

### 3.1.2 Port Management

#### (1) Organization

##### 1) General concept of port management

Concerning port operation and administration, there is no one definitive system that has been adopted in ports all over the world. The structure of the port management body at each port is slightly different depending on historical, socio-economic and institutional factors. Port activities are conducted by a port management body or private company or both.

Regardless of whether a port management body is public or not, the following issues should be taken into consideration for smooth and efficient management and operation systems.

- Port activity has a great influence on the national economy. Safeguarding the national interest should be the first priority issue concerning port management and operation.

- The basic role of ports is normally considered to function as a public facility. Port infrastructure and facilities should be basically operated in open use to the public.

- It is necessary to establish a basic policy and plan for proper development and conservation area.

- Safe and efficient transfer of cargo is vital. Cargo handling efficiency is strongly required in particular.

##### 2) The formation of port management

In relation to general concept mentioned above, the management is best undertaken by an independent organization that follows the framework described below:

- Semi-autonomous body

In general, the port which is of greatest importance to country should be managed by an independent organization comprised of a Port Authority and Port Trust under control of the government. Port Authority has a committee to make decisions, although the government's permission is required before proceeding with important matters.

- United management by a single body

United management by a single body is the most important principle to have competence of permission for port area and main facilities etc. and increase efficiency of port operation.

- Original budget

To preserve the port's identity, the budget is independent of the government's budget. Port charges also need to be kept at a reasonable level. If the level of port charge is reasonable, it is possible to operate the port by revenue from port charges including the

repayment of loans and depreciation and renewal of port facilities.

- Introduction of commercial management

The last factor is the application of modern commercial management to port management. In this respect, it is necessary to clarify responsibility under a well-structured organization. It is also necessary to transfer rights of management of the semi-autonomous body.

3) Issues to be considered

In light of the principle mentioned above together with the investigation by the Study Team, PC's management has several issues to be solved. However, PC is a huge body, having over 5,000 employees. It would take a long time to alter currently accepted practices; it would also require the cooperation and understanding people and authorities concerned. First identification of problems and, after that, measures to be taken should be understood. Therefore, issues regarding management should be tackled, in principle, from the long point of view.

Based on the above condition, some important issues are as follows:

- Lack of port management and operation strategy related to a basic policy and plan for the port development

- Ensuring appropriate budgetary system for the port development

To make things clear, following policies are required;

- a) Port Development Policy
- b) Financial Policy
- c) Personnel Affairs Policy
- d) Port Promotion Policy

In order to make the above policies, PC would be recommended to restructure the organization structure. Although they are closely related to one another, the above issues can roughly be divided into two fields; technical jobs and clerical jobs. It is preferable that these issues be coped with by new sections. That means PC should consider organizational reform.

Judging from main contents of the jobs, the following sectors will be necessary: Port Planning sector and Port Management and Operation Strategy sector. The former is in charge of making port development policy and the latter of the rest.

Port Planning sector is responsible for making port development plan considering the current and future socio-economic situation of the port, also amending the plan, if necessary, and managing to ensure investment cost. Such jobs require much technical knowledge and experience.

Port Management and Operation Strategy sector is responsible for employment plan, working system plan etc. so as to ensure efficient and high productivity of the port, and marketing strategy for port promotion. Such jobs require coordination and consultation with

various authorities and organizations concerned not only inside but also outside. In addition, this sector is recommended to examine the trend of privatization.

Finally, in order to set up the new sectors smoothly, some measures are recommended:

- To ask a donor country to provide experts for long term to advise preparation of port planning and management and operation strategy making and to transfer know-how of these matters
- To retain consultants to train the professional staff in preparation of long-term plan and strategy

## (2) Administration and Management

### 1) Communication

#### a) Internal communication in PC

Mutual communication and information exchange including distribution of documents/mails among Departments and Divisions must be improved. This is partly due to geographical hindrances like the long distance among the Main Port, Container Port and Industrial Port.

But lack of communication and information exchange is an obstacle to the improvement of port management and operation.

This issue should be solved in any means.

Possible solutions include;

- Mail and document distribution;

One clerk only should attend the above distribution periodically, calling on all Departments and Divisions by car through the day time.

- Human communication and information exchange;

The only solution is discipline on the part of each employee.

#### b) External communication and information between PC and others

The disruption of ship movement and cargo operation sometimes happened in the port, because necessary information and documentation were not given to the Ports Corporation by the parties concerned in advance. This is usually caused by lack of communication between PC and others except in some special cases.

Proper countermeasures by PC will be necessary to solve this issue.

One solution is;

- PC should publish circular letters or port regulations in Arabic and English to all the concerned which shall stipulate the necessary information and documentation to be forwarded to PC in advance as specified.

### c) Communication between inside and outside by third party

Currently PC does not allow persons of private sector to use wireless radio in the port. This regulation must be reconsidered for the convenience of private sector as a service for customers and clients, though some regulations to use wireless radio by the third party are necessary.

### d) Communication between PC and master of calling vessel

- Master of calling vessel at this port is required to send the same messages to shipping agent, Aqaba Radio and Port Control respectively by Radio, Telex and/or VHF.
- The Port Control should take simple and short VHF message from the master, unless it is changed, according to the message from shipping agent and Aqaba Radio in advance.
- It is desirable for PC to make close communication with the master of calling vessel. For instance, some responsible person of PC should be aboard on vessel arrival to advise her ETD and give any other necessary information and then PC could get more information from the master.

Communication with master is an important factor in improving port operation and service.

## 2) Upgrading port management

Regarding the International Organization for Standardization, ISO-9000 is nowadays being introduced in many countries including this country. This stipulates about a management of quality control(QC) and quality assurance(QA). The introduction of ISO-9000 by PC will be recommended to improve port management and operation.

## 3) Port Promotion Strategy

Port promotion or sales is one of the most important fields of activities for attracting port users. However, PC does not seem very active in pursuing potential clients. In the investigation or execution of port promotion PC should cooperate with government and private sectors which can bring prosperity to the port. Concrete activities of port promotion are as follows;

- a) Examination and Study of Port Promotion Strategy
  - Cargo Collecting Scheme
  - Attracting new lines
- b) Preparing an attractive brochure in which the sales points including various advantages and merits for the target users are clearly presented
- c) Holding seminars to introduce Port of Aqaba to users of various countries

#### 4) Statistics and Recording System

Systematic collection and compilation of data and information on various port affairs is a basic requirement of sound and effective port administration. While the management system for PC port statistics is considered fairly good as a whole, there remains still considerable room for improvement in its arrangement and practice.

Port statistics required for planning, administration, operation, budgeting, accounting and auditing should normally cover the essential fields including port activities, facilities, financial status, organization and personnel affairs, engineering management and other related information.

In light of the current situation of PC port statistics system and its practice, the following points can be recommended for further improvement.

- a) From the engineering point of view, structural or mechanical conditions of each major infrastructure and equipment should be carefully observed and recorded to assess their soundness.
- b) All statistics and records should be well maintained in good condition for easy access of users, and renewed annually or monthly if necessary, to ensure that updated information can be accessed.

#### 5) Keeping Completion Books of Port Facilities

Completion books of port facilities (contract, specifications, calculation of structure and construction cost and drawings) are indispensable to maintenance.

There is scope for improvement about keeping completion books.

#### 6) Safety of Loading/Unloading

Workers who take charge of loading/unloading on berths or storage do not wear working clothes, working shoes and helmet. This probably contributes to the large number of accidents (see Table 2.5.3). This also decrease productivity.

PC should supply workers with above outfits to maintain safety and increase productivity.

### (3) Computerization

#### 1) Pre-study

At present, PC are handling and managing no small number of vessels, weight of cargoes and passengers. According to the year book in 1993, they handled over 2,400 vessels, 6,381,000 tons of export cargoes, 5,252,000 tons of import cargoes, and 1,259,000 passengers. To handle these vessels and cargoes, PC employs over 5,000 people in the office and port area including casual and daily workers.

As mentioned in "2.6.5 Computerization", the management and operation of PC are not sufficiently computerized yet, as most functions are performed manually. Numerous handwritten documents are exchanged within the office, both from internal personnel and concerned parties from the shipping business who must travel to the office so that the many papers can be processed.

PC manages and controls well the many vessels, cargoes, passengers, documents and workers using their long experience and know how without the support of a computer system. In fact, they are managing and operating many vessels, cargoes, documents and workers as daily routine work.

But, for example, vessel and cargo work requires a considerable amount of time, labor, papers under the current manual procedures. Much information which comes from outside of PC is distributed to all concerned Dept. prior vessel arrival, and documents are exchanged by hand.

The current routine works and jobs which can be computerized should be researched and analyzed fully to match the computer task and job system.

As a pre-study of computerization, there are mainly two items, those are, one is personal the other is physical matter. In PC, these two items have not been organized and discussed yet.

## 2) Objects of Computerization

### a) Committee (Project Team)

PC is willing to introduce a computer system in their business to increase economic efficiency of their daily works and operation, provide a good services and keep close communication with the customers.

The jobs, works, form of documents and procedures are different from Department to Department. Each department manually prepares documents containing necessary data, but these documents aren't circulated which makes coordination difficult.

Each department seems to have some independent ideas for their computerization to perform their works and jobs more effectively. For an effective usage of a computer, it is better to minimize the total number of programs and data files. It is also recommendable to collect all current documents, data and information at one place, and analyze and arrange again according to requirements of each department.

For example, ship's arrival/departure data will be in common between Marine, Operation, and Finance Department, once Marine Department inputs the data into their keyboard.

To streamline different opinions, demands and requirements from 11 department and other offices, one coordinating committee (Project team) which is organized from each department together with people who have sufficient knowledge of computer technology must be organized.

### b) Priority

Each department should have a clear idea of how computerization will be utilized, that is;

"What and Which works/jobs/and procedures must be computerized" and  
"How to computerize"

At the organization meeting, each department states its vision and objectives of computerization. An independent organization (Project team) would discuss and select the objectives for computerization from the many ideas, and give priority to the objectives.

Nowadays, many computer systems and programs are proposed from software houses for the port control system. Typical systems for each department are listed below;

- ① Marine Department
  - Vessel arrival/departure information system
  - Pilot, tug boat, mooring arrange system
  - Vessel inspection control system
  - Vessel register control system
- ② Operation Department
  - Berthing decision control system
  - Pre-planning control system (Stevedoring)
  - Cargo work arrange system
  - Tally record system
  - Cargo delivery record system
- ③ Container Terminal
  - Container gate control
  - Container yard control
  - Container vessel loading/discharging
- ④ Specialized Berth Department
  - Bulk cargo berth loading control system
- ⑤ Technical Department
  - Equipment inventory control system
  - Equipment maintenance record system
- ⑥ Supply & Purchase Department
  - Spare parts inventory control system
- ⑦ Administration Department
  - Personnel data filing system
- ⑧ Finance Department
  - Worker's payroll control system
  - Claim payment issue/receive system
  - Account system(Balance sheet)
- ⑨ Development & Training Department
  - Port activities statistics

A highly integrated computer system, known as a network system, connects and links all computer system. At the current stage of computerization of PC, it seems difficult to adopt such a system. It is more practical to proceed with their computerization step by step, responding to needs as they arise.

### 3) Computer Operator

There is a dearth of specialists to operate main host and mini/personal computer of each department.

Development & Training Department has a computer training program the instructions are not versed in the latest computer technology.

Present main host computer, HP-90000 Series 800/827, is maintained by three members of the computer section of the Operation Department. Strictly speaking, they aren't sufficiently qualified to operate this computer.

Actually, under the existing limited condition, they are studying and trying to operate the host computer and to make an original software for the port operation.

Considerable time and expense might be required to educate computer specialists, however, PC hasn't yet begun initial procedures. PC should draw up a plan to send a selected person to a proper training course offered by a technical school or computer manufacture for a sufficient term. The knowledge and training this person will receive will be helpful and effective for establishing a future computer system and network.

### 4) Ship's Information

#### a) Ship's Data

Marine Department gets ship's information from shipping agent and master of vessel by telex and VHF.

Ship's particulars  
ETA/ETD  
Arrival/Departure draft  
Cargo commodity  
Cargo weight by hold-wise

According to ship's information, Marine Department arranges a pilot, tug boat, mooring man. At the same time, in Operation Department, pre-planning section arranges stevedoring gangs for cargo work based on the ship's information.

The ship's information should be delivered and communicated between Marine Department and Operation Department smoothly and on time. At present, Marine Department gets the information from master of vessel by telex and VHF, while shipping agent informs the concerned Department by document or telephone.

This information might be also necessary in Finance Department for preparing port due claim payments.



As a sub-system of this system, Marine Department makes up the vessel inspection system. Inspection Sec. inspects marine safety equipment, apparatuses and certificates of a vessel which calls port of Aqaba. And the Sec. is in charge of registry and periodical inspection of Jordanian vessel/boat.

In 1994, about 500 Jordanian vessels/boats and 400 other vessels were inspected. These vessel lists and data filings are controlled manually, and thus require a great amount of time and effort.

b) Ship's Information ("VTS")

"VTS" (Vessel Traffic Service) provides traffic safety service to a vessel under navigation bound for a port and anchorage. Provider of VTS sets or fixes some lines of position on proper sea area, and asks a vessel to inform the port controller when it passes the lines.

With the connection of marine radar screen and computer, port controller can provide the vessel with the safety course, and can identify a vessel position on the screen including such information as name, speed, and course.

In the Inspection section, they inspect safety equipment, apparatus, and certificates of a vessel at the berth. And they control the vessels which are registered in Jordan including small pleasure boats. Vessel lists and the results of inspection are controlled manually.

The above function should be computerized.

5) Finance Department Revenue Section (Document Center)

Documents of Port dues claim payment are processed at the revenue section in the main port area. After vessel departure or cargo delivery, the section receives the data and information of port dues from Operation Department, and prepares and deliver the debit note to shipping agent or custom clearing company.

To customs clearing company;  
Quay/Lighterage/Storage/Portage  
(Customs Declaration)

To shipping agent;  
Equipment charge  
Stevedoring tonnage  
Stevedoring for extra charge  
Port charge  
Tonnage fee  
Quarantine fee  
Wharfage fee  
Pilotage fee  
Mooring fee  
Other fee

This handwritten data and information come from Operation Department and then revenue section prepares a debit note by manual process. It takes a considerable amount of time and manpower to process this procedure, and mistakes are likely to be made.

Computerization can be strong tool in these procedures. Marine, Operation, and Finance Department should coordinate the computerization of these procedures and documents.

#### 6) Personal Computer

##### a) Application software

Each department has a different kind of mini/personal computer according to their own demands and requirements. As mentioned above, the level of computerization is different between each department. Some Departments use the personal computer as a word processor and file keeping, while other Departments use it more efficiently in data collection and calculation by means of software.

Generally speaking, these personal computers aren't used to their full capacity they are used almost exclusively for filing and printing. The main reason that these computer are under-utilized is the lack of software.

To improve the usage and operation of these computers, they must be supplied with more suitable software.

##### b) Type of Personal Computer

PC started to introduce personal computers to their offices by Department- wise. Each Department purchased their personal computers for their own use, consequently, they have many kinds of personal computer in their office.

Prior to deciding and purchasing their mini/personal computer, it is desirable that each department should propose their clear ideas and requirements to the organization.

In consideration of the future network system, the organization should streamline many ideas and requirements from each department, and decide the type of personal computer/operation system/etc to avoid a complicated operation system.

#### (4) Training workers

##### 1) Training of workers

Almost all the Departments in PC are required to train their workers and provide them with the technical skill and knowledge necessary for the future introduction of new system / machines.

Meanwhile, the Maritime Training Center in PC does not seem to be effectively functioning though there are 8 training courses for workers in the Training and Scholarships Division.

Lack of competent trainers, inadequate equipment and insufficient space are the main problems.

A new training system should be adopted.

Undermentioned are some of ideas to resolve the above issues.

a) The maritime Training Center provides common training by gathering workers from each Department if they require similar kinds of training.

- b) To invite some suitable experts and/or teachers to the Training Center
  - c) To prepare special training equipments like computer, simulator, cargo handling equipments and so on.
  - d) To spread the space of the Training Center by construction of second floor on the existing building in order to prepare more training rooms and offices.
  - e) To shift the Training Center from existing place in the Town to an applicable place in the Main Port in order that trainees will get lesson easily in a minimum distance and get actual practice easily.
- 2) To foster competent employees

As mentioned in the above Item(1), for the Ports Corporation to precede international competitors, high grade employees like computer operator, engineer, pilot, ship inspector as well as management are required to apply for high level and/or new system. PC should provide the opportunity for these employees to acquire such system.

### 3.1.3 Port Operation

#### (1) General

In the Port of Aqaba, there are 12 berths in the Main Port, 9 berths including Passenger Berths in the Container Port and 4 berths in the Industrial Port.

Almost all the berths are available for ocean going vessels, though some of them are for specific vessels like bulk, tanker, RO/RO and shallow draft ships.

On the other hand, there are many and wide storage facilities in the hinterland along the coastline of 27 kilo meters.

Currently the Port Corporation is competently operating the port. In 1994, the port accommodated 2,485 vessels and 10.57 millions tons of cargoes. Calling vessels were assigned to appropriate berths and cargoes were stored in suitable stowage areas.

Assuming that the peace process in the Middle East succeeds, volume of cargoes and the number of calling vessels will increase considerably .

Under the above circumstances, the current and anticipated problems to be resolved in this port were identified.

The issues for the identification of problems are as follows:-

#### (2) The Main Port

##### 1) Productivity of discharging grain in bulk

The operations of grain discharge in the Main Port are mainly done at No.1 berth by Ministry of Supply and at other berths by PC. Ministry of Supply discharges grain for domestic use by pneumatic unloaders to the silos. PC does other grain including transit grain by using mechanical and evacuators and/or grabs on trucks directly into bags and on truck and/or to storage area. Once a grain ship is berthed, she usually stays more than one week until completion of cargo operation, though it depends on cargo volume and productivity of discharging grain. The productivity of grain operation is one of the most important factors for the improvement of this port, because grain is the main cargo and

availability of berths will mainly depend on quick despatch of grain ship. In near future, the increase of transit as well as import grain will be expected.

Some solutions for current and anticipated problems for this issue are as follows:-

- a) Discharging operation should be done more efficiently by means of using suitable number of equipment and labors. Idle time during working hours must be shortened, especially preparation time for commencing cargo operation when ship comes alongside to berth.
- b) Capacity of cargo handling equipment like evacuators and grabs for bulk cargo must be enlarged in the future.
- c) Further communication between PC and Ministry of Supply is required to make effective use of the berths. At this port, berth occupancy rate has been highest at berth No.1 for the past four years. The occupancy rate averaged 80 percent, which means some ships may be forced to wait at anchorage while forward ship is at No.1 berth even if other berths are available.

The improvement of information exchange and communication between above two parties will be necessary for the best use of these berths, though there may be some difficulties due to different consignee cargoes. (for instance, MOS cargo and transit cargo)

## 2) Productivity of unified cargo operation

Imported unified cargoes like bags and cartons are basically handled using manual labor even when cargoes must be brought out from deep inside the hold of the ship and loaded on covered trucks like reefer trucks. The use of portable solid conveyors with rollers may be applicable for the above operations in order to make them faster and decrease number of labors.

## 3) Cargo dwelling time in the port

Average dwelling time of imported cargoes in the Main Port is 15 days according to PC reports. Although the duration will be mainly dominated by consignees, the reduction of dwelling time is required to make further storage space for the future.

For instance, if the dwelling time could be shortened by one day, total available space would be increased by about 7 percent.

One solution to the above matter would be to shorten the duration of free charge for cargo dwelling days in the port area (at present cargo can be stored without charge for ten days).

## 4) Dangerous cargo operation

There is a dangerous cargo storage area of 46,500 square meters in the east side of the Main Port. It has three big covered hunger stores and two closed stores in the area in which chemical goods as well as UN dangerous goods are orderly stowed. This area is separated from other cargoes; in addition, the residential area is sheltered by a cliff. Ten chemists are on hand to inspect DG (Dangerous Goods) handling operation and control DG storage, including in the Container Port.

On the other hand, PC addresses to the third parties concerned the "Instructions for Storage and Handling of DG from and to the Port" in Arabic, based on the recommendation of International Maritime Organization (IMO). The parties concerned translate the Instructions into English and send them to concerned overseas parties if necessary. The contents and instructions for handling UNDG can be accessed immediately in the computer display in the Public Safety Division of Service Department.

As mentioned the above, the handling system of DG functions sufficiently in this port, but following matters should be considered.

- a) The education of the chemists and the training of workers for handling DG.
- b) Suitable detectors for DG inspection and special safety equipment should be supplied though some of them are already provided.
- c) The Instructions for storage and handling of DG should be published in English and general information on these instructions should be described in the brochure of this port to promote port service as a international port.

#### 5) Phosphate dust emission

In the south side of the Main Port, there are two berths for loading phosphate which are connected with conveyor belt to 6 stores, 2 rail way dumping stations and 4 road truck dumping sheds. During operations, a lot of phosphate dust is emitted from these areas.

According to PC analysis, 60 percent of these dust emissions came under control when 2 special loaders (called "Choke Feeder" ) were introduced to the B berth (new phosphate berth) 2 years ago. But the remaining 40 percent is a problem.

On the other hand, these 2 phosphate berths are located near by No.1 berth which is assigned for grain ships, as mentioned in the above a ) of the same item. And also phosphate stores are not far from Grain silos (200 meters apart).

Although the wind usually blows from northeast (90 percent through the year), sometimes a strong southern wind brings phosphate dust to the cargo storage areas and the town.

From an environmental point of view, the control of phosphate dust must be made as soon as possible.

#### (3) Container Port

##### 1) Container Terminal

##### a) Handling Capacity

It might be possible to handle all jobs and procedures of a container terminal by manual process. In fact there are many container terminals in which yard planning, ship's plan, and documentation are handled by manual process. These container terminal are devised to use a certain original idea like a sticker label, magnetic board to systematize their works for a yard plan and a ship's loading plan.

Port of Aqaba is one of these ports now, all cargo works including ship's loading /discharging plan, yard stacking plan, container receive/delivery are controlled by manual process.

It is said that one container terminal (350m x 300m) can handle about 1,000 to 1,500 TEU per week, and 60,000 TEU per year without a computer system.

Container port of Port of Aqaba, according to year book in 1993, handled 55,669 TEU for import, and 100,120 tons of empty container for export. And in 1994, they handled 54,759 TEU for import, 7,920 TEU loaded for export, 48,138 TEU empty for export, total 110,817 TEU.

These figures show that Port of Aqaba, terminal length 540m, has almost reached to the limit. To become a modern port, and considering the limited volume that can be handled manually, PC should immediately start computerization of management and operation.

The following guide indicates when computerization should be introduced.

Step	TEU/Year	Plan/Control	Operation
1	Up to 60,000	Manual	Manual
2	60,000 to 150,000	Computerize	Manual
3	over 150,000	Computerize	Semi-Automatic

#### b) Container Yard

Storage location is monitored by the "T card" system according to the number of containers. When a terminal staff and a truck driver picks up a container, they come up to the control tower, and seek out a "T card".

The seeking procedure is;

- Check last two digits of container number
- Seek out a number of rack from 00 to 99
- Seek out a "T card" in the rack
- Pick up "T card" from rack
- Read storage location of container
- Inform the storage location to driver of straddle carrier
- Pick up the container

This system is controlled by manual process, but it will soon be necessary to introduce a computer. At present, container storage area is not used to its full capacity, but the container volume has almost reached the point where manual handling is not viable.

Storage areas of full and empty loading container, No.1, No.3 and No.4 area, are assigned to an individual slot by shipping agent. When full and empty loading containers are delivered to the terminal, the containers are stowed to the assigned area depending on shipping agent. These spaces are not under control of the container terminal.

Container terminal controls storage container by "T card", but they don't actually control the storage spaces which have assigned to shipping agents. All yard spaces have to be controlled by the container terminal.

Full containers which will be exported are stowed in ship's side of No.1 area by agent. These containers are easily picked up by a straddle carrier when loading. Empty containers which will be exported are also stowed in No.3 or No.4 area by agent, but loading export containers are not block stowed in front of ship's side prior to loading. To reduce port stay of container vessel, it is recommendable to prepare a block stow for loading empty containers alongside a vessel.

When a terminal controls the storage area, there are three key concepts;

- Speed
- Precision
- Effectiveness

In this required, there is a large difference in service. The Port of Aqaba must introduce computerization to its container terminal operation.

#### c) Container Delivery/Receiving

Container terminal is responsible for containers while they are stored in the terminal. Usually, the terminal gate is used for the delivery point of the container from a shipper and/or a truck driver to a terminal. Before responsibility changes hands, external inspection of the container is done by terminal side, and the driver signs the "Equipment Interchange Receipt".

At the gate, container number and weight is checked. Container number is checked by a gate clerk, and weight of container is checked at the same time by a weight scale which is equipped on the floor of the gate. These data are recorded on a document of gate in/out by a clerk by hand or input into a computer.

To inspect external conditions of the container, and to control in/out of the container by a computer, terminal gate equipped with weight scale on the floor is indispensable.

#### d) Ship's Loading/Discharging

For ship's loading/discharging, many kinds of documents are necessary between shipper, forwarder(customs clearing company), ship's operator, shipping agent and terminal. Shipping and cargo documents included;

- Booking List
- Customs Declaration
- Shipping Order
- Cargo Invoice
- Cargo Manifest

Dock Receipt  
Container Load Plan  
Bay Plan  
Schematic Plan  
Container List

The terminal office usually receives above documents from shipping agent, customs clearing company or ship's operator prior to vessel arrival, and prepares a working sequence, and a loading/discharging plan.

At Port of Aqaba, the container terminal doesn't receive these shipping documents (Booking list, Schematic plan, Bay plan, Container list) prior to vessel arrival from shipping agent or ship's operator, instead it receives those documents from captain after berthing.

As a result, the container terminal can't prepare a working sequence, a loading/discharging plan, and a yard plan prior to vessel arrival.

As to cargo work operations, a shipping agent comes on board on arrival with a container loading/discharging list, schematic plan and bay plan, and discusses the cargo work with the terminal staff and captain. These three parties cooperate with one another, but the shipping agent takes the initiative for cargo operations on board. This is an unusual system.

Prior to computerization of the container terminal, the terminal staff should change their current performance for terminal operation. Container terminal operators must perform all their works including working sequence, pre-stowage plan, and sailing stowage plan by themselves only.

For computerization of the terminal, the container terminal operator definitely needs these cargo documents prior to vessel arrival to input data of containers into a computer. Container terminal operator should keep closer contact shipping agent to obtain cargo documents.

#### e) Terminal Staff

The yard operation procedure of container terminal is different from terminal to terminal. There are also differences between manual and computerized operation. Key staff should have not only sufficient container terminal experience, but also be familiar with computerized container terminal operation.

The Port of Aqaba container terminal is not computerized, nor does the terminal have enough experience to operate a computerized terminal. To operate a computerized terminal smoothly, staff of the following rank should be trained prior to actual terminal operation:

General/Assistant manager  
Superintendent and Foreman

#### f) Terminal Layout

Container terminal is divided into two areas by a road, this layout causes certain problems, as follows.



#### Restriction for straddle carrier

For yard operation, tug masters/tractors are needed in spite of straddle carrier system.

Straddle carrier unavoidably operates within each of sea/inland side individually.

#### Two way traffic system

The tunnel takes two way traffic system.

Traffic system of yard operation can't take one way traffic system.

(Round stream traffic system)

#### Plural gates

For container delivery/receiving, plural gates are used.

Plural gates obstruct simple gate control.

Weight scale is located on each gate or yard with some different systems.

#### Control office/tower

Control office/tower is located on both sides.

Container yard is controlled by each office and tower.

These inconveniences and inefficiencies result from the road and the difference of land level between sea side and inland side. To control a container terminal by computer effectually, gate control, yard control and ship's cargo work should be linked with each other. Container delivery/receiving should be controlled at a gate, and given a storage address for yard control.

For smooth operation of straddle carrier with a round stream direction, like clock or anti-clock-wise, there should be no obstructions in their traffic routes. The road which divides the container terminal and the difference of land level between both sides constitute obstructions.

To systematize container movement, container yard is desired to be at one place instead of spreading out to plural areas. No.1/No.4, No.2/No.3, maintenance shop, and container terminal main office area should be combined into one wide and flat space.

As to the terminal operation, there are two systems for container handling. One is the straddle carrier system, the other is transfer crane system. Both system have merits and demerits, and neither system can be definitively recommended over the other from a strictly economic point of view.

New container terminals, however, have tended to adopt the transfer crane system rather than the straddle carrier system. For computerized operation of the container terminal, the transfer crane system is more suitable than the straddle carrier system.

This terminal currently employs the straddle carrier system. In future, when the terminal employs full automatic control system for the container terminal operation by computer, it might be necessary to consider using both systems. In this report, this matter is not dealt with in detail but is mentioned as a subject for future study.

## 2) Passenger Berth and Terminal

Yarmouk floating berth is used as the passenger berth, located 300 meters south from the Container Terminal and Passenger Terminal is located 540 meters south of the berth.

The floating berth is able to make fast 3 ferry boats at the same time. The west side of the berth is for main use, the south and the north are for stern ramp use (RO/RO). But big passenger ships like QE 2 come to the Container Terminal.

Nowadays ferry boats service with 3 hours sailing between Aqaba and Nuweiba (Egypt) and carried 1.25 million passengers, 50 thousand cars, 3 thousand trucks, 300 thousand tons cargoes for one year in 1994 with 2 calls a day ( estimation by Arab Bridge Company ). Passenger for ferry boat are usually transferred by bus between the berth and the terminal, and between the terminal and the town due to the long distance.

It is said that there are two problems. One is that the passenger terminal is 8 km from the town and the other is the distance between the berth and the terminal is 540 meters. Transport by bus solves such problems, but the fundamental problem concerning the location of the berth and the terminal will remain. A study of this issue may be necessary in the future.

### (4) The Industrial Port

#### 1) JFI Berths

2 JFI (Jordan Fertilizer Industries) berths are located about 20 km south from the Main Port. JFI East (Inner Jetty) accommodates vessels up to 30,000 DWT and JFI West (Outer Jetty) up to 50,000 DWT. JPMC(Jordan Phosphate Mines Co., LTD.) operates these berths and facilities which are owned by PC.

Currently JPMC and APC(Arab Potash Company) are mainly using these two berths for exporting and importing cargoes.

#### a) Handling cargoes in 1994 (Total 2.6 millions) (Cargo volume; thousand MT)

##### JFI West Berth (107 vessels )

Diammonium Phosphate(DAP) in bulk for export (553)

Potash for export (1,509)

Sulfur for import (331)

##### JFI East Berth (83 Vessels )

DAP (inc. above)

Potash for export (inc. above)

Ammonium for import(168)

Chemical Acid for export(9)

Product Fuel Oil (0)

#### b) Berthing occupancy by ship

Average berthing occupancy in 1994 was 71 percent with 190 vessels.

### c) Productivity of cargo handling operation

Average loading /unloading rates recorded in 1994 were Potash 282 MT/H, DAP 242 MT/H, Sulfur 78 MT/H and Ammonium 310 MT/H. (source; JPMC)

According to the above records, cargo handling operations are unreliable, with sulfur operations being particular in bad. Sulfur is usually discharged with chain bucket elevator which was installed 12 years ago but it is frequently out of order. It took average 177 hours to discharge 14,000 MT of sulfur per ship through the year in 1994. Major repair of the sulfur unloader is scheduled.

The operation and maintenance of cargo handling equipment must be improved by constructive discussions between JPMC which is the operator and PC which is the owner.

### 2) Smoke and Dust from Factory and JFI Berths

Based on inspections, a considerable amount of smoke comes out from the funnels of industrial factories and dust of raw materials is emitted from JFI berths during loading / unloading.

With the expected future increase of the volume of industrial materials, measures to control such smoke and dust must be considered.

### (5) Facilities and Equipment

#### 1) Maintenance System

The maintenance system for cargo handling machines and equipment was greatly improved during the passed 2 years. Useless old machines and equipment were withdrawn from the inventory. On the other hand, a new system whereby reconditioned machines are made by combining various parts of useless machines has been established. As a result, all machines and equipment on the inventory are always ready for use except ones of periodical inspection.

There are three workshops in the port. Central Workshop and Re-reconditioning Workshop are in the Main Port and Container Workshop is in Container Terminal. More than 400 workers are employed at these workshops. Some of these workers were transferred from other Departments to become mechanics. In addition, some technical students are being trained in the workshops. Even in such the above developed formation as a small factory, there are some problems.

Some problems are as follows;

- a) Education and training of workers for introduction of highly technical machines, especially, of electronic engineer
- b) Training workers as ordinary mechanics
- c) Casual workers are mainly assigned to Maintenance Section

After being trained as a mechanic, these workers tend to leave in pursuit of higher paying jobs.

This section, which maintains machines and equipment in good order, is the most important in the Technical Department.

The education / training of workers and strengthening of Maintenance Section are necessary.

## 2) Tug Masters

Tug master which is connected with low bed chassis is one of the most important machines for cargo handling and container operation.

Currently, a total of 30 tug masters are positioned in the Main Port and Container Terminal. As mentioned in the above "Maintenance System", all units are in good order, though some of them were built 15 years ago, while a few new rebuilt ones are being launching.

Number of tug masters presently seems to be sufficient, provided them effectively assigned for cargo operation, but additional tug masters will be necessary for the future increase of cargo volume, especially for the increased number of containers.

## 3) Weight Scales

There are 19 units of weight scales ( known as "Weighbridges" ) in the port area and 7 units are installed in the Main Port, 9 units in the Container Port and 3 units in the Industrial port. The scales ( capacity; 80 - 120 M/T ) are used to measure weight of cargoes / containers on vehicles. The accuracy of these scales is sometimes called into question by the parties concerned.

Periodical weight inspection and maintenance are indispensable.

With the exception of 5 new electric units, the rest are mechanical units which are old and sometimes out of order. Some of them should be replaced with electric units in future.

## 4) Industrial Berths

According to PC and JPMC statistics, the volume of industrial materials to be handled at the Industrial Port in 2000 is forecasted at more than 3 times the 1994 level. ( 1994; 2.6 million M/T, 2000; 8.7 million M/T)

When cargo volume increases in the coming years, cargo operation will be disrupted because no berths are available.

Countermeasures for this issue;

- The improvement of JFI berth operation is necessary.
- Some of those cargoes should be handled at berths other than JFI West and East.
- It will be required in the future plan to build a berth for handling those cargoes in addition to the existing berths in the Industrial Port.

## 5) Storage Capacity in the Main Port and Container Terminal

### a) The Main Port

There is a paved storage area of 281,000 square meters in the Main Port. (closed storage including cold store 500 M<sup>2</sup>, 40,000 M<sup>2</sup>, cover hunger storage; 34,000 M<sup>2</sup>, open storage; 207,000 M<sup>2</sup>)

Yearly capacity is determined as follows;

The conditions;	Cargo occupancy of storage	50 %
	Height of stored cargo	2 meters
	Cargo density	1 MT/M <sup>3</sup>
	Cargo dwelling time	15 days

Capacity through the year; 6,840 thousands MT

Thus, there is quite sufficient storage space in the Main Port.

### b) Container Terminal

Capacity of container storage ; 11,139 TEUs (Include Free Zone)  
Capacity through the year ; 189,518 TEUs (Include Free Zone)  
(Conditions ; container dwelling time ; 21 days for import, 22 days for export)

As a result, existing container yards could receive nearly 2 times the container throughput in 1994.

## (6) Maritime Operation

### 1) Port Control Tower

There is no radar installed in the Port Control Tower in the Main Port. It is necessary for Port Authority to control and confirm vessels movement in the port by radar from the viewpoint of safe operation.

Nowadays vessel traffic management system by radar is available which can be used for all vessel traffic management controlled by computer, but for the time being, the installation of radar is indispensable to make the port safe.

### 2) Pilots, Ship Inspectors and Tug Boats

#### a) Pilots

There are eight pilots working a three shift system 24 hours a day for calling / leaving / shifting vessels. Some of the pilots are forced to work overtime when ship traffic becomes heavy, which sometimes causes the delay of ships movement in the port. Some captains of calling vessels complain that pilots are tardy in coming to the pilot station.

Additional experienced pilots and training of pilots will be required in preparation for increased number of calling vessels in the future.

## b) Ship Inspectors

Six ship inspectors are in the charge of Port State Control to inspect vessel's certificates and conditions. Three inspectors are qualified as deck officers including one captain and the remaining three are marine engineers.

It is recommendable for ship inspectors to be acquainted with the latest developments in this field in developed maritime countries concerning Port State Control. This goal can be achieved through visits and training programmes.

## c) Tug boats

There are 7 tug boats in this port, a 3,200 HPx2 (Built in 1991), 1,500 HPx2 (1983), 1,300 HPx1 (1977) and 800 HPx2 (1990). These tug boats usually stay in the Main Port. Though 5 of the tug boats have low power and are old, ship handling operations are currently executed smoothly. But due to long distance among the Main Port, Container Port and Industrial Port, it takes more than one hour from the Main Port to the Industrial Port. Ship movement is delayed when big ships come to the different ports at the same time.

One solution for this issue will be to construct another waiting berth for tug boats in the Container Port or Industrial Port.

For the time being, the operation by pilots, ship inspectors and Tug boats is going well, but in the near future the improvements recommended above will become necessary.

## (7) Land Transportation

### 1) Roads

#### a) By-pass Route

Port of Aqaba is spread out from north to south, and main road is laid alongside a shore line from main port area to industrial port area. Trucks, regardless of whether they are loaded or empty, are prohibited to pass through city area.

To avoid a heavy traffic condition, a new by-pass high way has been opened for the trucks. The main high-way from/to Ma'an and Amman is Route 15, and the by-pass high way is branched off near the entrance of Aqaba city.

On the way to the industrial area, the by-pass high way of Route 15 is branched off again to the container port area, which is Route 90.

The by-pass high way of Route 15 is used for the traffic of an industrial port area, and Route 90 is used for the container port area.

Both of these by-pass Routes are rather steep for fully loaded trucks to pass. On Route 15, the road is uphill for about 4km from the industrial area, while Route 90 is uphill for about 4km from the container port area.

To maintain safety, a certain modification of these two by-pass routes is planned. The plan will be carried out in the near future.

## b) Main Road

At the container terminal, the main road, which is extended from main port area, divides the container yard into two separated areas. Due to the road, container terminal operation cannot be performed effectively.

The area of the main road between the container terminal is about 60,000 sq.m. After closing this road at the end of both ends, this area could be used as a container storage area.

## c) Back-road of Container Terminal

As a detour of the main road for container terminal, the back-road which is laid on behind the container terminal is planned in near future. This road could connect both ends of the container terminal, and detour behind the container terminal.

There is a distance of about 4km between both ends, and this road also connects to No.8 area which is the waiting area for trucks.

## 2) Railway

In 1993, Port of Aqaba exported about 3.5 million tons of phosphate rock in bulk. These phosphate rocks come from El Abiad Mine and El Hassa Mine, both about 300km away from port.

Jordan Phosphate Mines Co. and Aqaba Railway Corporation (ARC) are under contract to carry these phosphate rocks from the mine to the port by rail, and now about 60% of the total is transported by railway.

ARC owns 22 locomotives and 450 wagon cars. One train fleet is comprised of two locomotives and 30 to 33 wagon cars. Average weight of cargo is about 43 tons per wagon car, and 1,400 tons per fleet. Seven train fleets are operated per day.

There are two dumping sites for wagon cars, and phosphate is shifted to the storage sheds by belt conveyor.

There is no other connection with the rail in the port area.

## (8) Others

### 1) Radio Pratique System

For the purpose of commencing cargo operation immediately on vessels arrival to berth, it is recommended that the Port of Aqaba adopts "Free Pratique by Radio" system. This system is practiced in almost all ports in the world.

### 2) Contingency Planning System

In case of emergency, it is most important to minimize loss by taking the necessary steps immediately. PC is a society who manages more than 5,000 workers, facilities spread out the coast line of 27 km and vessels in the port.

If such a large organization as PC were to encounter unexpected accidents, the scale of disaster could be larger than in ordinary cases.

To prepare for such an emergency, it is necessary for PC to establish undermentioned matters.

- Contingency plan identifies (by flow chart) the persons who will be responsible for dealing with each type of emergency.

The flow chart must not exceed one sheet to ensure that information can be accessed immediately.

- Responsible personnel must draft procedures to be followed for each emergency situation as well as accompanying drills.

- Drills must be practiced regularly and emergency equipment must be inspected.

The Emergency Committee in PC seems to be not functioning as port management, though some cases like dealing with dangerous goods and oil pollution are functioning.

Contingency planning system must be established urgently by the port management.

### 3) Study Team of IMO

The investigation and study for International Conventions regarding International Maritime Organization (IMO) is to be executed by PC as the window of this country, but an actual study team has not yet been put together.

The study team joined by high level maritime experts must be established in order to follow the up-to-date information and judge whether this country should ratify the conventions.

### 4) Insurance of cargo damage by stevedores

PC does not insure cargo damage caused by stevedores. For the Port of Aqaba to be attractive for consignor and consignee, it is necessary to insure cargo damage by stevedores in near future.



## 3.2 Urgent Improvement Measures

### 3.2.1 Basic Concept

To draft urgent improvement measures for the issues and problems identified in the previous section, the following basic framework is first considered;

- a) Preparing for the future increase of cargo volume
- b) Introduction of computerization
- c) Environmental consideration
- d) Raising the quality of worker as well as management

Related to the above, the following basic criteria is needed before urgent improvement measures are delineated.

- a) Problems to hinder port activities or to be anticipated to become bottlenecks in the future.
- b) Facilities and equipment which require no large investment and are easily improved.
- c) Port operation and management which require no fundamental change of organization, but only small change of operational procedure or working method.
- d) Improvement measures without environmental destruction caused by port activities /facilities.

### 3.2.2 Introduction of Computerization

#### (1) Committee (Project Team) for Computerization

For computerization of Port of Aqaba, PC should organize the independent committee (Project team).

#### 1) Purpose of the Committee (Project Team)

- The organization determines the course of computerization, and proceeds with it.
- All procedures are discussed, scrutinized and determined by the committee (Project team).
- A consensus is finally obtained.

#### 2) Reason for Independence

Computerization is related to all Departments. It isn't appropriate for one existing organization to discuss and make decisions on computerization exclusively.

#### 3) Constitution of the Committee (Project Team)

The Committee (Project team) would be constituted by representatives of all departments, office and computer staffs.

Full-time staffs and a secretariat should be arranged.

#### 4) Study Items

- To gather and collect all current documents of each department.
- To analyze and adjust flow charts of current procedures.
- To precisely determine "What and which data are required as computer output".

#### 5) Priority

The committee (Project team) would squeeze these requirements and adjust the objectives for computer tasks and jobs, and give a priority to them.

#### (2) Training Program

Development & Training Department has many kinds of training programs for their employees, including a computer training course in the training center.

The term of the training course is 2 weeks, of which ten days are devoted to practical training using personal computers. They started this course in 1993 Feb., and have since trained 30 groups.

In consideration of the current level of skill, the training term of 2 weeks is insufficient to master the operation. More frequent and periodical training of the same person is recommended.

During the training course, the basic items for personal computer should be fought to the trainees.

Operating System (O/S); MS-DOS  
WINDOWS  
OS/2

Language ; Basic language (Beginner's all-purpose symbolic instruction code)

Also, there are only three personal computers for the training. To improve the course, the number of computers must match the number of trainees.

Operators of main host computer are not educated specially to operate the main host computer. Computer Section has three operators, and they are trying to operate the main computer and make software for the Operation Department.

PC should have them educated in a proper technical school. This would save much time and produce highly skilled operators.

#### (3) Ship's Movement Network

Ship's movement, cargo work operation and port due claim payment are closely linked with each other, and input and output data are redundant. These three procedures would be fed to a computerized network.

Ship's movement : Controlled by Marine Department  
Cargo operation : Controlled by Operation Department  
Port due claim : Controlled by Finance Department

Marine Department gives date of vessel movement to Operation Department and Finance Department. Then Operation Department gives data of cargo work to Finance Department. Finance Department receives information of vessel movement and a cargo work record, and prepare ports due claim from this information.

As a part of this system, Marine Department Inspection Section can sort a inspection vessel list with the system. Inspection Section inspects safety equipment and certificates of a calling vessel for vessel safety, and files the results. And also the Section inspects periodically the vessel/ship safety which are registered in Jordan port, and files the data.

#### Marine Department

- Vessel particulars
- ETA
- Arrival draft
- Cargo commodity
- Arrival/Departure time
- Vessel inspection list/record
- Pilot, tug boat, mooring arrangement

#### Operation Department

- Decision of berth
- Cargo work arrangement
- Cargo work record
- Tally record
- Cargo delivery record

#### Finance Department

- Preparation of Port due debit
- Claim payment to Shipping agent/ Clearing company
- Payment receive record

#### (4) Application Software for Personal Computer

For more effective use of the mini/personal computers, the introduction of suitable software currently on the market is the quickest and most economical way. Recently, there are many kinds of application software are issued from many software houses, such as word processor, drawing processor, calculation format, and so on.

This application software can be used easily, and is useful to develop the skill level of computerization. To save a time for effective use of these personal computers, P.C. should consider introducing some suitable application software according to the requirement of each department.

### 3.2.3 Modernization of Container Operation

#### (1) Computer System

The volume of container handling, in 1994, is about 110,000 TEU, the limit of manual handling. PC has main host computer already without software, but for the effective usage of the main host computer, the container terminal should employ a computer system for their terminal operation, including gate control, yard control and loading /discharging control system.

For the operation of container terminal by computer system effectively, some modifications to the terminal layout would be necessary. But in consideration of the container handling volume, PC should introduce a computer system immediately.

For the development of computer system, following items are necessary.

#### System design

- Analysis of current procedure
- Analysis of current documents
- System design summary
- System design detail
- Specification of system design

#### Development of program

- Specification of program
- Programming
- Sample of test data
- Program test

#### Preparation for operation

- Settlement of master
- Registry of master

#### Test run

#### (2) Layout of Container Terminal

Present layout of the container terminal is not conducive to economical terminal operation. As mentioned in (1)Computer System, for the effective use of container terminal by computer system, some modifications are necessary.

For example, areas No.1, No.2, No.3, No.4, No.8 and main office should be unified. For this purpose, the main road should be closed at the end of both sides of the container terminal, and the current road which covers an area of 60,000 square meters should be used as a storage yard.

There is a difference in land level between sea side, inland side and No.8 area. The south end of sea side and inland side area is almost at the same level, and a straddle carrier can pass through this area holding a container.

But from a view point of efficient operation, especially computerized operation, the difference in land level still constitutes a large obstacle for smooth operation. Sea side area and inland side area including maintenance shop, container terminal office, should be levelled.

With the modification of container yard, gate control should be established. At present, plural gates manage truck transportation in and out because of separated container yards. To put the traffic of container yard in order, the gate should be concentrated to one only.

The gate building, should be equipped with computer terminals, and weight scale should be provided on the entrance floor connected with a computer.

Main office building should be modified to a document and container yard control center. In this building, document section, yard planning section and ship's pre-stowage planning section work together. These sections and yard gate are connected with a computer system, all data are kept in common.

① Document section

Document section handles all documents

- Cargo manifest
- Booking order
- Dangerous/Reefer cargo list
- Deliver/Receiving order
- Customs declaration

② Yard control section(Yard planner)

Yard control section handles yard allocation control  
Allocation of yard(Export/Import, Full/Empty)

③ Ship's pre-stowage planning section(Ship's planner)

Ship's pre-stowage planning section handles ship's loading/discharging cargo work  
Working sequence  
Discharging plan  
Loading plan  
Ship's sailing plan/condition

Following effects are expected after unification of container terminal;

① Straddle carrier operation

Straddle carrier can move on one flat area.  
It is not necessary to transfer a container between a straddle carrier and a tug master.

② One way traffic

One way traffic of yard operation is available, either clock-or counter clock-wise.  
Trucks for delivery/receiving do not come into yard area except delivery area.

### ③ Control tower

Control tower can control gate in/out, container yard and cargo work from one office.

Control tower can get all information (gate in/out, yard location, stowage status) by computer.

### (3) Shipping Documents

Container terminal does not use the schematic plan for their cargo operation, because they don't receive documents prior to vessel arrival from shipping agent, and usually receive them after berthing from captain.

For computerization of container terminal, all necessary documents should be prepared prior to vessel arrival for making cargo work sequence, discharging /loading plan, and yard storage plan, etc.

Container terminal must get the following documents from shipping agent prior to vessel arrival;

- Container loading/discharging list
- Schematic plan
- Bay plan
- Exemption list
- Dangerous cargo list
- Reefer container list

### (4) Cargo Work Operation

Container loading/discharging works are being performed in cooperation with shipping agent who has container list, schematic plan and bay plan.

This system should be changed. For computerized container terminal, all following works must be performed by the terminal operator according to their working plan.

- Yard control
  - Yard space allocation

- Container location control
  - Yard plan

- Cargo work sequence
  - Pre-stowage plan
  - Loading/Discharging container
  - Gantry crane sequence
  - Working bay sequence

### (5) Operation Training

For the operation of computerized container terminal, manager, assistant manager and superintendent/foreman should be trained.

Training items are as follows;

General information of computerized container terminal

- Arrangement and layout
- Container flow
- Document flow
- Terminal Management

Gate in/out (delivery/receiving) control

- Gate in slip
- Equipment Interchange Receipt (EIR)
- Communication with yard control

Container yard control

- Communication with gate control
- Communication with straddle carrier
- Communication with document department
- Yard arrangement (Export/Import/Empty)
- Yard address
- Container allocation

Ship's cargo work (loading/discharging)

- Communication with Superintendent and Foreman
- Communication with straddle carrier
- Communication with gantry crane
- Communication with yard planner
- Communication with document department
- Communication with ship's master
- Pre-stowage plan
- Cargo working sequence (gantry crane/working bay No./number of working containers)
- Final stowage plan
- Other container lists

Documents control

- Communication with gate control
- Communication with ship's planner
- Communication with shipping company/agent
- Communication with clearing company/customs office
- Receiving/ delivery of all documents

(6) Operation System of Container Terminal

Operation system of computerized container terminal is as follows;

Gate in (Receiving)

(Gate Control)

↓

Storage in storage yard

(Yard Control)

↓

Loading to vessel  
(Loading Control)

Discharging from vessel  
(Discharging Control)

↓

Storage in storage yard  
(Yard Control)

↓

Gate out (Delivery)  
(Gate Control)

### 3.2.4 Upgrade of Environment

Upgrading of environment is one of the most important factors for the Port of Aqaba to be attractive in an international context.

The following issues require attention.

(1) To solve the problem of phosphate dust emission as mentioned in Section 3.1.3 (2) 5).

According to PC initial plan for this issue, the emission of phosphate dust and its control project are as follows:-

#### 1) Phosphate dust emission

a) From loading operations * Berth " B " 2 loaders	( 60 % )
b) From loading operations * Berth " A " 1 loader	( 10 % )
<hr/>	
(Small total 70 % )	
c) From unloading by trucks ( 4 dumping sheds )	( 5 % )
d) From unloading by trains ( 1 dumping station )	( 8 % )
e) From transfer towers	( 7 % )
f) From stores ( No.3, 4, 5, 6, stores )	( 10 % )
<hr/>	
(Small total 30 % )	
(G.total 100 % )	

#### 2) Dust control project

a) First stage * Berth " B " 2 loaders	( 60 % )
<hr/>	
(Small total 60 % )	
b) Second stage * Berth " A " 1 loader	( 10 % )
* Transfer Towers	( 7 % )
* Truck dumping sheds (No.3 & 4)	( 2 % )
<hr/>	
(Small total 19 % )	
c) Third stage * Truck dumping sheds (No.5 & 6)	( 3 % )
* Train dumping station	( 8 % )
* Stores	( 10 % )
<hr/>	
(Small total 21 % )	
(G.total 100 % )	



The first stage of the dust control project was completed in 1993. Accordingly, 60 % of the dust is already controlled, but the remaining 19 % of second stage and 21 % of third stage remain a problem.

Urgent execution is necessary.

(2) To control smoke and dust from factories and JFI berths in the Industrial Port.

As described in this Chapter 3.1.3 (4) 2), even now a considerable amount of smoke comes out from the funnels of industrial factories and dust of raw materials is emitted over JFI berths during loading and unloading operations.

Taking into consideration the future increase production by these factories and increased handling cargoes at the berths, urgent countermeasures must be taken.

(3) To make green belt by afforestation along the coastline between the Main Port and the Industrial Port

As is well known, there are many plantations and gardens around the Main Port, but in current situation, no plantation and garden can be seen in between the Main Port and the Industrial Port except Tourist Area.

It is recommendable to plant trees like palm trees along these areas, especially along the coast line road.

(4) To control wastes from factories and residences

According to investigations, the control of harmful substances and sewage by factories and residences currently seems to be taken by the purificatory cisterns system. This system must be kept on, while inspection for the control of wastes by competent authority must be carried out.

(5) To prohibit any wastes from ships by Port State Control

Port State Control of Aqaba Port Authority in PC implements the strict inspection of ships conditions, according to MARPOL 73/78 which was ratified by the Jordanian Government in 1994.

As mentioned in this Chapter 3.1.3, (6), 2), ship inspectors are required to follow up this regulation to date. Education and training for these inspectors should be mandatory.

It is recommended to stipulate further strict penalties for ships violation pollution control laws and for imposing on ships to maintain present conditions in the Gulf of Aqaba, though coordination with the Port of Eilat would be necessary.

(6) To establish Contingency Planning System

Contingency plan is very important for port management to minimize loss by taking the first necessary measures immediately in case of emergency. As mentioned in this Chapter 3.1.3, (8), 2, the following measures are recommendable.

1) Contingency Plan identifies the persons who will be responsible for dealing with each type of emergency by flow chart.

The flow chart must not exceed one sheet to ensure that information can be accessed immediately.

2) Responsible personnel must draft procedures to be followed for each emergency situation as well as accompany drills.

3) Drills must be practiced regularly and emergency equipment must be inspected.

The Emergency Committee in PC seems to be not functioning as port management. This committee is required to establish Contingency Planning System.

As for current situation concerning this issue, the management of dangerous goods and fire brigade seems to be functioning. On the other hand, effective counter-measures against oil pollution have not been taken, though a 875 meter oil containment boom and one small oil skimmer are available in the Oil Jetty. To cover the entire port, sufficient equipment for oil pollution control like a floating reception, additional boom, bigger oil skimmer and so on will be necessary and also drills in preparation for oil spillage from ship must be practiced periodically.

### 3.2.5 Strengthening of Communication

Communications and information exchanges are a fundamental factor of administration. The Ports Corporation as a government enterprise is urgently required to strengthen communications.

What follows is an analysis of internal and external communications in PC, as described in this Chapter 3.1.2, (2), 1).

#### 1) Internal Communication in PC

Mutual communication and information exchange including distribution of documents / mails among Departments, Divisions and Sections must be improved.

This is partly due to geographical hindrances like long distance between the Main Port, Container Port and Industrial Port. But lack of communication and information exchange is an obstacle to the improvement of port management and operation. This issue should be solved by any means.

Some possible solution are;

- Mail and document distributions;

One clerk only should attend the above distribution periodically, calling on all Departments and Divisions by car in the day time.

- Human communication and information exchange

The only solution is discipline on the part of each employee.

#### 2) External Communication and information between PC and others

The disruption of ship movement and cargo operation sometime happens in the port, because necessary information and documentation are not given to PC by the parties concerned in advance. This is usually caused by lack of communication between PC and

others except in some special cases.

Proper counter-measures by PC will be necessary to solve this issue.

One solution is;

PC should publish circular letters or port regulations in Arabic and English to all concerned which shall stipulate necessary information and documentation to be forwarded to PC in advance as specified.

### 3) Communication between inside and outside by third party.

Currently PC does not allow persons of private sector to use wireless radio in the port. This regulation must be reconsidered for the convenience of private sector as a service for customers and clients, though some regulations to use wireless radio by the third parties concerned are necessary.

### 4) Communication between PC and master of calling vessels

a) The master of calling vessel at this port is required to send the same messages to her shipping agent, Aqaba Radio and Port Control respectively by radio, Telex and / or VHF. Port Control should take simple and short VHF message from the master, unless it is changed, according to the messages to shipping agent and Aqaba Radio from the master in advance.

Currently the flow of this information is not very good, for instance, the message of the agent is usually submitted to Operation Department in PC but it is not regularly transferred to Marine Department. On the other hand, the messages of Aqaba Radio from the master are usually transferred by car once a day, which involves a 6 km drive between Port Control and Aqaba radio Station, because no facsimile machine is available at either side.

Those issues must be urgently improved.

b) It is desirable for PC to make close communication with the master of calling vessel. For instance, some responsible person of PC should be aboard on vessel arrival to advise her ETD and give any other necessary information and then PC could get more information from the master.

Communication with master is an important factor in improving port operation and services.

## 3.2.6 Improvement of Training System

For the Ports Corporation to become internationally competitive, the training / education of workers and fostering of competent employees are indispensable. As mentioned in this Chapter, 3.1.2, (4), 1) and 2), almost all the Departments in PC are required to train their workers and provide them with the high technical skill and knowledge necessary to introduce a new system.

Meanwhile, existing Maritime Training Center in PC seems not to be effectively functioning. Lack of competent trainers, adequate equipment and sufficient space are the main problems.

The following is a list of recommendations for improving a training system.

- a) The maritime Training Center provides common training by gathering workers from each Department if they require similar kinds of training.
- b) To invite some suitable experts and / or teachers to the Training Center.
- c) To prepare special training equipment like computer, simulator, cargo handling equipment and so on.
- d) To spread the space of the Training Center by construction of first floor on the existing ground floor in order to supply more training rooms and offices.
- e) To shift the Training Center from existing place in the Town to an suitable place in the Main Port to reduce the accessing distance and get actual practice easily for trainees.
- f) To develop current training courses, curricula, upgrade and train instructors and to introduce any necessary programmes; for instance, the training on personal computer and practical knowledge of modernized container terminal system.

Meanwhile, the Ports Corporation must strive to foster highly qualified employees like computer operator, engineer, pilot, ship inspector as well as management.

### 3.3 Urgent Improvement Action Plan

#### 3.3.1 Basic Concept

"Urgent Improvement Measures" were described in Progress Report with following basic criteria.

- a) Problems to hinder port activities or to be anticipated to become bottleneck in the future.
- b) Facilities and equipment which accompany no large investment and are easily improved.
- c) Port operation and management which require no fundamental change of organization, but only small change of operational procedure or working method.
- d) Improvement measures without environmental sanitation caused by port activities/facilities.

In spite of the above criteria, "Urgent Improvement Measures" contained the wide scope of problems and improvement articles which were required a large investment and some changes of operational procedures. Some of these articles were, strictly speaking, out of the definitions of the basic concepts.

In this report, "Urgent Improvement Action Plan" are selected and chosen from "Urgent Improvement Measures" under the following conditions.

- a) Articles and problems which are urgently required to improve.
- b) Articles and problems which are not required a large amount of investment or expenses to improve.
- c) Articles and problems which are not required a big, fundamental change of their organization.
- d) Articles and problems which are effected directly or quickly by the improvement measures.

"Urgent Improvement Action Plan" is consisted of Objective, Items, Contents, Expectative Effects, and Remarks. These articles of each measures are constituted by the table format as follows;

(See Table 3.3.1)

Table 3.3.1(1) Urgent Improvement Action Plan

NUMBER	OBJECTIVE	ITEMS	CONTENTS	EXPECTATIVE EFFECTS	REMARKS
1	Preparation for computerization of PC	Main frame (Main computer)	Establishment of the committee (project team) for pre-study of computerization of PC. The committee will consist of representatives of each Dept. Tasks to be computerized will be decided by the committee. Full-time staff and a secretariat should be arranged.	Computerization will be introduced in a logical manner to best meet the needs of PC.	Election of representative of each Dept. Arrangement of full-time staffs and secretariat
2	Effective usage of current personal computers.	Software of personal computer.	Supply of software for personal computers which are on market, such as word processor and Lotus 1,2,3. Training for personal computer at training center. How to use software on the market.	Documentation will be made easier. A typewriter is currently used in the office of the director general. After introducing word processor, documents can be drafted, filed and amended more easily.	Purchasing 「Word processor English edition」 and 「Lotus 1,2,3」 etc
3	Improvement of cargo work efficiency of container terminal	Container terminal	Receiving cargo work documents (container list for disch./loading, bay plan schematic plan) from shipping agent. Based on cargo work documents, PC makes cargo work sequence plan, and arranges cargo work equipment and stoworing. Discharging container on chassis directly. At present, containers are discharged on land once by gantry crane, and then transferred on chassis by top-lifter. Current operation has been adopted because of lack of tug-master, and to improve operation efficiency of gantry crane.	At present, shipping agents make disch./loading plan based on cargo work documents, and they oversee the cargo work operation. If terminal staffs handle cargo work directly, and make cargo work sequence plan, cargo work plan can be made in advance which will facilitate mobilization of gantry crane and equipment. By means of additional tug-masters, containers can be discharged on chassis directly by gantry crane. Improvement of efficiency is expected for container handling.	Close contact with shipping agent to obtain information and documents. Information of fax machine to receive information and documents. Purchasing tug-masters for exclusive use of container terminal. (About 10 units)

Table 3.3.1(2) Urgent Improvement Action Plan

NUMBER	OBJECTIVE	ITEMS	CONTENTS	EXPECTATIVE EFFECTS	REMARKS
3	Improvement of cargo work efficiency of container terminal	Container terminal	<p>Training for gantry crane operator.</p> <p>Preparation for storage space of discharging container, and marshalling space of loading container.</p> <p>Yard plan for discharging container is not adopted.</p> <p>Marshalling for loading container is adopted partly.</p> <p>Pre-notice system of delivery container.</p> <p>Consigned(Customs clearing company) should inform container number for delivery to container yard in advance.</p> <p>(1 or 2 days pre-notice)</p>	<p>As the gantry crane operator gain more expertise, the efficiency of the gantry crane will be improved.</p> <p>Yard plan for discharging container is not planned in advance. Driver of straddle carrier places container in storage area as he likes.</p> <p>Planning storage area of discharging container in advance.</p> <p>Container yard can prepare documents for delivery container in advance, and reduce procedure time on delivery.</p>	<p>Training place and form for gantry crane operator.</p> <p>It will be easier to control yard space once this system is introduced.</p> <p>Close contact with shipping company and customs clearing company (delivery document).</p> <p>Trucking company Customs Quarantine</p>
4	Main port No.1 berth(grain berth) Improvement of discharging efficiency.	Main port No.1 berth	<p>Due to low productivity for discharging grain by unloaders at No.1 berth, vessel congestion often results.</p> <p>Planning to use other berth alternatively (No.2 and No.3) for discharging grain cargo together with No.1 berth.</p> <p>No.3 berth is suitable for deep draft vessel.</p>	<p>Congestion of grain vessels will be reduced.</p>	<p>Ministry of Supply</p> <p>Portable evacuator</p> <p>Truck for discharging grain in bulk</p>

Table 3.3.1(3) Urgent Improvement Action Plan

NUMBER	OBJECTIVE	ITEMS	CONTENTS	EXPECTATIVE EFFECTS	REMARKS
5	Main port Improvement of cargo work efficiency of general cargo	Cargo work system	<p>Introduce roller conveyor and motor conveyor, and improve cargo work efficiency for carton and bag cargo.</p> <p>At present, these cargo works are handled by hand without any equipment.</p> <p>General cargo, like carton and bag is handled one by one without palletizing.</p> <p>When cargo is discharged from vessels, it should be palletized and transferred to warehouse/shed.</p> <p>When cargo is delivered from warehouse/shed, it should remain palletized.</p>	<p>Cargo work efficiency on both sides (on board/in warehouse) will be improved by using roller/motor conveyor.</p> <p>Palletized general cargo can be handled by forklift in large quantities.</p>	<p>Purchasing roller conveyor and motor conveyor.</p> <p>Purchasing pallets (PC) Request shipper and consignee to introduce palletization for general cargo.</p>
6	Industrial port Plan to improve berth usage of the JPMC berth.	Industrial port JPMC berth	<p>Improvement of working hour efficiency of loader/unloader by establishment of maintenance system.</p> <p>JPMC operates multi-purpose berth according to contract between PC/JPMC.</p> <p>It is said that working hour efficiency of loader/unloader is not sufficient due to lack of good maintenance system.</p>	<p>Improvement of working hour efficiency of loader/unloader.</p> <p>Improvement of rate of berth occupancy.</p> <p>Reduction of vessel congestion.</p>	Check and confirm contract between PC/JPMC.
7	Improvement of internal and external communication of PC	Communication	<p>There seems to be insufficient communication between internal parties.</p> <p>For example, there is a lack of information exchange between the Operation Dept. and Tech. Dept. concerning cargo equipment.</p>	<p>Close internal communication.</p> <p>Improved communication and information exchange.</p>	

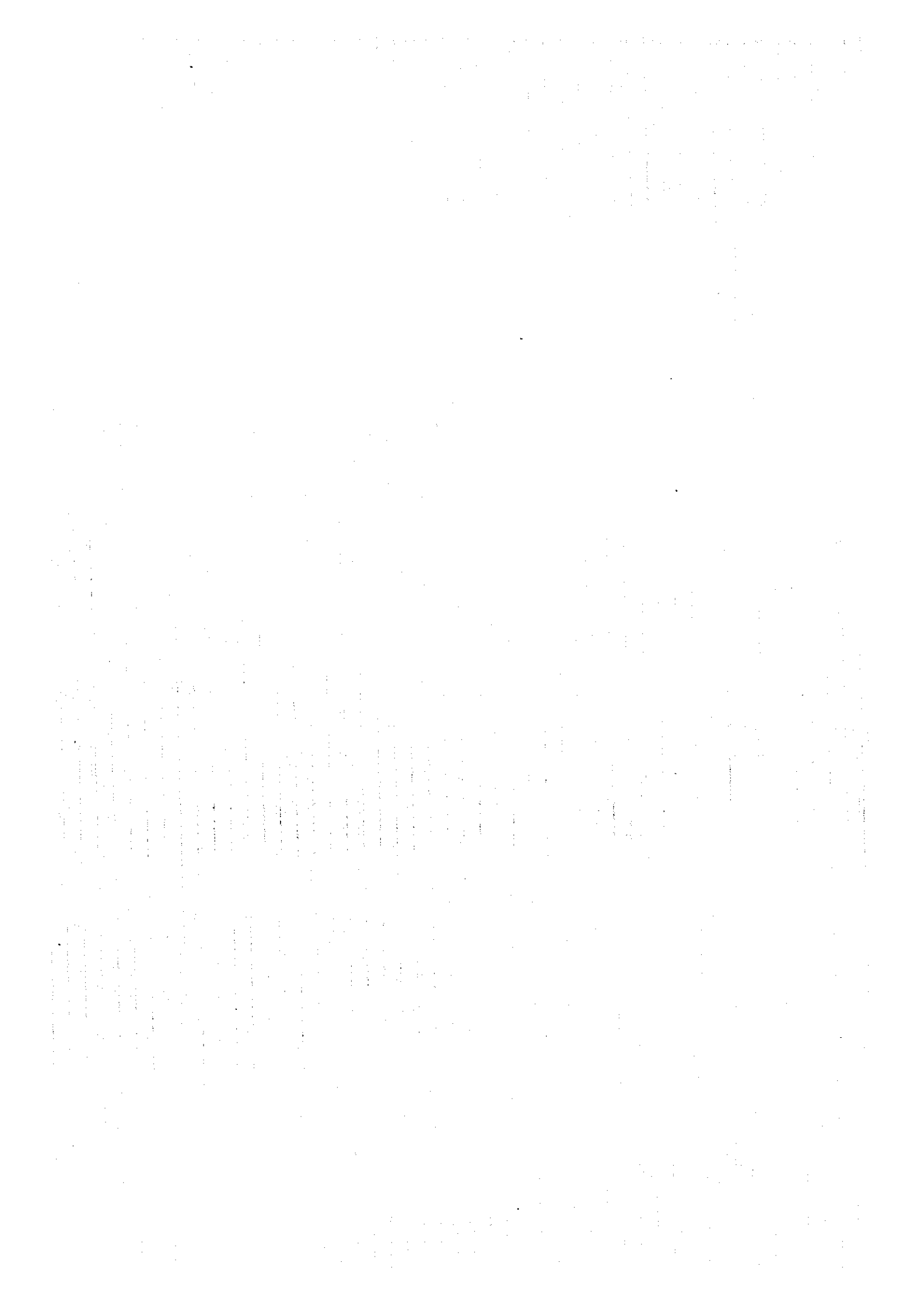


Table 3.3.1(4) Urgent Improvement Action Plan

NUMBER	OBJECTIVE	ITEMS	CONTENTS	EXPECTATIVE EFFECTS	REMARKS
7	Improvement of internal and external communication of PC	Communication	<p>External/Operation Dept. doesn't get the necessary cargo documents from shipping agent.</p> <p>Arrange full-time person who is in charge of delivery of documents and mail.</p> <p>Arrange delivery/receiving document and mail box inside of PC office.</p>	<p>Obtaining necessary documents which are required by Operation Dept. for their daily business, and PC can take charge of cargo work operation.</p> <p>Documents and mail will be delivered timely.</p>	<p>Keep close communication with shipping agent</p> <p>Arrange a full-time person</p> <p>Arrange document/mail delivery and receiving box.</p>
8	Improvement of measures of communication with outside.	Communication	<p>Setting up Telex machine.</p> <p>At present, telegram via Aqaba radio is utilized for communication with vessel, and it is not delivered quickly.</p> <p>Setting up fax machine.</p> <p>PC has 3 fax machines, but more are required if outside communicated is to conducted smoothly.</p>	<p>PC can communicate with internal and external party directly by telex</p> <p>PC can receive and deliver documents directly by fax machine instead of mail.</p>	<p>Setting up Telex machine</p> <p>Setting up fax machine</p>
9	Improvement of communication between office and field of shipping agent.	Communication	<p>PC prohibits usage of portable transceiver for shipping agent by reason of disturbing PC's communication.</p> <p>PC can permit shipping agent to use transceiver with conditions attached.</p>	<p>At present, field staff of shipping agent uses a telephone for communication with their office. If they are allowed to use a portable transceiver, contact can be made more easily.</p>	<p>Discussion with shipping agent</p>
10	Safety control of vessels which are proceeding to and anchoring at port.	Safety control of vessels	<p>Setting up marine radar on the top of marine tower.</p>	<p>PC can maintain safety of vessels which are proceeding to and anchoring at port.</p> <p>PC can advise the safety of vessel traffic and confirm the anchoring position of vessel.</p>	<p>Marine radar and display unit</p> <p>About 30 million yen</p> <p>375,000 \$ (\$80 yen)</p>

Table 3.3.1(5) Urgent Improvement Action Plan

NUMBER	OBJECTIVE	ITEMS	CONTENTS	EXPECTATIVE EFFECTS	REMARKS
11	Prevention of drain of technical engineers and experts.	Management	Technical experts generally do not stay long because of poor pay and working conditions. The payment and working conditions should be improved.	Technical experts will not be lured away.	Improvement of the payment and working condition of labors.
12	Adjustment and replottion of port statistics	Management	Port statistics found in the year book are not sufficient for port user or third party. Editing of useful statistics for port user or third party, for example, Ratio of containerization of general cargo Container cargo in TEU base	Practical use for port sales by studying the items of port statistics. Port user will find statistics more useful.	Study and check item of port statistics which are requested by port user.
13	Dust control of Phosphate berth	Environment	Loader of "Berth B" has been replaced with new choke feeder type with dust control system, but still dust control is not sufficient. Loader of "Berth A" should be replaced with new loader with dust control system. Dust control system of Phosphate storage shed.	Improve and prevent the pollution of Phosphate dust from storage shed to sea, coral reef, air and residential area.	Choke feeder loader with dust control Dust control system of Phosphate storage shed
14	Establishment of action and communication in emergency	Environment	Establishment of 「CONTINGENCY PLAN」 for action and communication in emergency such as marine disaster, fire, oil leakage and etc.	Studying the countermeasure for emergency condition by establishment of 「CONTINGENCY PLAN」.	









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