Introduction of Port Management Information System in Korea
**Background For Port-MIS**

**Integrated Data Network for Port Logistics**

- The Ministry of Maritime Affairs and Fisheries has built its backframe information network to realize a paperless administration and provide an integrated port service in handling imports and exports.

- The Ministry uses computer and telecommunications technology to link all ports and shipping operations in an information network.

- The network is comprised of two parts:
  - PORT-MIS (Port Management Information System)
  - EDI Network for Logistics (Electronic Data Interchange)
Changing Paradigm in Port Management

### PAST PORT
- SOC
- LOCAL PORT
- EX/IMPORT CARGO
- PUBLIC BENEFITS
- FUNCTION

### FUTURE PORT
- High Value Added Ind.
- 21C Strategic Ind.
- Integrated Logis-Center
- Hub Port
- T/S cargo
- Business Profit
- Service Quality

- Sharp Increase of containerized cargoes
- Competition between ports
- Investing Large Capital

- High productivity
- Automation
- Advanced Information
- High Service Quality
- Customer Satisfaction
Port-MIS is an information system that handles data on ships and cargoes moving in and out of ports. MOMAF has built the system back-frame network to realize paperless administration and provide integrated port service to users. It provides users with real-time information about vessel arrival/departure, cargo, port facilities and decision-making etc. The network comprises two areas: Port management information system and EDI network system for users.
History Port-MIS

1986 - 1991
- Feasibility study and detailed design.

Jan 1992
- Port-MIS On-line service in port of Pusan. The service expands to other ports including Ulsan, Masan, Pohang and Inchon up to Jan 1996.

Apr 1996
- Port-MIS EDI service commences.

Dec 1997
- All major ports in Korea linked with Port-MIS network

Sep 1999
- Nationwide Port-MIS network and integrated D/B building completed
Overview of System Contents

Port-MIS operations

Vessel Control
- Vessel arrival/departure
- Berth control
- Vessel traffic control
- Pilot/tugboat control

Cargo Control
- General cargo
- Container cargo
- Transshipment cargo
- Dangerous goods

Billing
- Levy data generation
- Levy calculation
- Bill publication
- Billing error/arrear management

Statistics
- Ocean-going vessel
- Coastwise vessel
- Export/import cargo
- Domestic cargo
Environment for external users

Port-MIS

User

User client
S/W

Declar

Web EDI

ED

EDI

KL-Net EDI system

KL-Net
DBMS

Mailbox,
information table

KL-Net
application

KL-Net
X400 system

Data
transfer

Direct data input

Port-MIS

Running system

DB

Clustering

Standby system
EDI service

Overview

- Port authority (MOAMF) ↔ Shipping company/agent
- 19 documents including conveyance report
- Users – around 800 (ID)
- Implementation history

- Commencement of EDI service: Apr 1996
- Conveyance report and passenger/crew list EDI service commences in customs office: Apr 1997
- Conveyance report and passenger/crew list EDI service commences in immigration office: Jan 1999
- Unified CIQ documents (DEOVAD, PAXLST): Jan 1999

Port-MIS WEB EDI screen
<table>
<thead>
<tr>
<th>Document name</th>
<th>Korea</th>
<th>UNSM</th>
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<tr>
<td>Declaration of ocean-going vessel’s arrival and departure</td>
<td>DEOVAD</td>
<td>CUSREP</td>
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<tr>
<td>Declaration of coastal ship’s entrance</td>
<td>DEOCOS</td>
<td>PAXLST</td>
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<tr>
<td>Passenger/Crew List</td>
<td>PAXLST</td>
<td>PAXLST</td>
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<tr>
<td>Application/approval for using port facility</td>
<td>APPFCL</td>
<td></td>
</tr>
<tr>
<td>Declaration of using port facility</td>
<td>DECUSE</td>
<td></td>
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<tr>
<td>Request for tugboat service</td>
<td>APPILT</td>
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<tr>
<td>Request for pilot service</td>
<td>REQRTS</td>
<td></td>
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<tr>
<td>Request for quarantine service</td>
<td>CGOREP</td>
<td></td>
</tr>
<tr>
<td>Export/import cargo loading/discharging report</td>
<td>INCAGO</td>
<td></td>
</tr>
<tr>
<td>Cargo notification (for coastal transport)</td>
<td>CONREP</td>
<td></td>
</tr>
<tr>
<td>Export/Import container loading/discharging report</td>
<td>INCONT</td>
<td></td>
</tr>
<tr>
<td>Container notification (for coastal transport)</td>
<td>SHREPR</td>
<td></td>
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<tr>
<td>Declaration of ship’s mooring and repair</td>
<td>SMPLAU</td>
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<tr>
<td>Certificate of ship’s launch</td>
<td>CGOSUM</td>
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<tr>
<td>Cargo Summary report</td>
<td>GENRES</td>
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<td>General response</td>
<td>REPILS</td>
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<td>Release notice from pilot service</td>
<td>CARDGN</td>
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<td>Notification of dangerous cargo</td>
<td>DGMNFT</td>
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<td>Dangerous Goods Manifest</td>
<td>APERAK</td>
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<td>IFTDGN</td>
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<td>IFTIAG</td>
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Sample Screen(1)

Vessel Arriving Report for Users

Vessel Arriving Report for Officials
Port-MIS Web Enquiry Programs

<table>
<thead>
<tr>
<th>Port</th>
<th>Vessel Name</th>
<th>Port of Call</th>
<th>Port Call Date</th>
<th>Arrival Time</th>
<th>Draft</th>
<th>Tonnage</th>
<th>Cargo Type</th>
<th>Cargo Weight</th>
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<tbody>
<tr>
<td>USA</td>
<td>NYK Maru</td>
<td>NEW YORK</td>
<td>15/03/2023</td>
<td>09:00 AM</td>
<td>4.5</td>
<td>10000</td>
<td>General</td>
<td>1200 Tons</td>
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<tr>
<td>KOR</td>
<td>M/V Korea</td>
<td>Pusan</td>
<td>16/03/2023</td>
<td>10:30 AM</td>
<td>5.2</td>
<td>15000</td>
<td>General</td>
<td>1800 Tons</td>
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</table>

Sample Screen(2) Port-MIS
Effects of Port-MIS

- **Management Effects**
  - Smooth management of vessel arrival/departure and cargo handlings by transferring and using information about vessel, cargo and port facilities via information network linking all Korean ports.
  - Preventing unexpected accidents by monitoring vessel movements (arrival/departure, berthing) and port facilities management information.
  - Enabling effective use of limited port facilities by providing port facilities management status information on a real-time basis.
  - Uplifting user’s credibility on port operation by providing paperless administration, removal of user’s visit to governmental organizations and fast port operation information services.

- **Visible Improvements**
  - Simplification of export/import process: related documents decreased from 75 to 22 (Abolishment of annually 2.5 million paper submissions)
  - Saving logistics cost of annually 25 million US$ due to process simplification and paperless administration
System Strategy

Advanced System with New Technologies

Achievement of Target

High value added 21st century Terminal
Get the highest Competitiveness
Support Automatic Terminal Operation

Electronic Data Interchange
With various Network

Automated System with the optimized Algorithm

Simplicity, Flexibility & Effectiveness
**System Target**

**Requirements of Terminal**

- Minimize the work load
  - Simple and easy User Interface
  - Linking with Operation System
- Maximize the Operation Efficiency
  - Optimize the Resource Recycling
  - Specialized System
- Improve the Productivity
  - Efficient Work Process
  - Linking with Equipments
- Strengthen the Work with Outside of Terminal

**Features of ATOMS**

- Work Environment using GUI
- Knowledge based Expert System
  - Rule based System
  - Automatic Plan and Simulation
- C/S, Web Environment of 3-Tier Structure and Optimized Algorithm
  - Efficient Job ordering
  - Proper Equipment Assignment
- Real-time Monitoring and Control System
  - Fast and correct Trouble Solving System
- EDI and IP Service
  - Fast and correct Information Interchange
- Easy to get Individual Billing Format by Shipping Company
- Effective Analysis of Operation Information
  - Various Statistics and Analysis
- Providing real-time Operation Information

**Planning system**

**Operation system**

**Management system**

**Achievement**
Terminal operation flow

- Carrier
- Transporter
- KL-Net
- Customs
- Shipper
- Gate-In
- Gate-Out
- Gate Automation
- Berth
- Yard
- Ship
- Transfer Crane
- Yard Operation
- Operation
- Monitoring
- Control
- Problem Solution
- Management
- Billing
- Statistics
- Wireless
- Gantry Crane
- Planning
- Server
H/W & Network Configuration

Planning
- Berth Planning
- Yard Planning
- Ship Planning
- Configuration

Monitoring & Control
- Monitoring
- Control
- Trouble Solving

Yard & Ship oper.
- Load/Discharge
- Re-marshalling
- Inventory

Gate Operation
- Gate In
- Gate Out

Management
- Billing
- Statistics & Analy.
- Equipment Mainte.

SAN
- SAN Switch
- SAN Switch
- DB Server
- EDI Server
- HA
- Backup Device
- APP/WAS Server
- Disk Array

NMS/SMS Server
- Fire Wall
- IDS Server

Web/Mail Server

SAN Switch

Wireless N/W

NMS/SMS Server

IDS Server

Fire Wall

Web/Mail Server

SAN Switch

APP/WAS Server

Disk Array
Planning system(1)

- Multi-Ship, Multi-Call, Multi-Window, Multi-Tasking
- Yard to Yard planning for shifting containers
- Ship to Ship planning for transshipment
- Intuitive understanding based on graphical user interface

- Creation of vessel route for berth planning
- Weekly/monthly calling schedule
- Re-arrangement of ETA by changing vessel route

- Providing information of stem/stern side
- Berthing clearance, BITT position, vessel code in intuitive way
- Easy recognition of vessels with different colors (berthing planned or to be planned)
Yard planning with multiple block inquiry with multiple windows
Convenient yard structure with 3 dimensional ‘Lane-Block-Bay’ mode enabling users to know yard position intuitively
Displaying containers with various cell colors by POD, G/C

Multiple ship planning with multiple windows
Inquiry to shipment status by three different views (general view, hatch view, bay view)
Displaying detail information of containers at properties window
General stowage plan, loading/discharging plan, ship-to-ship plan
Gate/Yard/Ship Operation

**COPINO**
- Gate automation
  - Detecting truck entrance
  - Recognition of truck & container number
  - Size recognition, verification
- Yard position determination
- Issuing SLIP, EIR
- T/C order creation
- Identifying gate-in activity
- Cutoff control

**Monitoring & control system**
- **T/C activity control**
  - Log management
  - Truck load/unload handlings
  - Yard shifting order
  - Y/T order transmission
- **Message Queue**
- **G/C activity control**
  - Log management
  - Loading/discharging
  - Operation suspension control
  - T/C Assign
  - T/C order transmission
  - Y/T assign
  - Y/T order transmission

**Management System**
- Data auto mapping
- Monitoring System -

**Gate Monitoring**
- Gate in/out status
- Gate in/out congestion status
- Cross Validation Check
  Cntr pickup notice ↔Booking
- Yard Plan
- Turn-around Time

**Yard Monitoring**
- Yard Job Order
- Yard Equipment Status
- Yard stacking status & plan by attributes
- Container Lift/Hour (LPH) & Movement/Hour (MPH)

**Ship Monitoring**
- Berthing status
- Discharging/loading status
- Quay Equipment status
- Elapsed Operation Time & Estimated Departure Time
- Working Container Spec.

**Message Queue**
- GATE operation
- YARD operation
- SHIP operation

**Monitoring Information**
Control System

- Operation Control, Trouble Solving
  - Gate, Yard, Ship
- Manual Planning
  - Yard, Ship
- Equipment Control
  - Coverage of T/C, Y/T
  - Sequence of Job Order
- Inventory Display, Control
  - Yard(Bay,Area) Detail View
  - Container Search View
- Resource Control
  - Stoppage
  - Equipment’s Status
  - Berth Information

Message Queue

GATE Monitoring
YARD Monitoring
SHIP Monitoring

Monitoring Information
Control Instruction

GATE operation
YARD operation
SHIP operation

Operation Status
Trouble Notification
Sample Screens

Gate Monitoring

Yard Monitoring

Ship Monitoring

-30-
Billing

- Separate billing formats according to individual contract terms with shipping companies
- Publication of invoice, invoice details/summaries

- Berthing status, yard positioning status
- Gate in/out status
- Discharging/loading, all 40 types

Statistics & Analysis

- Operation status by route, ship, carrier
- Stevedoring performance by G/C, ship
Terminal EDI service flow

Container trucker

Shipping Company

via KL-Net

COPINO (EX/IMPORT)

BAPLIE (EXPORT)
COARRI

BAPLIE (IMPORT)
BKPROS, MOVINS.
COLDLT (EXPORT)

Container Terminal

Since 1996
<table>
<thead>
<tr>
<th>Document name</th>
<th>Version</th>
<th>Korea</th>
<th>UNSM</th>
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<tr>
<td>Bay plan</td>
<td>D95B</td>
<td>BAPLIE</td>
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<td>Container loading list</td>
<td>921</td>
<td>COLDLT</td>
<td>COPRAR</td>
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<tr>
<td>Booking prospect</td>
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<td>BKPROS</td>
<td></td>
</tr>
<tr>
<td>Stowage instruction message</td>
<td></td>
<td>MOVINS</td>
<td>MOVINS</td>
</tr>
<tr>
<td>Pick-up/arrival pre-notification</td>
<td>D95B</td>
<td>COPINO</td>
<td>COPINO</td>
</tr>
<tr>
<td>Container loading/discharging report</td>
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<td>COARRI</td>
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<tr>
<td>Call information</td>
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<td>CALINF</td>
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