WPSP: Safety & Security

Busan Port: Leaders in Maritime Safety
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Enhancement of safety at Busan Port and growth of related innovation technologies
Introduction of innovative safety technologies for a safer Busan Port

Securing the safety of port users via innovative, K-Technology

1/ Ensuring safety of port staff and citizens

Introduction to the port of innovative, safety-related technologies developed in Korea → Enhancement to security of staff and citizens

2/ Contributing to growth of domestic technologies

Identifying and introducing port-related safety technologies developed by local SMEs → Promotion of the development of Korea’s maritime technology industry

Examples of innovative technologies introduced to the port:
- Life jacket launcher
- Distress alarm
- Automatic escalator handrail cleaner
- AI-connected Smart fire extinguishers
Monitoring, selection, and adoption of maritime safety technologies

Examination of incidents at the port to identify risks affecting the safety of staff and citizens
Drowning incident at Ganman Pier, Jagalchi passenger ship accident, fire at Yeompo Port in Ulsan, etc

Monitoring of relevant technologies
Platform supporting the testing of innovative technologies and promoting the growth of domestic technology industry.
Through consistent monitoring of the technology platform, Busan Port identified innovations that promised to strengthen public safety

Introduction of innovative technologies to port
BPA directly purchased and implemented hard-to-commercialise products which incorporated innovative technologies

Promotion of technologies in press
BPA promoted the positive effects of the implementation of these technologies via reputable media outlets, contributing to brand awareness and credibility
In the case of a drowning person, the self-inflating buoyancy device can be fired and automatically unfurls into a life jacket upon contact with water. The device can be aimed easily and accurately by all, and can be fired up to 40 consecutive times, travelling up to 60m each time.

Additional safety measures identified as needed at Gamman Citizen's Pier - a leisure space and pier for small-sized ships, where several incidents of drowning are known to have occurred.

The lifesaving, life jacket launcher travels up to 60m, and can complete a rescue within 3-minutes, making quick rescue possible in the case of drowning-related accidents on the waterfront at Busan Port.
Operated by the Busan Port Authority, the port guide boat ‘Saenuri’ has carried around 174,000 local and foreign guests between 2004 - 2020.

Quick response to at-sea accidents and incidents of drowning is needed to relieve passenger anxieties around travelling at sea.

**Distress Alarm**
- Installation point: BPA Port tour boat
- Number installed: 20

### At-sea incidents annually in Korea

<table>
<thead>
<tr>
<th>Detail</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maritime accidents in 2020</td>
<td>3,247 accidents</td>
</tr>
<tr>
<td>Maritime deaths and missing persons</td>
<td>98 people</td>
</tr>
<tr>
<td>Optimum time for rescue</td>
<td>3 hours</td>
</tr>
<tr>
<td>Cost of rescue</td>
<td>USD 82,300 / day</td>
</tr>
</tbody>
</table>

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**Need for real-time location information of persons lost at-sea for efficient rescue and recovery**

*“The Tongyeong Maritime Police received notice today from the Japan Maritime Police that they have discovered a body, presumed to be that of a missing passenger on the sunken ship, Mujeok.”*

*“Three people are still missing after the ship 32 Myeong Minho overturned and sank near the Port of Jeju.”*

*“Today was the second fruitless day of the search for missing persons after the ship Daeyangho sunk nearby to Galgot Island in Geoji, Gyeongsangnam Province.”*
2. Project Overview

Distress Alarm

- Installation point: BPA Port tour boat
- Number installed: 20

Locational information is automatically sent to the control room of the port’s guide boat by the device – which is attached to life jackets - in the case of a distress at sea. Helps prevent fatal accidents that may happen as a result of passenger ship use, while contributing to development of domestic technologies.

Pilot installation on BPA port guide boat of automatically inflating life jackets containing real-time location tracking devices that automatically transmit location information in cases of distress.

The initiative sees the technologies of SMEs, the computer infrastructure from large corporations, and the operational measures and standard controls of a public enterprise come together to help prevent accidents at sea, and contribute to development of domestic technologies.
Busan Port Int. Passenger Terminal post-COVID-19

While the no. of terminal users fell by 90.8% during the pandemic, reinforcement of safety measures was necessary in order to proceed with the government’s 'With Corona' scheme to move out of the pandemic, and resume terminal-use and cruises.

<table>
<thead>
<tr>
<th>Passenger Terminal Users (Pre-Corona)</th>
<th>2019</th>
<th>2020</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int. Passenger Terminal</td>
<td>937,139</td>
<td>61,475</td>
<td>△92.6</td>
</tr>
<tr>
<td>Coastal Terminal</td>
<td>44,357</td>
<td>17,239</td>
<td>△46.6</td>
</tr>
<tr>
<td>Total</td>
<td>981,496</td>
<td>78,714</td>
<td>△90.8</td>
</tr>
</tbody>
</table>

※ Source: Busan Passenger Terminal

Introduction of selected, innovative technologies to the port by the BPA

3 Automatic escalator handrail cleaner

- Installation area: International Passenger Terminal
- Number installed: 10

※ Source: Busan Cruise Administrative Statistics

Tourists to Busan by Country in 2019 (Unit: No. of people)

- Japan: 79,392
- USA: 72,702
- Taiwan: 17,613
- Australia: 17,449
- Korea: 14,377

Number of cruise tourists and vessels to International Passenger Terminal (Unit: tourists/vessels)

- 2015: 163,069 tourists, 71 vessels
- 2016: 572,559 tourists, 209 vessels
- 2017: 173,165 tourists, 108 vessels
- 2018: 138,865 tourists, 82 vessels
- 2019: 189,387 tourists, 108 vessels
3. Automatic escalator handrail cleaner

- **Installation area**: International Passenger Terminal
- **Number installed**: 10

1. Provision of upgraded safety measures to **prevent spread of infectious diseases**, including COVID-19

2. Enhancement to facility management via 24-hour, **automatic disinfection and cleaning**

- 24-hour, automatic cleaning by 3 cleaning rollers
- Automatic application and instant sterilization using Ministry of Environment-approved disinfectant
Application of advanced, AI algorithms and ICT technologies, including fire-detection, fire extinguishing, smoke extraction, real-time monitoring, and emergency call functions

**AI fire extinguisher, for Smart safety management and early-stage fire control**

- Installation area: Busan Port
- Number installed: 355

Existing fire extinguishers can be heavy, complicated, be prone to clumping, and cause whiteout, and so may be difficult to use.

**Simple fire-prevention devices needed in all multi-purpose facilities**

"It is amazing that this extinguisher detects smoke automatically. It is convenient to use and acts as additional safety reassurance to users of the passenger terminal."

- Quote from terminal passenger
02. Project Overview

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Al-connected Smart fire extinguisher

- Installation area: Busan Port
- Number installed: 355

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Throwable AI fire extinguishers</td>
</tr>
<tr>
<td>BPA headquarters</td>
<td>-</td>
</tr>
<tr>
<td>Int. Passenger Terminal</td>
<td>-</td>
</tr>
<tr>
<td>Coastal Passenger Terminal</td>
<td>-</td>
</tr>
<tr>
<td>Cruise Passenger Terminal</td>
<td>-</td>
</tr>
<tr>
<td>Int. Supply Center</td>
<td>-</td>
</tr>
<tr>
<td>Power plant team</td>
<td>-</td>
</tr>
<tr>
<td>Staff break room</td>
<td>15</td>
</tr>
<tr>
<td>Port vehicles</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
</tr>
</tbody>
</table>

Provision of 355 extinguishers throughout multi-purpose facilities, facility management centers, and in port vehicles

AI Smart fire extinguisher installation point: Busan Port Facility Management Center

Quotes from on-site installation staff

Manager <International Supply Center>

"Vessels ship a large amount of highly flammable material which are extremely combustible in the case of a fire. This means that vessel management are highly sensitive to issues concerning fire safety. These smart fire extinguishers, however, are very reassuring, and can extinguish flames quickly."

Customer <Busan New Port Welfare-Plus Center>

"The Welfare-Plus Center is a 180-room accommodation facility for staff. The throwable fire extinguisher facility is easy to use, even for those who have not used one before. Fires in their early stages can be easily extinguished."

Office Staff Member <Busan New Port Office>

"Whether a trailer collision, or a vessel accident, it is impossible to predict when or where fires may occur. This multifunctional fire extinguisher allows for a one-touch emergency call to be made, preventing property damage and saving lives. It allows for swift response without panic."

AI Smart fire extinguisher installation point: Busan New Port Facility Management Center

<table>
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<td></td>
</tr>
<tr>
<td>Throwable fire extinguishers</td>
<td></td>
</tr>
<tr>
<td>New Port Offices</td>
<td>-</td>
</tr>
<tr>
<td>Busan New Port Welfare-Plus Center</td>
<td>-</td>
</tr>
<tr>
<td>Woongdong Sewage Treatment Plant</td>
<td>-</td>
</tr>
<tr>
<td>Substations</td>
<td>-</td>
</tr>
<tr>
<td>Staff break room</td>
<td>10</td>
</tr>
<tr>
<td>Management offices</td>
<td>-</td>
</tr>
<tr>
<td>Port vehicles</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
</tr>
</tbody>
</table>

Project Overview

Introduction of selected, innovative technologies to the port by the BPA
Enhancement of safety at Busan Port and growth of related innovation technologies

Discovery of four, new, port-related safety technologies and installation and Busan Port

1. Life jacket launcher
   - Dispatch to recipient within 3-6 seconds
   - 60-meter effective range
   - Capable of 40 consecutive launches
   - One-button automatic reporting of incident to maritime police and 119

2. Distress alarm
   - Triggered automatically when danger of drowning is detected
   - Single charge lasts for 24 hours of operation
   - Location tracking at minimum of one minute intervals
   - First life jacket to use LTE cellular network
   - "Intuitive" control system

3. Automatic escalator handrail cleaner
   - 3 automatic cleaning rollers operate 24-hours
   - Immediate sterilization of surface area with Ministry of Environment-approved disinfectant
   - High-power, 200mW, ultraviolet AOP sterilization
   - Double Advanced Oxidation Process means 99.99% of germs killed
   - Convenient, IoT-based control management platform

4. AI-connected Smart fire extinguisher
   - One-touch emergency calls
   - Fire detection in real-time
   - Automatic transfer of location information
   - Light and convenient use on early fires

Protecting staff and citizens from drowning, fires, and infectious diseases

• Application of innovative technologies to the port to secure the safety of its users, effectively minimising risks to the safety of staff and citizens

Test bed provided for port-applicable innovative technologies from SMEs

• Busan Port Authority’s promotion of innovative, domestic technologies
• Public sector's initial purchase of innovative products, pre-commercialization, results in a win-win situation that helps boost sales