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Greening Ports: Bangkok Port's Experience and Achievements

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Introduction

Bangkok Port is one of the three ports that have attained Port, Safety, Health and Environmental Management System (PSHEMS) Recognition from PEMSEA. Its experience in the development and implementation of its PSHEMS resulted in concrete benefits and provided valuable lessons learned. Starting with the handling of its Dangerous Goods (DG), the port has exhibited remarkable willingness to improve the management of its core business processes, demonstrating that efforts to improve safety, health and environment (SHE) governance contribute to the triple bottom line of economic gain, social benefit and environmental preservation.

Bangkok Port's experience in DG handling is a showcase of a concerted team effort leading to inspiring outcomes. In spite of limited resources, Bangkok Port's DG handling has radically improved after the implementation of the PSHEMS. Records on the number of incidents related to DG handling went from a worrisome quantity to an almost nil figure. At the same time, perhaps as a result of enhanced reputation, Bangkok Port's general cargo handling has likewise improved. The volume of cargoes it was able to handle increased from 1.345 million TEU in 2004 to 1.449 million TEU in 2011. More importantly, Bangkok Port's PSHEMS experience has demonstrated that with the proper training and with the support of top management, it can do so much more in managing its operations, controlling its environmental impact and safeguarding the health and safety of its workers.



Bangkok Port personnel in action.

The PSHEMS initiative has sown seeds of continual improvement in Bangkok Port. They only need to be cultivated and nurtured to ensure that Bangkok Port will continue to derive more economic, social and environmental benefits from these undertakings. Back in 2009, then Deputy Director General of the Port Authority of Thailand (PAT) and now Managing Director of Bangkok Port, Sub Lt. Viroj Chongchansittho R.T.N. remarked that “Sustainable port development, including environmental dimension, is crucial to long term growth. The integrated implementation will generate chain reaction benefits for port stakeholders, happiness for port staff, increasing efficiency, reduced operation costs, higher income and reduced accidents, etc.” Although these benefits are hard to quantify, and some of which can also be attributed to factors other than PSHEMS implementation, it is nonetheless a safe assertion that Bangkok Port’s much better conditions after the implementation of PSHEMS has shown that indeed Green Ports are the gateway to a blue economy.

Background

Bangkok Port is one of the five main ports in Thailand. It is located on the east side of the Chao Phraya River in Klongtoey District, Bangkok, which is under the jurisdiction of the PAT. Bangkok Port is a river port, positioned

as Thailand’s second largest port with a throughput of 1.449 million TEU in 2011. It has a total land area (within the customs fence) of about 145.36 ha.

Bangkok Port offers cargo services to promote and facilitate international transportation. The services of Bangkok Port include container storage and inbound cargo service, outbound container freight station service, open stuffing area, empty container yard service, reefer container service and coastal and barge terminal.

Explosion in the DG Warehouse: The Abrupt Awakening

In March 1991, an explosion caused by an unidentified chemical occurred in the dangerous cargo warehouse of Bangkok Port. The accident caused losses of life, cargo, property and damage to the environment was estimated at US\$ 8 million. The fire started in a warehouse for hazardous substances and spread rapidly via several large explosions. The unfortunate incident prompted the PAT to review safety, health and environmental issues in managing its port operations. Since then, setting up of a new safety, health and environmental management system has been given top priority prompting Bangkok Port to step up its efforts towards improving its SHE governance.



Explosion in Dangerous Cargoes warehouse prompted the prioritization of safety, health and environmental concerns in Bangkok Port.

In March 2005, PEMSEA introduced the PSHEMS to the PAT, who in turn decided to implement the PSHEMS in Bangkok Port. The PAT recognized that PSHEMS is an integrated management system designed to provide port authorities or individual port operators with a management framework for enhancing efficiency, cost-effectiveness and profit for their operations.

PSHEMS Development

Organizing for the PSHEMS: The First Steps

Not surprisingly, the initial scope of PSHEMS development and implementation in Bangkok Port was limited to DG handling since this is one of the core processes in port operations with the highest threat on safety, health and environment. Bangkok Port also took into consideration the availability of resources, manpower and time constraints in determining the scope of the PSHEMS. Later on, with the initial progress it has achieved in DG handling, the scope was broadened to include all other services in the organization (See **Table 1**).

To pursue the development of PSHEMS, certain milestone activities had to be undertaken, foremost of which is securing top management support. Fortunately, in the case of Bangkok Port, top management support and commitment were clearly evident and unwavering right from the start. Top management provided the overall direction in PSHEMS Development and Implementation and gave the organization not only a compelling vision but also a clear path towards achieving the targets it has set for Bangkok Port.

While the scope was limited to DG handling, the development and implementation of PSHEMS has broader strategic objectives. It was also

the intention of top management to increase the competitiveness of Bangkok Port, enhance its reputation not just in Thailand but also globally, improve its environmental stewardship and enhance its capability in managing port operations. Within the ambit of these overall goals and objectives, top management eagerly ventured into key activities deemed to facilitate the development and implementation of PSHEMS.

Legal Compliance: Knowing is Half the Battle

As an initial desk review activity, the safe handling and transport of dangerous goods in Bangkok Port was related to the International Maritime Dangerous Goods (IMDG) Code and Recommendations on the Safe Transport of Dangerous Cargoes and Related Activities in Port Areas. In developing the PSHEMS of Bangkok Port, the specific provisions of these international instruments were reviewed and applicable provisions were identified. An action plan was developed to address the gaps in the implementation of relevant and applicable provisions of these instruments.

The PSHEMS Working Group: Great Things Start from Small Beginnings

To be able to effectively control and monitor the PSHEMS development and implementation activities, an

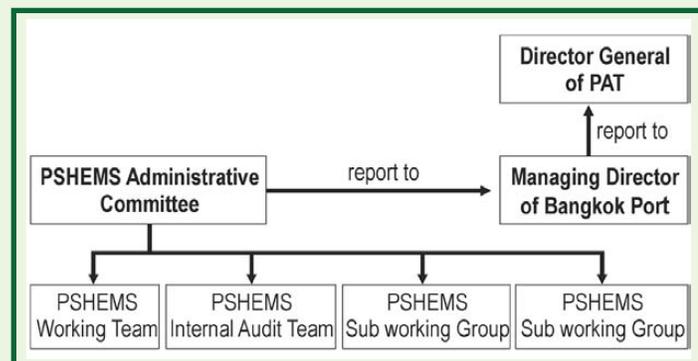
Administrative Committee (AC) was established and was headed by no less than the Managing Director of Bangkok Port. To support the AC, a working team composed of representatives from all concerned units was established. This working team was further sub-divided into three groups: operational group, equipment handling group and administrative group. Each group was assigned a certain process to meet PSHEM Code requirements. Bangkok Port also provided a working area to serve as a meeting room for PSHEMS-related activities. Apart from the working team, an internal Audit team was also established and was given adequate training. The Audit Team was responsible for the monitoring, control and improvement of the PSHEMS. The organizational chart (**Figure 1**) summarizes the working dynamics of the various entities created for the development and implementation of the PSHEMS.

The aforementioned administrative arrangements facilitated the establishment of the PSHEMS in Bangkok Port. The emphasis on involving all units concerned has encouraged not just support from the bottom ranks but has also effectively engaged key personnel in the planning stages of PSHEMS development. This approach ensured that the processes that would be eventually documented, standardized and monitored are driven by the real process owners and other key contributors in the process areas.

Table 1. Scope of Bangkok Port's PSHEMS.

Scope of Bangkok Port PSHEMS recognized by PEMSEA	Effective Years of Coverage
Service for Handling of Dangerous Cargo	December 2006-2009 November 2009-2012
All Services of Bangkok Port	August 2011-2014

Figure 1. Structure of the PSHEMS Working Group.



Building Capacity: Trainings and More

With technical assistance from PEMSEA, several trainings were provided to the personnel of Bangkok Port to equip them with the right tools and materials in the development and implementation of the PSHEMS. The first training given to port personnel was on “Applicable International Regulations Concerning Port Operation and PSHEMS Design and Implementation.” This training covered the major international regulations on port operations such as the Recommendation on the Safe Transport of Dangerous Goods and Related Activities in the Port Area (IMO 1995), SOLAS Chapter VI and VII (IMO 1992), Code of Practice of the Safe Loading and Unloading of Bulk Carriers (IMO 1998), APELL for Port Areas (IMO/ UNEP 1996) and Guidance Concerning Chemical Safety in Port Areas (OECD, 1996). The training facilitated the identification of international and national regulations relevant to Bangkok Port’s operations.

In addition to increasing the awareness of the project team on the relevant regulations, practical exercises enhanced their auditing skills and enabled them to assess the strengths and weaknesses in port operations and identify areas for improvement.

The result of the audit exercises were used as baseline information for PSHEMS development in Bangkok Port. All in all, Bangkok Port personnel had to undergo several training workshops, that have been put together and tailor-fitted to the needs of Bangkok Port by PEMSEA. The series of trainings followed a step-by-step approach, as follows:

- **Phase 1:** Initial Status Review
- **Phase 2:** Strategic Planning
- **Phase 3:** System Design, Development and Documentation
- **Phase 4:** Implementation, Monitoring, Measuring and Auditing the PSHEMS
- **Phase 5:** Continual Improvement

PSHEMS Documentation: No Pain, No Gain

The development of the management system and documentation of the PSHEMS manual was a challenging task for Bangkok Port. Guided by the trainings and with a ready access to PEMSEA’s technical assistance, the following steps were undertaken to ensure proper documentation and to control this process:

- **Step 1:** Review documentation for functional adequacy.

- **Step 2:** Review documentation for compliance with ISO 9001, ISO 14001, OHSAS 18001 and PSHEMS Code.
- **Step 3:** Revise if necessary to correct any inadequacies.
- **Step 4:** Test procedure in operation.
- **Step 5:** Make any final adjustments and implement controlled copy.
- **Step 6:** Update PSHEMS Main manual and Process manual accordingly.

PSHEMS Implementation

Safety, Health and Environment (SHE) programs

During the course of the PSHEMS implementation, various SHE programs were implemented to address identified safety hazards and environmental aspects with significant risks.

Traffic Management

Traffic congestion in and around Bangkok Port has been creating significant environmental and social problems, including air pollution, dust, noise, and

Table 2. Bangkok Port’s Traffic Management Measures.

Short-term measures (to be undertaken within a one-year period)	Medium-term measures (to be delivered within 36 months)	Long-term measures (Complex and could take up to ten years or longer to deliver)
<ul style="list-style-type: none"> • Appointment of a Port Traffic Management Officer 	<ul style="list-style-type: none"> • Establishment of a Port Park and Ride scheme 	<ul style="list-style-type: none"> • Undertaking of Master Planning exercise for the Port area.
<ul style="list-style-type: none"> • Development of gatehouse policies and procedures 	<ul style="list-style-type: none"> • Preparation of a scheme designating key routes as clearways 	<ul style="list-style-type: none"> • Relocation of unnecessary site-uses to offsite locations
<ul style="list-style-type: none"> • Establishment of a Working Group with Highway Authority to address offsite issue 	<ul style="list-style-type: none"> • Formal scheduling of arrival and departure of cargo trucks 	<ul style="list-style-type: none"> • Increase use of rail for the movement of goods within the port area.
<ul style="list-style-type: none"> • Provision of instruction cards to vehicles entering the gates of the port 	<ul style="list-style-type: none"> • Introduction of Health and Safety pack and the conduct of safety briefings for each employee 	

safety issues. Air pollution, in particular, is exacerbated by emissions from ocean-going vessels, harbour craft and cargo handling equipment. Traffic management was therefore considered a priority concern for the port as the solution to this problem would greatly enhance the management of safety, health and environmental concerns. Thus, Bangkok Port initiated a traffic management program with the support of the German International Cooperation (GIZ) under the Sustainable Port Development in the ASEAN Region project.

The port undertook a Rapid Transport Assessment to study the existing traffic situation of Bangkok Port, prepared a streamlined emission inventory and formulated a work program for the development and implementation of a Port Traffic Management Plan. Eleven solutions have been identified by applying available engineering and transport management techniques (See **Table 2**).

So far, Bangkok Port has been able to accomplish several of the identified measures. Short-term measures implemented include the appointment of a Port Traffic Management Officer, introduction of Gatehouse policies and procedures, appointment of Port Traffic Management Officer who cooperates with the Highway Authority to address offsite issues and the introduction of a safety guidebook. Medium-term measures undertaken included the introduction of

a Port Park and Ride scheme on a voluntary basis and the establishment of key routes as clearways. Long-term measures have been likewise initiated including the study for Bangkok Port's Land Use Master Plan and the program for the increased use of rail for the movement of goods within the port area. All in all, the aforementioned measures have yielded significant benefits and improved the traffic management capability of Bangkok Port.

e-Gate System

One of the safety programs implemented was the Bangkok Port Access Control Project – e-Gate System, which was introduced in 2011. The implementation of the e-Gate System was done in 3 phases. Phase 1 involved the use of a Radio Frequency Identification Card (RFID) for authorized persons and vehicles that regularly enter the gates. This activity started on 1 October 2011. Phase 2 of the project enabled the use of e-Payment for the Gate Entrance Fee, which started on 1 March 2012. The last phase, which is targeted for implementation by the end of 2012, will require the linkages of three computer systems namely, e-Gate System, Container Terminal Management System (CTMS), and Vessel Cargo Management System (VCMS).



The e-Gate system will further enhance the quality of service in Bangkok Port.

The project is expected to yield a number of benefits. First of all, it will support Bangkok Port's implementation of the International Ship and Port Facility Security Code (ISPS Code), which is a comprehensive set of measures to enhance the security of ships and port facilities. It will also reduce the traffic congestion and the activity level at the gate entrance as it would control the number of vehicles and the time that they would be coming in and out of the port area. With the full implementation of the e-Gate project, it is expected that the ability of Bangkok Port to deliver quality services will be greatly enhanced.

Corporate Social Responsibility (CSR) Programs

Bangkok Port has actively participated in several CSR programs that the PAT has spearheaded. These include energy conservation, greening of the port area,



"Cycling to Protect Our World," a campaign to reduce the use of cars.



Increasing the green area inside the port.



Increasing green area outside the port (mouth of Chao Phraya River) .



“Love Our World, help tackle Climate Change” exhibition.

pollution reduction, health programs for children and other environmental programs.

Results

SHE Department institutionalized within the Port Organization

The most valuable benefit that is being considered by Bangkok Port in the development and implementation of PSHEMS is the institutionalization of an SHE Department. Whereas in the past, the big responsibility of looking into SHE concerns falls on one person and was deemed to be unsustainable, there is now a dedicated department that concentrates on purely SHE matters. This signifies a clear commitment by the port’s top management that it is not taking SHE-related problems lightly. It gives a reassuring atmosphere to port

personnel that they are in good hands with Bangkok Port management.

With assistance from the GIZ-supported Sustainable Port Development in the ASEAN Region project, the SHE Department is now in the process of setting up the work procedures and work instructions including daily work records and reports of accidents, accident investigation records and reports on environmental aspects.

Another indication of the benefits of PSHEMS to Bangkok Port is the notable appreciation of top and middle management on SHE concerns. This is especially evident

during management meetings when managers are now demonstrating keen understanding and eagerness on how to address SHE-related problems and issues. Such a showing of concern was not as evident before the PSHEMS project was introduced.

DG-related incidents

With the development and implementation of PSHEMS, remarkable improvements were experienced in the handling of dangerous cargo. With the identification of potential environmental hazards, several measures were undertaken to prevent accidents in the DG area. This includes



PEMSEA audit.

the strict regulation of access to the DG warehouse area for cargo trucks, which are now required to park in a designated area and can only enter the DG area when the dispatch process has already been completed. In addition, a safety sign was posted at the entrance showing the number of accidents that have occurred in the DG warehouse. In terms of capacity building, the DG training course has been revised based on the prescribed DG training course developed by GIZ.

In particular, a dramatic reduction in the number of incidents/accidents related to DG handling has occurred (See **Table 3**).

Table 3. Records of Accidents related to Dangerous Cargo handling.

Before PSHEMS Implementation	After PSHEMS Implementation
Explosion of warehouse in 1989	Small leak, no fire 1-2 items per year
Fire one container in 1993	
Fire in warehouse in 1990	
Explosion of warehouse in 1992	
Leakage and small fire 2-3 items per year	
Small leak, no fire 10 items per month	

Improvements in the Overall Physical Environment

With the implementation of the PSHEMS, Bangkok Port has likewise exhibited notable improvements in its physical environment, as shown by the following pictures:

Oil spill during maintenance operation



BEFORE



AFTER

Access area in front of the West Main Gate



BEFORE



AFTER

Cargo handling equipment maintenance work



BEFORE



AFTER



AFTER



AFTER

Remaining Challenges

Despite the initial success of the PSHEMS project, Bangkok Port is still facing a number of challenges that it needs to tackle in order to further improve its port operations.

- Further improvement on the awareness and appreciation levels of port personnel on the importance of PSHEMS. Bangkok Port aims to make port personnel (operational level) have the same attitude as the management level with regard to safety, health and environment.
- Improving records management.

Future Plans

To address the issue of raising the awareness and appreciation levels of port personnel with regard to SHE issues, Bangkok Port plans to integrate the topic of PSHEMS in various training courses designed for different training levels. The three-hour PSHEMS topic will be incorporated in the port basic course, operations course for level 2-6, level 6-10, terminal operation level 8-11 and in the orientation course for new staff.

Moreover, with the support of the ASEAN-GIZ Sustainable Ports Development in the ASEAN Region project, Bangkok Port will embark on the following program of actions:

- Improvement in record keeping with regard to traffic-related accidents;
- Environmental quality monitoring starting 2012, including the installation of an air quality monitoring equipment;
- Emissions inventory;
- Action Plan for Energy Conservation of Cargo Handling Equipment (December 2013–April 2017);
- Preliminary study on the reduction of greenhouse gases (GHG) by 20 percent within 10 years (2011-2020);

- Improvement in terminal operations;
- Maximum use of cargo handling equipment; and
- Reduction of traffic flow in the area.

Lessons Learned

Most of the lessons learned in Bangkok Port's experience in the development and implementation of PSHEMS are management imperatives that can also be applied in other ports. Key lessons learned include:

- Securing top management support is key to the sustainability of the PSHEMS as top management provides not just the resources needed for PSHEMS but also the overall direction and strategy that would guide the whole organization.
- To ensure that the development and implementation of PSHEMS is well planned, monitored and supported, a working group and working teams composed of representatives from all concerned units must be established. This has ensured commitment and support from the grassroots level.
- The competency of personnel tasked to develop and implement the PSHEMS must be fully addressed through proper training.
- Continual improvement of the port management system through the internal audit and management review processes are essential components for a management system to remain effective.
- To remain relevant and competitive, ports implementing PSHEMS must continually adopt its policies and procedures to applicable national and international regulations and revise existing rules and regulations accordingly.
- The crafting of a good PSHEMS Policy will give clear directions toward the attainment of targets and objectives.
- It is important to build up a culture of safety among port workers. Likewise, increasing the awareness of people concerned on the environmental impact of port operations and the problems that may arise from it lead to a better appreciation of the PSHEMS and how it can address these problems.
- Cooperation and coordination among different units concerned has proved to be an effective way in solving problems.

- Providing intensive trainings to key personnel capable enough to be trainers is an effective way to support other ports in setting up the system.
- Exchange of knowledge and experience to develop PSHEMS with other ports is a mutually beneficial way to improve port SHE governance.
- Intensive and numerous trainings of port personnel have helped raise the awareness on safety, health and environment and enhanced their competency to develop and implement a PSHEMS.
- Given limited resources, limiting the scope of work to a small manageable area but having the greatest risk has proved to be a good strategy.
- Technical assistance from a knowledgeable organization such as PEMSEA, provides a good headstart for the development and implementation of projects as large as PSHEMS.

Conclusion

Bangkok Port took early action to implement PSHEMS and is confident that with this integrated management system and with the support and cooperation of all agencies concerned, Bangkok Port can demonstrate high quality for the execution of its safety, health and environmental responsibility.

However, there are still some remaining challenges and opportunities for improvement that need to be addressed. True to its spirit of continual improvement, Bangkok Port's PSHEMS remains a continuing endeavour. Inspired by its initial gains, PSHEMS will have an ever increasing relevance in the face of new challenges and opportunities.

Bangkok Port is ready, as it has always been.

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