medium-/long-term decision making.

**ENVIRONMENTAL**
- Significant reduction of CO2 port emissions and perceived noise.

**OPERATIONAL**
- Improvement of terminal operations’ efficiency.
- Reduction in congestion, waiting and idle times.
- Establishment of efficient connections with hinterland transport network (railway & inland waterways).

**SOCIAL**
- Increased port-city stakeholder collaboration & improved quality of life for port-city residents.
Truck Appointment System

Challenge:
- Congestion in the port area and highways around the port, noise

Innovation: Innovative TAS able to coordinate and optimise the arrival of trucks according to city traffic, terminal and other operations in the port area

- Minimisation of waiting times at the port gates
- Improved traffic flows
- Increased terminal throughput

- Booking of a specific time slot according to preference/existing capacity in the CT (pre-reserve mode)
- Live virtual Queue for users that do not have an advance booking
- Priority Queue for last minute container delivery
Circular-economy based Fleet management

Challenge:

- Optimization problems related to efficient management of equipment
- Broader traffic within ports

![Innovation: Leasing service for storage and maintenance requirements (i.e. chassis for intra-terminal truck operations) and other required services (i.e. trucks, drivers etc)](image)

- Booking of assets/visualization of statuses of cargo arriving to the port
- Reduction of storage and maintenance costs
**Challenge:**
- Ports have limited storage capacity and increased maintenance costs

- **Innovation:** Asset management requires for the optimal use of port assets, (i.e. yard vehicles, forklifts, cranes, trucks)
  
  - Optimal maintenance schedules
  - Schedule of purchases of new spare parts or yard vehicles for just-in-time inventory
  - Reduction of the inefficient use of storage space

- Predictive/descriptive analytics
Analytics-driven Cargo Flows Optimisation

Challenge:

- Sub-optimal organisation of pickup and delivery of containers due to schedule changes and misalignments (inland waterways, rail)

**Innovation:** Cargo flow optimisation component for minimising containers’ waiting time at the port.

- Improvement of the modal split towards rail and barge
- Increased cargo throughputs
- Reduction of the dwell time of containers in the port

- Predictive analytics based on rail/barge/vessel ETAs
**Challenge:**

- Ensuring sustainability of port activities
- Better coordination between the port and city authorities

**Innovation:** Innovative and interactive training and simulation tool for assessing the feasibility and sustainability of ports

- Emission reduction and noise reduction
- Real-time sustainable complex scenarios of logistics flows, port design and planning
- Improved decision making
5G-driven Situational Awareness

Challenge:
- Non-optimal intra-terminal operations

Innovation: Real time control of operations in CTs

- Vessel operation completion times
- Improvement of stacking and availability of container handling equipment and cranes
- Better allocation of work effort and costs to each stage of the process

- Remote video processing, image and context recognition
- AI processing to guide drivers with Augmented Reality info in real time
- Real-time 3D monitoring and control
Optimisation of Container Terminals' Energy Profile

Challenge:
- Ensuring energy efficiency for port operations while respecting environmental concerns

- Innovation: Development of a comprehensive framework for analysing energy efficiency of ports, including guidelines for reduction
  - Assessment of most energy-savvy operational points in the terminal
  - Energy profiling produced by heavy equipment using sensors
  - Improved decision making for green, efficient and cost-effective solutions
THANK YOU FOR YOUR ATTENTION

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