DEVELOPMENT STRATEGY OF THE PORT SAID CONTAINER TERMINAL

Strategija razvoja kontejnerskog terminala u luci Port Saidu

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Summary

Since 1960 there has been a growing trend for utilizing containers in marine shipping due to the growth of global trade, safety of containers, faster handling in ports and door to door services. This trend led to a development of container ships from 1000 TEU to 12000 TEU capacities. Consequently there is a continuous development in all related parties to container shipping such as port authorities, container terminals, cargo handling equipment manufacturers, management of container terminals and information technology. The system of containerization made a revolution at the entire pattern of trade and ports around the world, gearing up to meet trade growth and its requirements. Although there is a development in most of container terminals globally, our Egyptian container terminals still suffer from low performance which leads to losing the competitive capability. The paper is discussing the problems of public sector container terminals in Egypt and pointing particularly to Port Said Container Terminal, focusing on existing problems and suggested solutions for solving and improving the performance and productivity to compete and face the challenges due to the continuous growth in container shipping market.

Key Words: Container Ships, Container Terminal, Global Trade, Performance and Development of Container Terminal, Egyptian Container Terminals.

Sažetak

Od 1960. stalno raste trend rabljenja kontejnera u pomorskom brodarstvu. Taj je rast generiran prije svega zbog rasta globalnog prometa, sigurnosti kontejnera, bržeg rukovanja u lukama i servisom „od vrata – do vrata“. Taj trend doveo je do kontejnerskih brodova kapaciteta od 1000 do 12000 TEU. Sukladno tome, došlo je do razvoja svih ostalih subjekata međusobno povezanih s kontejnerskim brodarstvom, kao što su: lučke vlasti, kontejnerski terminali, proizvođači za opremu pri rukovanju teretom, upravom kontejnerskih terminala i tehnologijom informacija. Sustav

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prijevoza robe u kontejnerima revolucionarno je djelovao na globalnu strukturu prometa i luka, čvrsto se povezujući da bi se zadovoljio zahtjev porast prometa. Na globalnom planu većina se kontejnerskih terminala razvila. Ali, primjerice, egipatski kontejnerski terminali još uvijek pate od niskog stupnja učinkovitosti, što dovodi do nedostatne konkurentske sposobnosti. U ovom se radu raspravlja o problemima javnog sektora kontejnerskih terminala u Egiptu s posebnim osvrtom na kontejnerski terminal Port Saida, fokusirajući se na postojeće probleme i na elaboriranje prijedloga za rješavanje i usavršavanje rada i produktivnosti kako bi se povećala konkurentnost i suočilo s izazovima neprekidnog rasta na tržištu kontejnerskog brodarstva.

Ključne riječi: kontejnerski brodovi, kontejnerski terminal, globalni promet, rad i razvoj kontejnerskog terminala, egipatski kontejnerski terminali.

INTRODUCTION / *Uvod*

With globalization of trade the maritime transport has obtained a central role in the world trade. Whereby, more than 80 % of the world trade volume [1] is being transported by ships which are basically compatible with the environment and more economic. Until the end of 1950's (before containerization) the international trade was transported in general cargo, break bulk and bulk ships. Handling of cargo depended mainly on manpower. This system of handling was the reason of reducing the number of ship's trips per year, consequently minimizing the profit of shipping companies and delaying in receiving cargo and the cargo was subject to damage. The solution was to adopt a new system for handling cargo at ports, which is based on machines and advanced technology.

At the end of 1950's one of the main shipping companies in the USA started to use steel boxes - steel containers - on some converted ships to transport cargoes between American ports [2]. The appearance of the first container ship's generation with 1000 TEU capacity, happened at the end of 1960's. This development followed by many generations of container ships with more capacities. Now, the global fleet has some container ships with 12000 TEU. At the same time, there was a continuous development in all related parties to container shipping. The development in container ships has a significant and continuous growth even through economic crises, as seen with the Asian crisis at the end of the nineties. No doubt, container transportation (efficient, secure, clean and economical) is so convincing that almost any cargo will stay with the container concept, once shippers have seen the benefits and become used to them. This facts and the growth of world trade has formed a basis for a continuous growth of container shipping with annual growth rates between 6 and 9%. Today the major portion of semi-products and finished goods are shipped in containers, which are carried on all major routes by container ships. The high performance and productivity become the paramount requirements of the global trade to the port authorities and container terminals.

Globally, some countries are the leaders in developing their container terminals through ambitious plans, but some others are still suffering in this step such as Egypt. The fact is that the Egyptian public container terminals are still working with low performance. This paper will concentrate on the problems of Port Said container terminal such as poor yard planning, insufficient yard, low performance of equipments, low berth capability, insufficient training courses and without modern terminal operating system in use. According to our estimation that means loss in productivity by more than 80% and consequently loss in income and revenues of the company and loss in the national income. At the same time, there is a real challenge with the new private sector container terminals in the area. This challenge may convert the public container terminals from main ports or main terminals for shipping lines to feeder terminals. The paper aims to introduce some practical solutions to increase the performance and competitive power of Port Said container terminal.

WORLD DEVELOPMENT IN CONTAINER TRADE AND OPERATIONS / *Svjetski razvoj u prometu i radu kontejnera*

Container ships / *Kontejnerski brodovi*

Containerization started with using some converted ships and progressed with designing of container ships to maximize possible number of containers to be carried. The appearance of the first generation of container ships happened forty years ago in the late 1960's. The first constructed generation of container ships had a capacity of approximately 1000 TEU. The third generation of 3000 TEU capacity was delivered in 1972. These ships had *panamax* dimensions (length 285 m, breadth 32.2 m). During the second half of the 1980's, the capacity of *panamax* container ships had been increased to

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more than 4000 TEU through design improvements. These were relatively slow 19-knot ships with a small power plant designed to maximize fuel efficiency, but initiated the concept of around-the-world service. Today *panamax* ships can carry approximately 4700 to 4900 TEU, represent an increase in transport volume of 50 % as against that of the first third generation design, practically with the same overall dimensions. Economy of scale effects in container shipping have led to a rapid increase in ship size for all types of vessels, from feeders to the large transcontinental carriers.

During the second half of the 1990's, American President Lines (APL) ordered five, 273-metre long, 39-metre wide ships with capacity of 4400 TEUs for use in transpacific service. These containerships were unable to transit the Panama Canal and paved the way for increasingly larger *post-panamax* ships over the other shipping lines. The principal advantage of the *post-panamax* ship is virtually unlimited container capacity. Also, for the same TEU capacity, the *post-panamax* ship is five per cent cheaper to build, as length is the most expensive dimension in addition to no ballast water is needed as *panamax*, also, the *post-panamax* is wider and consequently more stable.

Fig (1) shows the container terminal operation on post *panamax* ship. In 1997, the shipping companies introduced *post-panamax* container ships of more than 7060 TEU with 17 containers across the deck (42.8 m. wide).

Where the global trade is growing, the ship capacities increase. There was a need for bigger and faster ships. In 2006, Maersk line started in operating the biggest existing container ship in the world "EMMA MAERSK" with about 12000 TEU capacity, length = 397.0 m., breadth = 56.0 m., depth = 30 m. and draft = 15.5 m. It is suggested that the next generation of mega-size container ships to be built in near future from 12000 to 16000 TEU capacities with 22 to 24 containers across 60 m. wide deck and drafts of 15 to 21 m.

A new term - *Malacca-Max* - has been nominated for the largest of these vessels. These ships would be capable of carrying 18000 TEUs. It would be 450 meters long, 60 meters wide and have a draft of 21 meters, which would be the maximum depth for transiting the Malacca Strait. Fig (2) can illustrate the cost of container transport against the ship capacity [3].

Most of container terminals are capable to receive the 5th generation of container ships (up to 5500 TEUs capacity). But for serving larger container ships, it will need deep water, wider channels and deeper berths. Ports and terminals will need to invest in high-speed cargo-handling equipment for productivity, including longer out-reach for cranes (super *post-panamax* cranes). These new cranes become equipped with twin lift containers and also, double and triple spreaders lift capacity. Some cranes are equipped with dual handling platforms

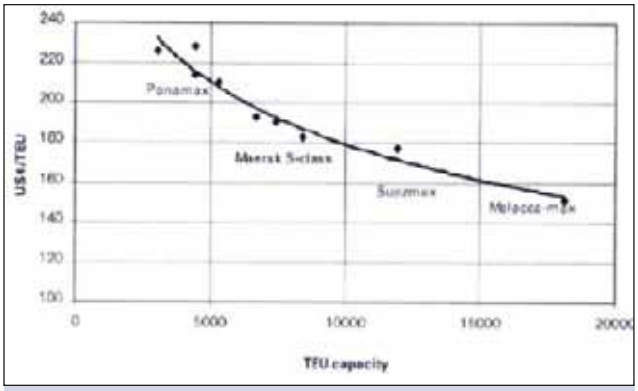

Fig (2) - The cost of container transport against the ship's capacity
Slika 2. Cijena prijevoza kontejnera prema nosivosti broda

To ensure high productivity, the hub ports require a considerable expansion of the port's landside as storage area, suitable berths for feeder vessels and good roads to inland destinations and reasonably

Fig (1) - Container terminal operation on *post-panamax* ship
Slika 1. Operacije na kontejnerskom terminalu s post--panamax brodom

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priced labor supply, available 24/7. The relation and trend of container ship specifications are illustrated in fig (3), [4].

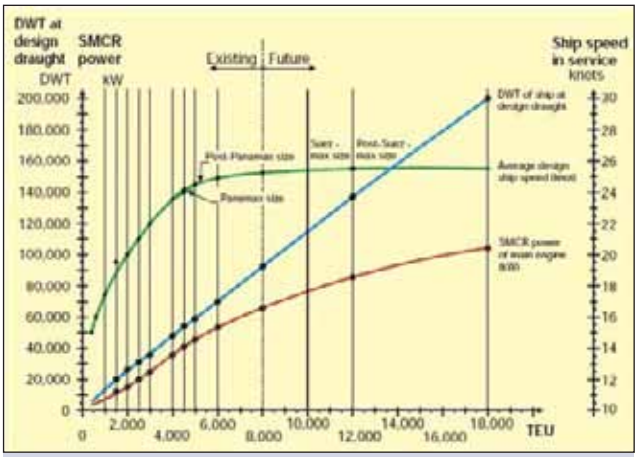

Fig (3) - The development of container ship specification
Slika 3. Razvoj specifikacije kontejnerskih brodova

Although longer out-reach of super *post-panamax* cranes are being built and delivered to various ports, their longer crane arm (about 65 m.) could create significant static and dynamic loads on the terminal's marginal wharf's carrying capacity and its pile bearings. These increased loads on the wharf structure might lead to either expensive retrofits or new deep water terminals designed to handle the imposed loadings. Currently, ships are served from one side only along a marginal wharf. This necessitates the use of longer out-reach gantry cranes to handle containers on the outward side of the ship. An alternative arrangement involves a slot berth for mega-size container ships to enable gantry cranes to serve both sides of the ship simultaneously. Fig (4) shows such a slot berth (50 m wide), which is currently being constructed in Amsterdam at the Ceres Paragon Terminal [5].

Container handling equipment / *Oprema za rukovanje kontejnerom*

The container terminals use many types of equipment, some of them on the quay side, others in the different yards as shown in Fig (5).

The container handling equipment can be divided as follows:

1. Quay cranes:
   a- Ship to shore cranes (STS Cranes).
   b- Mobile harbor cranes.
   c- Wide span ship to shore cranes.
2. Yard cranes:
   a- Rubber tired gantry cranes (RTG Cranes).
   b- Rails mounted gantry cranes (RMG Cranes).
   c- Straddle carrier's cranes (SC cranes).
3. Tractors and trailers (this machine can provide horizontal transport of containers from quay side to the yard or vice versa or from yard to another one).
4. Miscellaneous cranes:
   a- Reach-stackers cranes.
   b- Forklift cranes.
   c- Empty handler cranes.
   d- Top left cranes.

Fig (4) - *Ceres Paragon* Terminal, Amsterdam
Slika 4. Terminal Ceres Paragon, Amsterdam

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Fig (5) - Types of container handling equipment
Slika 5. Tipovi opreme za rukovanje kontejnerima

As a result of container ships development, the container terminal equipments were developed to satisfy customer's requirements. The cranes become bigger, fasters, equipped by high technology and facilities for more productivity. As shown, there are a lot of cranes and equipment types, capacities and capabilities used in container terminal. Of course, the container terminal must choose one compatible system for operation at the terminal.

The system of equipment that can be used in container terminals are:

1) STS / Tractors / RTG (medium and hub ports)
2) STS /Tractors / RMG (medium and hub ports)
3) STS / Straddle Carriers.
4) STS or/and Mobile cranes / Tractors / RTG or Reach stackers (at small and feeder ports).
5) Wide span or/and Mobile cranes / Tractors / Reach stackers (for small, feeder and inland ports).

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6) Combination of more than one system (public Egyptian ports case).

The choice of equipment system depends mainly on:

1- Location of the terminal and maritime environment.
2- The expected capacity of the terminal (move / year).
3- The expected transshipment, export and import volume.
4- Expected generation of ships which will call on the terminal.
5- Yard area and shape
6- Hinterland and connections with inland. (Rail / trucks /water ways).
7- Values of available investment

Wheeled system (road chassis system) is commonly employed in North America, in which containers are moved directly to and from the terminal on road chassis. The containers are stacked and stored on road chassis. Obviously this standard needs much space and a huge fleet of tractors is required. Although the wheeled operation needs more space than other handling systems, the benefit of this system is that handling is reduced to a minimum.

Operation at container terminals / *Operacije na kontejnerskim terminalima*

Recently, following the global trend of containerization, shippers have been working for lower transportation fees and the shipping companies have made significant effort toward reducing transport costs per shipping unit. Furthermore, shipping companies become more interested in maximizing vessel's turnover by minimizing the time at ports for economical reasons.

These situation forces rival terminal companies to develop into the latest technology of loading and unloading, as well as the renovation of their terminal facilities in order to reduce vessel's time at terminal.

The operation at container terminals becomes a vital issue for measurement of terminal performance. It depends mainly on the design and layout of the container terminal which is based on the expected maximum volume of containers to be processed through the terminal. Its characteristics are as follows:

1. Quay length and draft according to expected generation of ships.
2. Storage Capacity of yard to be sufficient for import, export and transshipment.
3. Number of berths to optimize quay utilization according to capacity and types of ships.
4. Number of quay cranes to be compatible with quay length and required productivity.
5. Yard cranes and trucks to facilitate stacking containers in different yards.
6. Number of gate lanes to facilitate inbound and outbound containers.

There is a relation between the above elements to satisfy the best performance where every modern STS *post-panamax* crane need 100 m. long quay, 50,000 sq. m. of stacking yard, 3 RTGs, 6 trucks with trailers. This equation can produce about 200,000 TEU/year. Fig (6) explains the layout of modern container terminal [6].

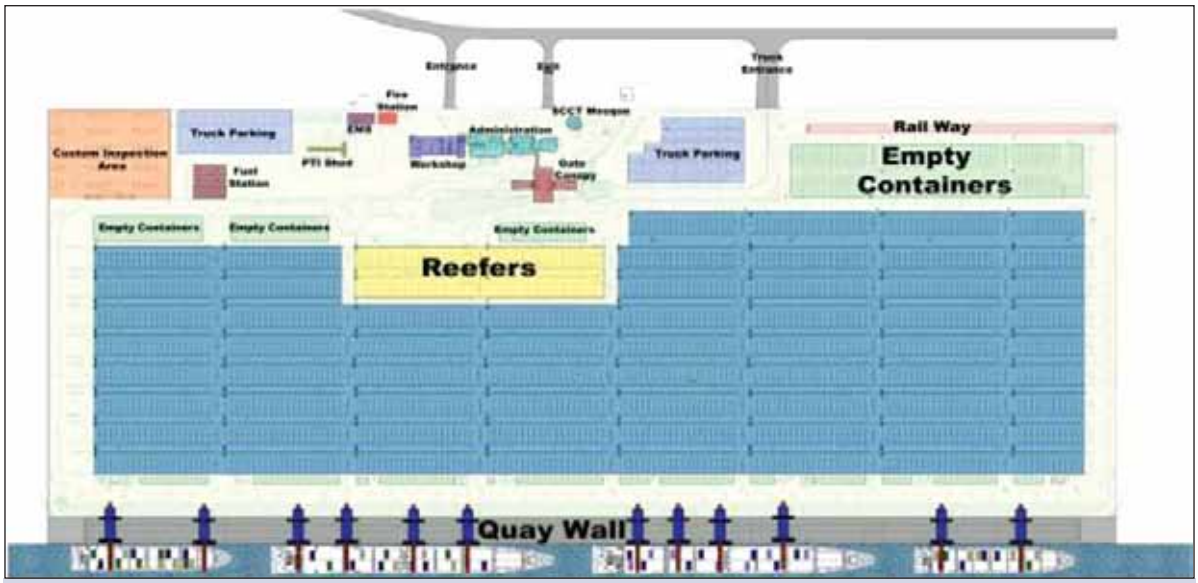

Fig (6) – The layout of modern container terminal
Slika 6. Plan modernoga kontejnerskog terminala

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In this respect, the container terminals are looking into ways of making existing facilities more efficient. One of the main solution to improve efficiency, increase capacity, and meet future demand is using advanced technologies and computerized operating system in order to speed up terminal operations. Computerized container terminal operating systems have functions and roles as follows:

- Manage the flow of containers through the terminal in the most efficient manner.
- Plan loading/unloading schedule and yard operation by receiving information from shipping companies.
- Process the containers transported into the terminal by rail or road, receiving notification from shipping companies and trucking companies.
- Notify shipping companies and trucking companies about the locations of containers.

An increase of the efficiency of those systems is mandatory to achieve further reduction of terminal operating costs with high productivity. Fig (7) explains the modules of modern terminal operating system.

1. Very high skilled management team that can plan and manage huge amount of investment and trade in addition to taking the right decision. Mainly, the public sector container terminal operating companies are suffering from old fashion management particularly in developing countries.
2. To prepare the required huge budget and investments for continuous development of ports to satisfy the requirement of global trade. Also, the majority of countries "especially developing countries" are not able to arrange the required and sufficient budget as well as investment for port development [7] [8]. In order to help, the World Bank has introduced many useful strategies. Every country can choose the most suitable one to develop their ports such as:
   1. Modernization of port administration and management strategy.
   2. Liberalization or de-regulation of port service strategy.
   3. Commercialization strategy

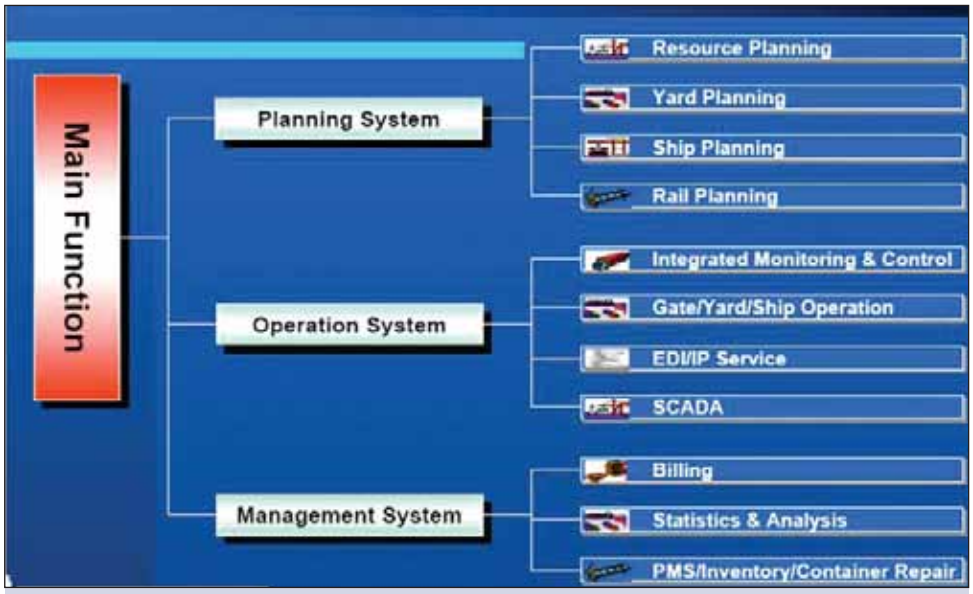

Fig (7) – The modules of modern terminal operating system
Slika 7. Moduli modernoga radnog sustava terminala

Development in port management systems / *Razvoj u sustavima lučke uprave*

The port sector has been traditionally viewed as a public sector owned by port authority and operated by public companies. With growing in global trade, experience indicates that the public sector has considerable difficulty in adapting to the needs of the users and of ensuring that the service is permanent without any interruption. Therefore operation of ports and container terminals will need the following:

4. Corporation strategy.
5. Privatization strategy.

The main reason which pushed the World Bank to adopt these strategies is to standardize the rules in investment into the ports to enhance the global trade growth.

However, these strategies encourage the partnership between public and private sector in addition to the following reasons:

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General Reasons:

- Improve port efficiency
- Decrease costs and prices
- Improve service quality
- Increase competitive power
- Change the attitude with respect to port clients.

Administrative/managerial Reasons:

- Diminish the political influence on the public port administration
- Reduce bureaucracy
- Introduce performance-based
- management
- Avoid governmental monopolies.

Financial Reasons:

- Reduce public sector expenditure
- Attract foreign investment
- Reduce commercial risks of investments for the public sector
- Increase the private sector participation in the regional and national economy

Employment reasons:

- Reduce public administrations size
- Restructure and retrain the port labor force
- Eliminate restrictive labor practices
- Increase private sector employment.

Where the port organization and structure were basically public sector called "service ports system" and with adoption of different strategies and private sector participation, the structure of port management system has been changed according to environment, requirements and policies of each country [7] [8]. These strategies and participation created some new form or models of port management system such as:

- o Tool port management system.
- o Landlord port management system.
- o Private port management system.
- o In addition to service port management system (public ports).

Table (1) explains the relation between the types of port management and the ownership or provision of infrastructure, superstructure and the stevedoring labor [7] [8].

Few years ago some of the largest, most efficient ports in the world were public ports, operated by the public sector such as Singapore port which has converted to landlord system recently. The majority of the best ports in the world are working now under landlord system of management. The enthusiasm for increasing private sector participation (PSP) in port operations derived from the failure of public port operations in most terminals to meet the following objectives:

- Providing efficient and cost-effective services from the port users' perspective.
- Responding to changes in cargo-handling technologies.
- Responding to the requirements of the port users.
- Providing variety of services and ability on competition.
- Making schedules for investment to improve efficiency and expand capacity.
- Ability for existing needed funds for investments.

THE SITUATION IN PORT MANAGEMENT OF THE EGYPTIAN PORTS / *Situacija u lučkoj upravi egipatskih luka*

All Egyptian ports are related to service port system of management. Just few years ago the Egyptian government adopted new strategy to let the private sector participate in operation of new container terminals through concession agreement or BOT (Built – Operation – Transfer) in Alexandria, Port Said, Damietta and Suez ports. Now all Egyptian ports have become a mix of private and public terminals. The trend of partnership between private and public sector at the Egyptian ports is as follows:

1. Alexandria:

The port has two container terminal operators [9]:

- Alexandria Container Handling Company (public sector).
- Alexandria International Container Terminal. AICT (private sector). Where Hutchison port holding (HPH) agreed with the government to build and operate new two terminals in Alexandria and el-Dekhila port.

Table (1) – The relation between the types of port management and the ownership
Tablica 1. Veze između tipova lučke uprave i vlasništva

Management system	Infrastructure	Superstructure	Stevedoring labor
Service port	Public	public	public
Tool port	Public	public	Private
Landlord	Public	Private	Private
Private port	Private	Private	Private

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2. Port Said:

It has two container terminal operators [10]:

- Port Said Container and Cargo Handling Company (public sector at the west port).
- The Suez Canal Container Terminal (private sector at the east port). Where AP Muller agreed with the government to build and operate the Suez Canal Container Terminal.

3. Damietta:

It has two container terminal operators. One is already operating and the other is under construction [11].

- Damietta Container Handling Company (public sector).
- KGL Container Terminal (private sector). KGL Company contracted for a big terminal and is still under construction.

4. Soukhna port at Suez City:

Has one container terminal operator [12].

- Soukhna Container Terminal (private sector) is started to become used instead of Adabya port.

Figure (8) shows the global leading companies which participate in development and operating the container terminal in the world as:

1- Hutchison Port Holdings (HPH)

2- Port of Singapore Authority. (PSA).

3- A.P. Moller.

4- Dubai Ports World.

5- COSCO Pacific.

THE PRESENT CONDITION OF PORT SAID CONTAINER AND CARGO HANDLING COMPANY / *Sadašnje stanje kontejnerskih kompanija i kompanija za rukovanje teretom u Port Saidu*

As known, container terminals vary significantly in terms of size, type of operation, location, management, type of equipment, layout and some other aspects. All these criteria show that there are so many factors that should be considered in the early stages of container terminal design and / or decision making for any development or extension plan and by using tools that can provide enough information about alternatives. The managers of the terminals can make their decisions on these criteria. On the other hand, there is an interrelationship between various activities in container terminals which require more flexibility in daily operation and decision making.

The Egyptian container terminals are suffering from many issues which affect deeply the performance and productivity. Port Said container and cargo handling company "PSCCHC" is one of the main container terminals in Egypt and located at Port Said port. This company is suffering from many problems that affect the operation performance. In the following chapters, we will concentrate on these problems and defects which affect the performance and productivity.

Terminal layout / *Plan terminala*

The container terminal layout contains the yards, quay and buildings [13]. The design and layout of the area are based on the expected maximum volume

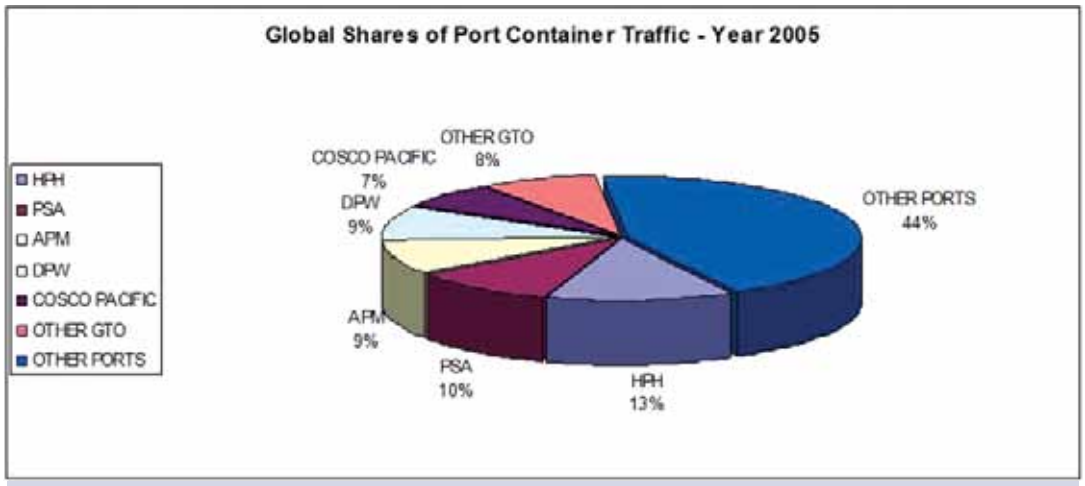

Fig (8) - The global shares of private companies in operating the container terminals
Slika 8. Globalni udjeli privatnih kompanija u operiranju kontejnerskih terminala

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of containers to be processed through the terminal. At the same time it has to assure smooth flow of containers between yards and quay. The perfect planning of terminal layout is the main factor for high productivity and best performance. Organized yards and good stacking of containers lead to better and faster movement of containers from ship to yard and vice versa. As known, the shape of container terminal is usually rectangular, starting with the quay side and followed by the yards in behind. The yards have to be divided longitudinally and transversely by roads to facilitate moving of containers from yards to the quay and vice versa. When applying such standards to the present layout of PSCCHC, it is evident that the problems are as follows:

1. The area of yards is not sufficient for the existing volume.
2. The layout is not properly planned or organized.
3. Some yards are separated and irregular in many destinations inside the port.
4. There are no identified routes for traffic inside the yard.
5. There is no specified yard to check import containers, where the custom can inspect and check the cargo in between the container's stacks.
6. The functions of terminals such as administration, management, operation etc. are separated away from each other. In the city such arrangements cause congestion and a huge waste of time and effort for contact all function points, particularly when the company has not computerized network to connect all departments. Thus the cooperation among various functions is seriously disabled.

The solution is:

1. To add an extension to the south side of the terminal with about 200,000 sq. m. regular yards, just behind the quay. This yard can be used for export, import, reefers and import inspection.
2. To build a new independent building for all company departments to minimize time and efforts for communications.
3. To add a computerized network to ease communication between departments.

Fig (9) explains the existing container terminal yard and quay.

Fig (10) explains the proposed extension to yard and quay.

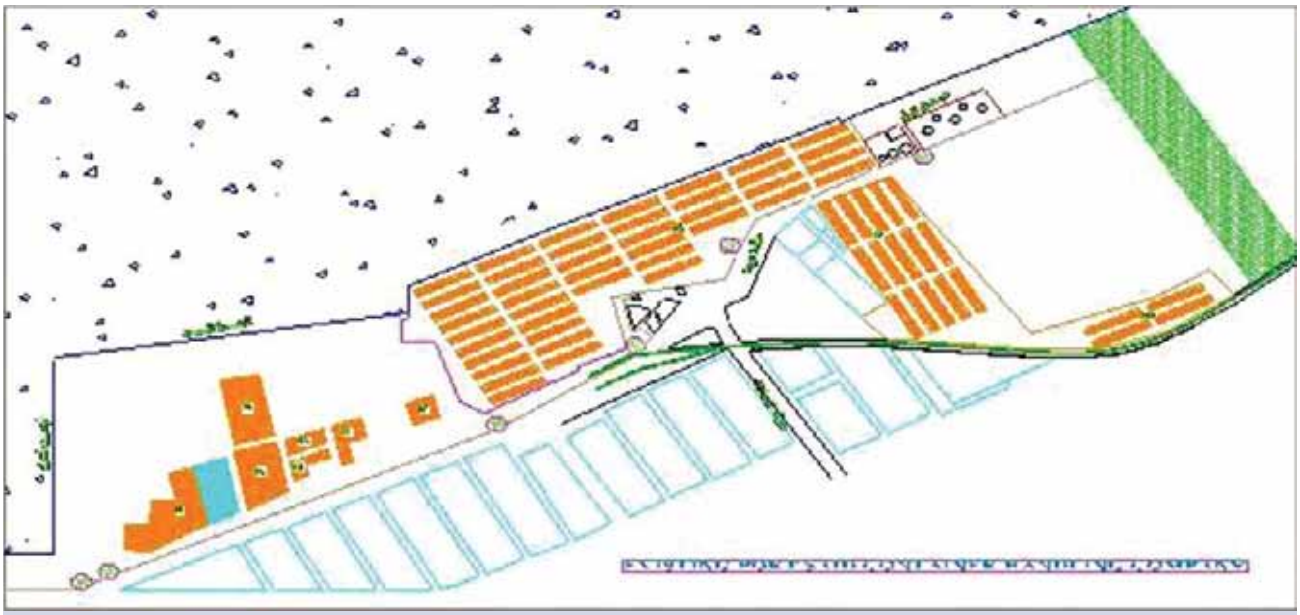

Fig (9) – The existing layout of the terminal
Slika 9. Postojeći plan terminala

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Fig (10) - The proposed extension to the terminal
Slika 10. Predloženo produljenje terminala

The quay and quay cranes / *Operacijska obala i obalne dizalice*

According to the terminal layout, the existing assets and equipment must cover all required activities inside the terminal. The quay length is the main factor to identify all other requirements of the terminal yard and equipments. For example every 100 m. of quay length must be equipped with one modern STS crane and served by 3 RTG cranes, 5 to 6 trucks with trailers and 50,000 sq.m. of area.

- The quay length is 950.0 m length x 13.5 m. depth. That means the quay can be utilized by 9 to 10 modern STS cranes.
- The capacity of the quay was 7 STS cranes with the additional two added in July 2008 (after losing of 40% of terminal volume in April 2008). The total has become 9 STS cranes.
- The company has other 2 mobile cranes used in Abbas quay (350.0 m. long x 11.0 m. depth) to handle feeder ships.
- There is a relationship between the quay depths, the expected container ships which will berth on the quay and cranes outreach length.
- In our case the quay depth is 13.5 m. and the maximum allowable draft of ships which can be berthed is not more than 12.0 m.

Table (2)
Tablica 2.

STS no.	Type of crane	Max load (Ton)	Outreach length (m.)	Capability (lifting capacity)
01	Panamax	41.0	35.0 m (13 row)	One full container
02	Panamax	41.0	35.0 m (13 row)	One full container
03	Panamax	41.0	35.0 m. (13 row)	One full container
04	Super post-panamax	60.0	50.0m (18 row)	2X20 ft. or 1x40ft. full
05	Post-panamax	40.0	44.5 m.(16 row)	One full container
06	Post-panamax	40.0	44.5 m.(16 row)	One full container
07	Post-panamax	40.0	50.0 m.(18 row)	One full container
08	Super post panamax	60.0	55.0 m (22 row)	2X20 ft. or 1x40ft. full
09	Super post panamax	60.0	55.0 m. (22 row)	2X20 ft. or 1x40ft. full

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- According to global statistic the aforesaid 12 m. of draft is for 5th generation of container ships.
- The maximum capacity of this generation is 5500 TEU.
- That means the maximum allowable ship to berth on PSCCHC terminal is the one of 5500 TEU capacity. This generation of ships has maximum 17 containers across or 42.5 m. breadth.
- In order to compare the expected mother ships and the existing facilities (STS cranes), the next table (2) can illustrate the specification of these cranes.

Conclusion from the facts shown in Table (2):

- *Panamax* cranes (STS no. 01,02 & 03) cannot work on *post-panamax* ships because of short outreach (due to that only 4 cranes can be used with *post-panamax* mother ships in addition to the new two ones.
- *Panamax* cranes are in bad technical and operational condition.
- No. of 6 STS cranes can lift only one full container (not able to lift 2x20 TEU full), although the cranes can be equipped with twin spreader. The twin spreader can be used only with 2x20 TEU empty.
- The short quay related to demand makes the ships delay and waiting long time at the waiting area.
- A new quay was studied 5 years ago among the Port Said authority, PSCCHC, the Suez Canal authority and shipping company's joint venture. The project has not been completed yet. This joint venture was representing a 60% of terminal output.
- In addition to the above, the 1st and 2nd berth of the quay are suffering from dismantled and broken STS cranes rails clips. Due to the low technical condition of the cranes on these two berths, there is fatigue strength on the rails which make the rail's clips broken. That leads to the loose of quay rails.
- Due to above specifications of cranes and quay there was a direct effect on terminal productivity. Consequently the shipping companies left the terminal.
- The solution:

1- To construct a new quay with min. 16 m. depth and 350 m. long as an extension to the existing quay and equipped with 4 new super *post- panamax* cranes (65.0 m. outreach and 65.0 tons lifting capacity). As shown in fig (10).
2- The oldest STS cranes must be replaced by new modern cranes.
3- The allowable stress on the new quay must be calculated properly due to heavy weight of cranes in order to minimize crane's width.
4- It is necessary to re-fix the existing quay rails by new clips.

Terminal operation and handling systems / *Sustavi rukovanja i rada terminala*

The global increase in trade led to an increase in number of containers and vessel's capacities. This increase has added pressure on seaports and terminals to increase productivity. The container terminals have to provide customers with high-quality services. This can be accomplished through improvement of the productivity that depends on efficient equipment, skilled workers and advanced automated operating systems. The PHCCHC has not got a computerized system which can plan for loading and discharging containers and allocating containers on yard. All these activities are done manually which effect on the performance. At the same time, the computerized system is the main alternative solution for better yard shortage. This system can support the company as follows:

1. Optimize utilization of container handling equipment.
2. Improve and maximize yard capacity and utilization
3. Increase visibility into gate transaction times.
4. Integrate planning and operation.
5. Optimize vessel planning.
6. Reduce operating cost
7. Improve data accuracy.
8. Minimize re-handling.
9. Enhance safety and security.
10. Optimize utilization and forecast.

By using automated operating system the company can do complete planning integrated with operations carried out and follow all current procedures. On the other hand many container terminals in the world were facing the problem of land constraints and extension requirements (as PSCCHC case) due to high volume from gate and vessels. The main solution was to adopt the automation that can help the terminals to achieve the requirements.

Service level agreement / *Ugovor o razinama usluge*

The contracts between terminals and shipping lines contain items such as rate of handling, expected volume and scheduling of ships as well as some other items related to the storage cost of containers at the terminal yard. Usually the terminal provides the shipping lines some allowances for the empty containers between 3

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or 4 weeks free of charge depending on the agreement. The high volume of empty containers at the terminal requires a lot of non-productive re-handling. The yard is not properly planned and quite congested. This action will require the following:

1. More equipment to do re-handling (non-productive moves).
2. Depreciation for equipments, fuel, spares parts and time.
3. More space in the yard required.
4. More effort for operators.
5. Delay in yard and low quay productivity.

The solution is to change the storage charges from day basis to quantity basis. It means that the shipping line will be granted a limited amount of units free of charge. However any extension over the agreed limit will be charged. This will help in loading containers directly without any re-handling.

The terminal gate of PSCCHC / *Pristupna vrata terminalu PSCCHC*

The terminal gate is the access and control point to the export/import gate of the containers. It must be designed to facilitate crossing the containers from hinterland and local market to terminal and vice versa. The crossing is usually done by local trailers. The import, export and empty container's yards at PSCCHC have the following:

1. The yards are disconnected and separated.
2. They are not well organized nor equipped with any communication network.
3. Transfer of local trucks from yard to yard have to go outside the port authority area and boarder.
4. Yards are not sufficient for containers (empty, export or import).
5. The customers have to make many turns to complete their documents among many various buildings, yards, offices, crane operators and weighing scale.
6. There are 3 main sections working as a function of the gate team as follow:
   - Import containers section.
   - Export containers section.
   - Empty containers section.

   Each section is located separately and has its own team work.

The solution:

1- With the proposed extension of yard with 200,000 sq. m. area fig (11) and using automated operating system, the yards have to be re-arranged and allocated according to container type (export – import – empty) and steel gantries for reefers.

2- New structure for gate team (fig (12) has to be organized as only one section (not 3 sections as it is at present) under centralized operations management. The gate team will be responsible for all the traffic of inbound and outbound containers at the gate according to shipping lines requirements and customs regulations. The gate department has to have software for easy contact with all customers.

3- New design for traffic of inbound and outbound containers at the gate is shown in fig (13), instead of the existing one shown in fig (14).

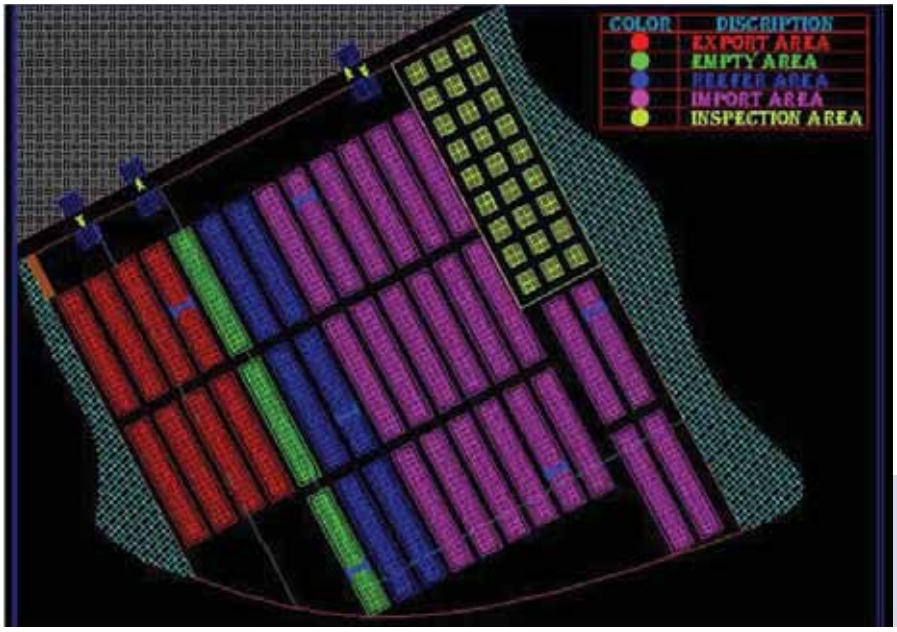

Fig (11) – The proposed extension of yard
Slika 11. Predloženo produljenja depoa

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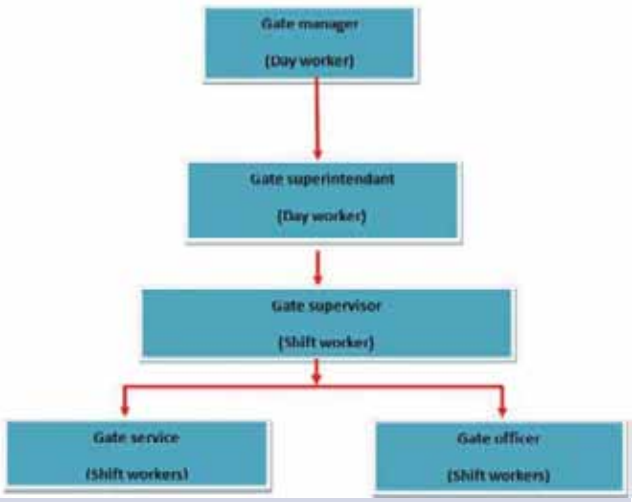

Fig (12) - Gate team structure
Slika 12. Struktura organizacije tima na pristupnim vratima terminala

Fig (13) – New designed gate
Slika 13. Novi izvedbeni pristup vratima terminala

Fig (14) – Existing gate
Slika 14. Postojeći pristup vratima terminala

Yard cranes / *Dizalice depoa*

Due to the shortage of yard, the existing distribution of yard cranes and yard plan has to change into the back to back yard cranes arrangement fig (15).

By using this arrangement the number of container stacks can be increased and it will be possible to add about 1000 TEU capacity to the existing yard.

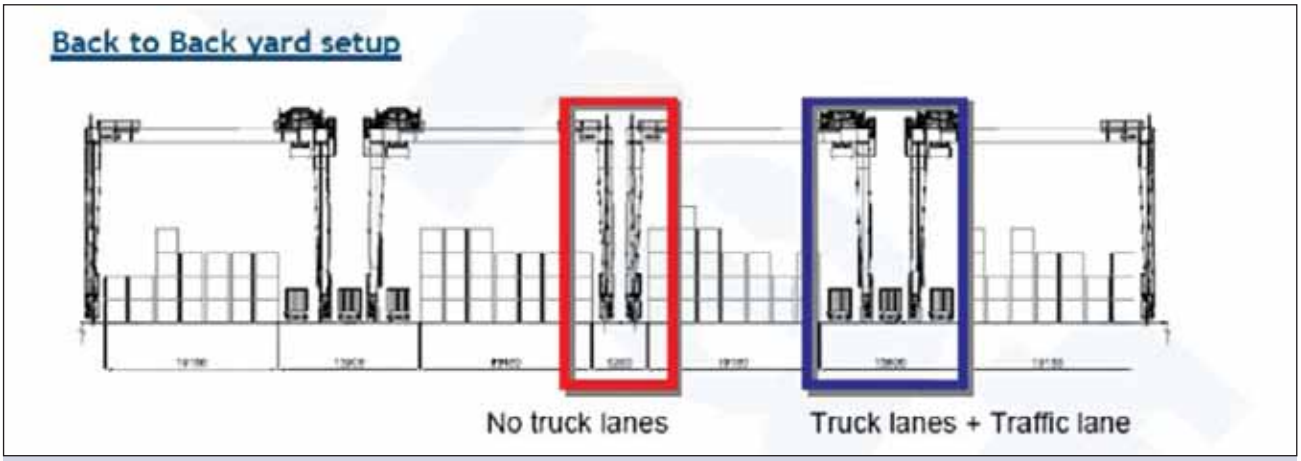

Fig (15) – *The back-to-back* yard cranes arrangement
Slika 15. Prijedlog za izvedbu dizalica depoa tipa back-to-back

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Tractors and trailers / *Traktori i prikolice*

The number of trucks and trailers do not comply with the number of cranes due to long distances between the yards and quay. They are not sufficient to carry out and perform the required activities. This shortage causes delays in handling and low productivity. Number of trucks must be increased to become 6 trucks/cranes to cover the requirements.

Reefer yard / *Depo hladnjače*

The reefer yards are separated, insufficient and not organized. There is the lack of space for pre-trip inspection (PTI) for reefers. With the proposed extension a sufficient reefer yard can be added and organized in addition to PTI area. Fig (16) shows the arrangement of reefer yard.

Fig (16) - Reefer yard
Slika 16. Depo hladnjače

Store management system / *Sustav upravljanja zalihama*

Usually, there are delays in internal and external purchase orders for spare parts and materials. The quantity at stock is limited due to financial reasons. All this leads to reduce the availability of the existing equipment. New system can be adopted through yearly contract with the main spare parts and material suppliers to supply yearly stock of main spare parts and consumables (such as crane wire ropes, tires, filters and dry batteries…) with credit payment according to supplier's offers. The advantage of this system is availability of spare parts through the year and credit payment instead of cash.

Training and knowledge / *Izobrazba i znanje*

Training is an investment in people. It is the process of imparting knowledge to people so that they become capable of performing their assigned duties in an acceptable manner.

At PSCCHC, the training has a little priority because of many reasons such as cost saving policy or government recommendation for higher revenues. In the course of time the amount of knowledge and initiatives decreased. Due to the fact that the employees are not updated on the new technology, the result is a low performance. On the other hand, new employees must be aware to meet a challenge. It is required to implement a new strategy for training to upgrade and improve the company performance and can be introduced in two directions.

- To choose the best qualified candidates for vacant jobs through necessary exams like IQ tests and personal skill's evaluation according to job requirements.
- Two years ambitious plan for training courses to the majority of the company's staff according to the departments, priority, budget and work requirements.

The training courses can be classified according to the following:

1. General courses:
- Introduction to ports course:

2. Safety courses [14]:
- Introduction to safety.
- Hazardous materials transport driver course.
- Understanding and applying IMDG Code.
- Lifting supervisors' safety course.
- Principles of fire fighting course
- Safety supervisors.
- Developmental safety.
- Security training course

3. Management skills courses [15]:
- Management Skills course.
- Coaching Employees to Their Potential
- Managing in Tough Times course
- Management Skills for Experienced Managers
- Finance and Accounting for Non-Financial Managers
- Making Successful Business Decisions
- Leadership Skills.
- Emotional Intelligence.
- Project Team Leadership.
- Strategic Planning course
- Effective Time Management.
- Personal Skills for Professional Excellence
- Critical Thinking and Problem Solving.
- Communication Skills.
- Negotiation Skills.

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4. Special courses:
- Technical and engineering programs.
- IT programs.
- Financial and accountant programs.
- Human resources programs

By adopting ambitious 2 years development plan for PSCCHC, the terminal has the potential to become one of the most important in the east Mediterranean region. According to our estimation the plan will cost about one billion Egyptian pounds (US$ 182 m.). The investment can be funded through participation with private sector, preferable shipping company or a joint venture between many shipping companies or global terminal operators.

CONCLUSION / *Zaključak*

It is evident that the Port Said Container and Cargo Handling Company (PSCCHCT) have missed to follow the global continuous growth of container trade. The presented analyse shows that PSCCHCT have been faced with many problems.

The improper organization and shortage of space inside the port authority boarder restrict any further extension and lead to heavy congestion. Many small, irregular, separated yards affect the terminal performance. The best solution is to use the available vacant wide hinterland for terminal extension. Furthermore, the main alternative for shortage of land is to use the automated operating system which can provide the optimal solution for yard utilization, planning and operation of container ships. The review, the specification of quay and quay cranes, showed that 33% of cranes are old fashion and not compatible with the global requirement. The terminal needs an extension to deep quay of about 350 m. long to avoid transferring to feeder port. This quay must be equipped with new modern four ship-to-shore (STS) cranes, with replacement to the oldest three STS cranes. The yard equipment such as rubber tired gantry cranes (RTG), trailers and tractors are insufficient and not balanced with the quay cranes. This leads to idle time to the quay cranes and delay in handling. Therefore the equipment on quay and yards must be balanced with each other to satisfy best performance. On the other hand, there are 3 sections responsible for dealing with local customers for Import, export and empty containers. These three sections can be consolidated in one section called Gate Section. The new gate has to be designed in a way to facilitate inbound and outbound containers, while the new building beside the new gate for collecting the gate team and customs staff, has to facilitate the procedures on the terminal customers.

The reefer yard is not sufficient for the existing volume. The present number of reefer steel gantries is not sufficient to facilitate monitoring of reefers and no space and no enough power for pre-trip inspection (PTI). All this affect the handling of reefer containers. So, the planning is to allocate the proposed new extension yard to be for import, export, reefer and empty containers with special area for custom inspection and PTI reefers.

The system of purchasing of the spare parts must be changed. New system can be adopted such as yearly contract with main suppliers to supply the strategic spare parts. The prices and payment terms can be negotiated.

The terminals usually invest a lot of money in new system of automation, new equipment and yard extension. At the same time they must consider the human resource skills and performance. The skilled and high motivated workforce is essential for safe and efficient operation. In this respect it is essential for the terminal to invest in their staff through high level, continuous training programs to update the staff by the modern technology, management and personal skills.

All the above requirements for terminal development are applicable. It can be done through built-operate-transfer system (BOT).

With the adoption of this plan of development, the expected volume can be increased to reach 2.5 m. TEU per year. In case of no development, the terminal will be transferred to feeder terminal with big loss in productivity and income.

By adopting ambitious 2 years development plan for PSCCHC, the terminal has potential to become one of the most important in the east Mediterranean region. The plan will cost about one billion Egyptian pounds (US$ 182.0 m.). The investment can be funded through participation with private sector, preferable shipping company or a joint venture between many shipping companies or global terminals operators.

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