



الأكاديمية العربية للعلوم والتكنولوجيا والنقل البحري
Arab Academy for Science, Technology & Maritime Transport

MRCC



**International Maritime Transport and logistics Conference
Toward Smart Ports**

13-15 March 2016 Hilton Green Plaza – Alexandria - Egypt

**INFORMATION TECHNOLOGY IN MODERN PORT MANAGEMENT
(ECONOMIC PERSPECTIVE)**

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Introduction

Smart ports increase role of ports in the economy as development of ports infrastructure based on a smart approach is:

- cost effective
- sustainable
- safe design
- smart to operate the port efficiently
- smart to make port operations more environmental friendly

The current study focus on information and communication technology in ports and how it affects port performance and economic development

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**PORTS AND
ECONOMIC
DEVELOPMENT**

**PORTS
PERFORMANCE
AND NATIONAL
ECONOMY**

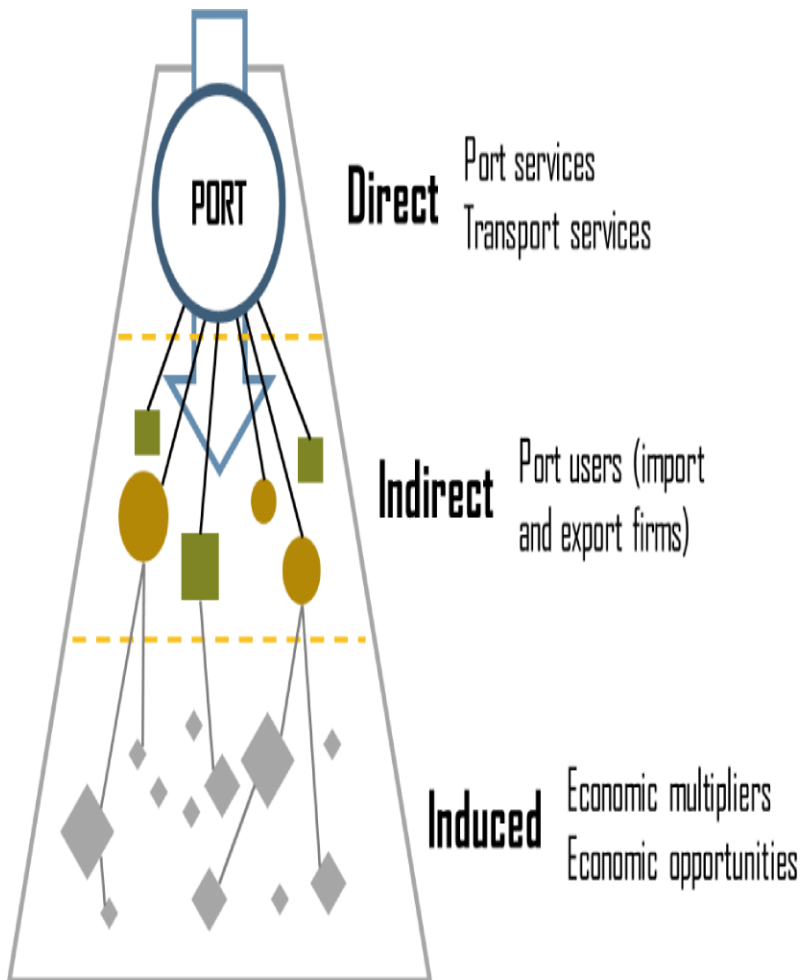
**ICT AND PORT
PERFORMANCE**

**ICT IN LEADING
WORLD PORTS**

**BENEFITS OF
ICT IN PORTS**

**ICT IN
EGYPTIAN
PORTS**

FIRST: PORTS AND ECONOMIC DEVELOPMENT



The economic benefits of ports categorized as

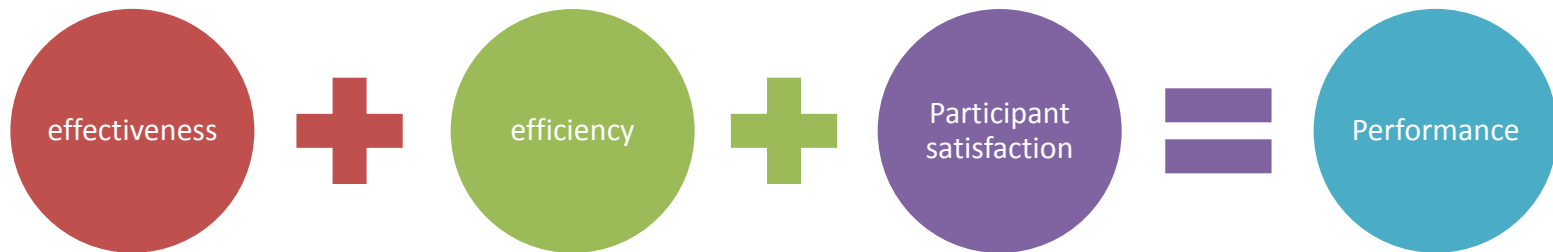
Direct impacts: The outcome of improved capacity and efficiency where transport provides employment, added value, larger markets as well as time and costs improvements.

Indirect impacts: Investments in ports lead to an increased economic activity. Indirect value-added and jobs from local purchases by companies directly dependent upon transport activity.

Induced impacts: The outcome of the economic multiplier effects where the price of commodities or services drops and their variety increases.

SECOND: PORT PERFORMANCE AND NATIONAL ECONOMY

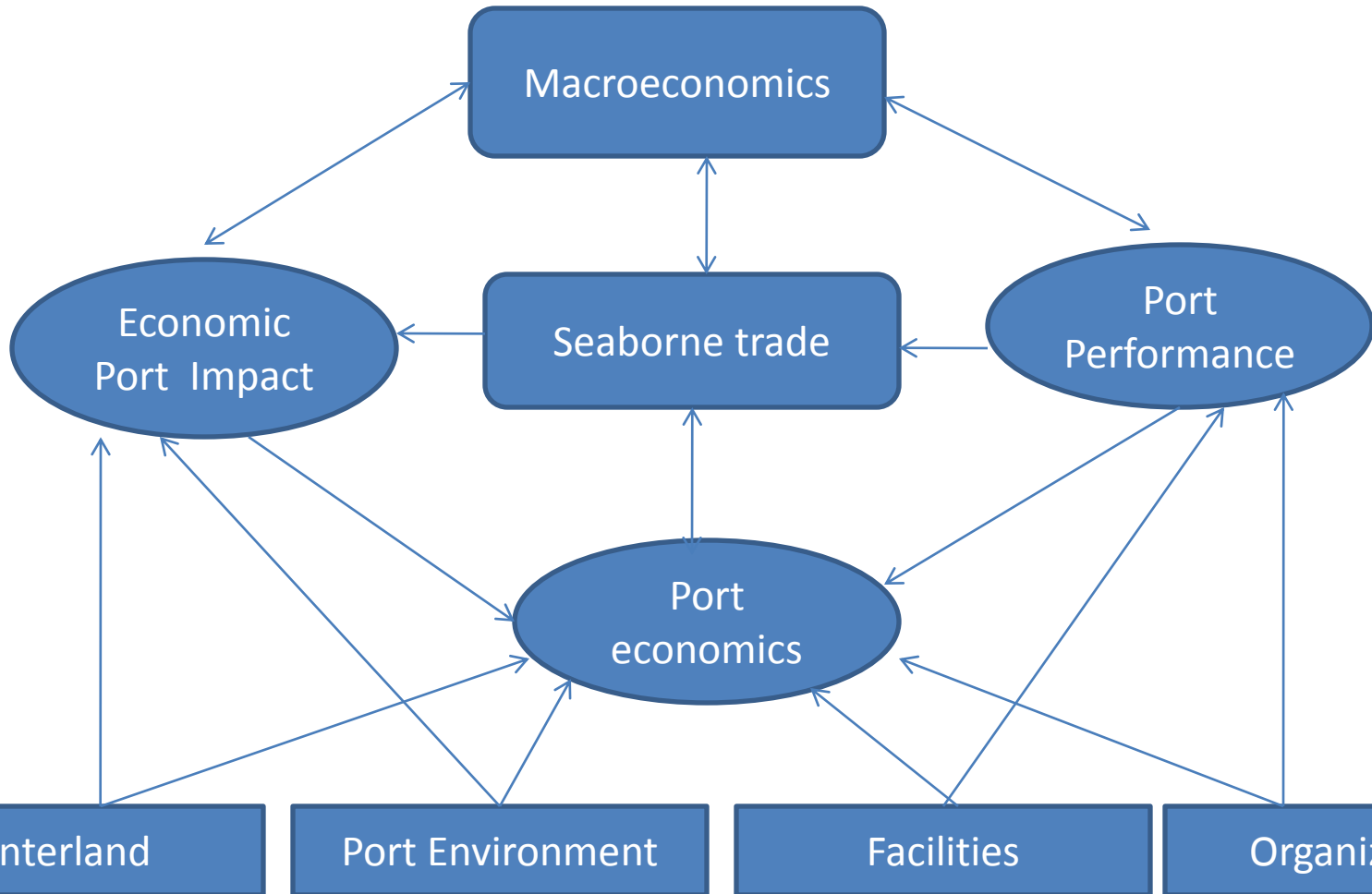
Improvement in port performance has an impact on national economy as change in port operation, infrastructure and organization has an impact on the efficiency of the supply chain then on cost.



Efficiency has impacts on the following elements:

- Ports competitiveness
- Export trade competition
- Price of imported goods
- Balance of payment

Relationship of Port Economics and Macroeconomics



THIRD: ICT AND PORT PERFORMANCE

3.1 IT Business Applications in Shipping

3.2 Shipping Automation Stages

3.3 Port Competitive Advantage

3.4 IT and Port Competitiveness

3.1 IT BUSINESS APPLICATIONS IN BUSINESS

IT business applications in shipping can be grouped into three main segments:

- ***Electronic documentation and transfer of data as*** cargo tracking, electronic documentation, etc.
- ***E-commerce or e-business*** as online registration and chartering of ships, electronic procurement of supplies, online booking and e-payment systems, etc.
- ***E-marketing*** as virtual deal rooms for document transactions and processing, online publishing, etc.

3.2 SHIPPING AUTOMATION STAGES

Automation can be applied to three intermodal stages which are:

- **First** transshipment with loading and unloading sequence
- **Second** container tracking and yard management as stacking
- **Third** the interface between the terminal and inland transport systems

3.3 PORT COMPETITIVE ADVANTAGE

- Location
- Infrastructure
- Transport capacity
- Competitive labor costs and skills
- Effective and efficient port operations
- Updated and adequate equipment
- Information systems
- Integration of ports into logistics chains
- Port coordination which facilitate the reduction of uncertainty, transaction and transport cost

3.4 IT AND PORT COMPETITIVENESS

Technical efficiency improve port efficiency and competitiveness as follow:

- IT reduces costs, time waste and human errors
- Increasing security, Immediacy and traceability
- IT contributes to trade facilitation
- More efficient custom procedures
- Better utilization of assets and productivity

3.4 IT AND PORT COMPETIVENESS (CONT.)

- Information becomes more standardized and exchangeable
- Paperless administration and electronic information management
- Higher level of control over freight flows, security, and cargo issues
- Improve command flows and supply chain management
- Strengthen supply chain integration

FOURTH: ICT IN LEADING WORLD PORTS

4.1 Port of Singapore

4.2 Port of Hamburg

4.3 Port of Valencia

4.4 Port of Jebel Ali

4.1 PORT OF SINGAPORE

Port of Singapore Authority (PSA) uses the most advanced information technology, which separated into three levels.

- **In the First level**, a program integrates main operations called Computer Integrated Terminal System (CITOS). An ERP system keeps track of all activities related to terminal operations and movements in yard.
- **In the second level**, real time management, coordination, and control of operations
- **In the third level**, PORTNET a web based IT software and a community network. Portnet.com limited was formed in May 2000 as a subsidiary of PSA Corporation with its products: P-commerce, eMart, eSolution and Inforhub

Economic Significance of Port of Singapore

- **First, direct multiplier effect:** the initial injection of spending by ships for direct needs as fuel, food, and water creates direct revenue.
- **Second, indirect multiplier effect:** PSA purchase the fuel and other needs from producers who will obtain the raw materials from primary producers.
- **Third, induced multiplier effect** the recipients of all this direct and indirect spending will spend part of their newly acquired income on goods and services.

4.2 PORT OF HAMBURG

The city of Hamburg realizes the importance of the port to economic growth. In 2002, the city planners focused on transforming Hamburg port to a smart port to:

- Foster new opportunities for economic growth
- Ensure the quality of life within the city
- Establish intelligent infrastructure in the port of Hamburg
- Optimize the flow of information to manage trade flows efficiently
- To increase the efficiency of the port as an important link in the supply chain

Smart PORT logistics

Smart PORT logistics is an innovative approach developed to increase the efficiency of existing infrastructure capacities through new IT systems taking account of both economic and ecological aspects

Traffic information system: has been in operation for almost five years. It ensure that roads are not overloaded and automatically provides information about traffic disruptions.

Transport Rail: The port invested in the expansion of the port railway and installed a new railway IT system, to increase efficiencies, and increase the proportion of freight transported by rail as the most eco-friendly mode of transport.

Parking Space Management: mobile app inform truck drivers about capacities on the individual car parks and allow them to “book” parking bays.

Port Traffic Centre: the traffic information available about all modes of transport is merged at the Port Traffic Centre, enabling the management of traffic across all modes of transport.

Economic Significance of the Port of Hamburg

- Direct economic effects:
 - Throughout Germany a quarter of a million employees are linked to the Port of Hamburg.
 - Nearly a sixth of Hamburg's gross value added, was generated by the port.
 - Production value of port related activities is 8.3 billion EUR.
- Indirect economic effects
 - The greatest effects are on the transport equipment, food sector and petro-chemical sectors.
 - The port of Hamburg multiplier calculated at 1.71 meaning that one euro of additional demand in the port of Hamburg leads to 0.71 euro of additional supply in the sectors that provide input to the port.

4.3 PORT OF VALENCIA

The Port of Valencia has pioneered the development of ICT system in Spain since the 1980s then developed further:

- Since 1995, the EDI introduced for different administrative documents such as:
 - Call requests
 - Summary declarations
 - Dangerous good declarations
 - Reception of authorizations
- In late 1990s, the port community started exchanging information on a centralized system.
- In 2006, an integrated ICT tool allowed for electronic data interchange among all private and public members of the port community.

The Port Community System PCS

- Allowed port community actors to enjoy a centralized platform acting as a single window
- Reduced information costs
- Increased productivity of logistics operations
- Improved coordination along the supply chain
- Reduced operations cost

Economic Significance of Port of Valencia

- ***Direct economic effects***: linked to sectors directly related to port activities as freight forwarders, shipping companies, pilotage companies, tugboats companies, and customs services.
- ***Indirect economic effects***: it is resulting from the impact of ports on the industrial activities sector.
- ***Related or induced economic effects***: derived from the capacity for consumption and investment in companies and economic agents related to port activities.

Economic Impact of Valencia Port in Major Economic Areas

	Direct	Indirect	Related	TOTAL
<i>Gross Salaries (x €000)</i>	507.763	113.616	61.545	682.924
<i>Tax Income (x €000)</i>	23.381	9.065	4.515	36.961
<i>Total production (x €000)</i>	1.260.241	290.613	189.441	1.740.296
<i>Jobs</i>	11.020	1.950	6.830	19.800

Source: Valencia Port Authority web site last visited 26/2/2016

These numbers show that for every 10 jobs directly related to port activities, another 8 jobs are created throughout the production and commercial chain.

These data reinforce the relevance of Valencia port in the economic growth of Valencia and Spain.

4.4 PORT OF JEBEL ALI

Jebel Ali Port is one of the most modern technologies:

•***Gate Automation system and paperless processing of cargo documentation:***

The customers use the Dubai Trade online platform a single window trade enabler integrates over 200 online services supporting the supply chain industry.

•***Remote Reefer Container Monitoring System (Refcon):*** It enables port operators to respond quickly to emergencies and eliminate idle periods. Reefer operators can track their cargo boxes throughout their journey via remote access.

•***On-line Payment services:*** Customers can pay their portal deposits and cash guarantees using online payment services.

•***Dubai Trade Services:*** such as Berth Booking, Monitoring gate and Yard inventories, Container release and acceptance, Vessel schedule, Container tracking, Port payments.

•***Free Zone Registration, License Management, Zone Administration.***

Economic Significance of Port of Jebel Ali

Jebel Ali Port plays a vital role in the UAE economy

There are 6,700 companies based in Jebel Ali Free Zone JAFZA

- Directly employ 135,000, this is about 12.82% of Dubai's total 1.32 million-labor force.
- Contribute about 20% to Dubai's economy.

FIFTH: BENEFITS OF ICT IN PORTS

- Secure exchange of information between port actors
- Minimizing of waiting time
- Optimal deployment of port space and resources
- Fast speed for loading and unloading
- Real time information exchange
- Online management reporting and decision support
- Automatic information registration
- Fast process for trucker

FIFTH: BENEFITS OF ICT IN PORTS (CONT.)

- Real time monitoring and control of operations
- Saving time and money
- Paperless work environment
- Coordination between transport modes
- More efficient utilization of existing resources
- Optimized work instructions and yard allocation
- More efficient management of cargo handling
- Stronger integration of logistics processes

SIXTH: ICT IN EGYPTIAN PORTS

6.1 Egyptian Ports Status

6.2 Egyptian Ports Characteristics

6.3 ICT at DP World Sokhna Port

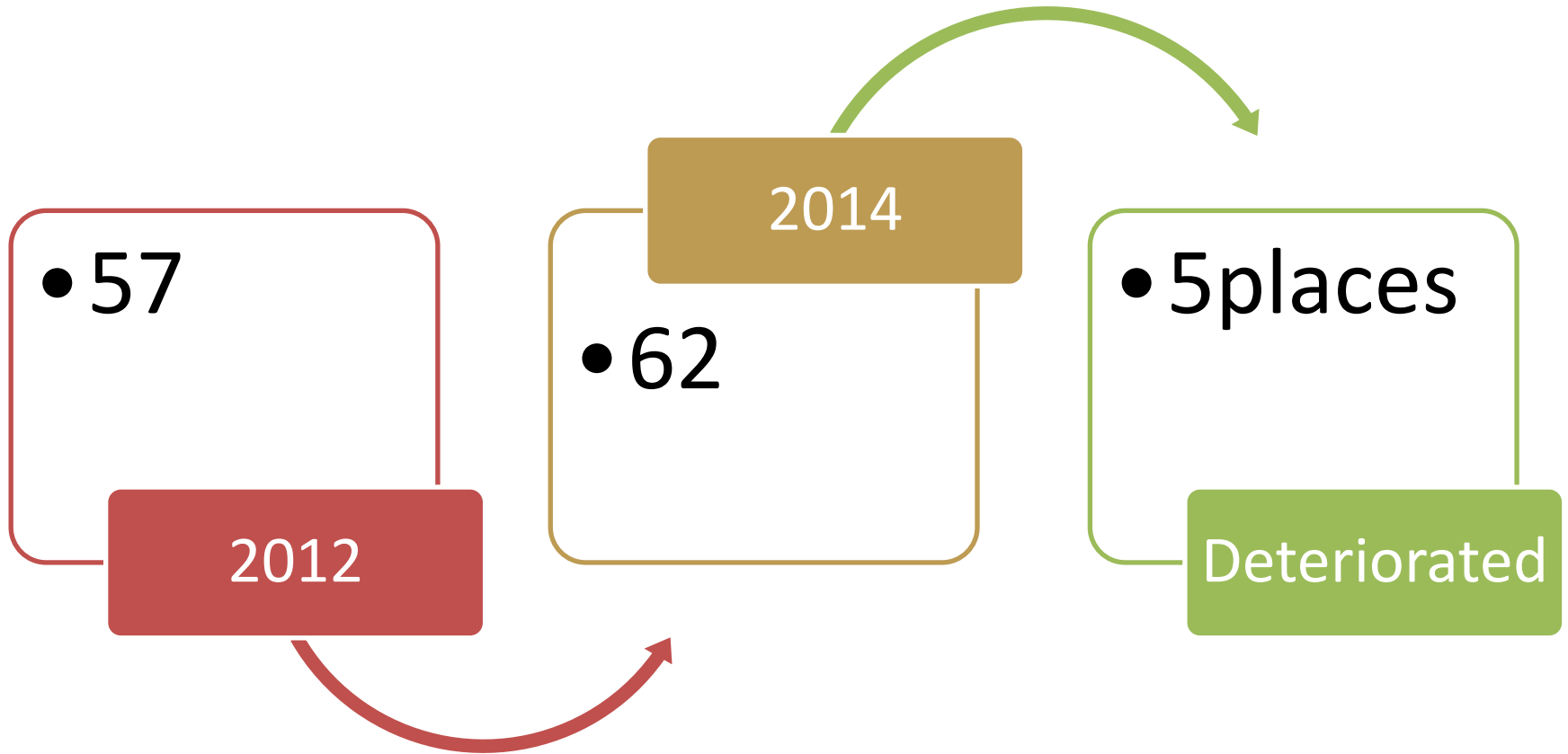
6.4 SWOT Analysis of Automation of Egyptian Ports

6.1 EGYPT STATUS AMONG OTHER COUNTRIES

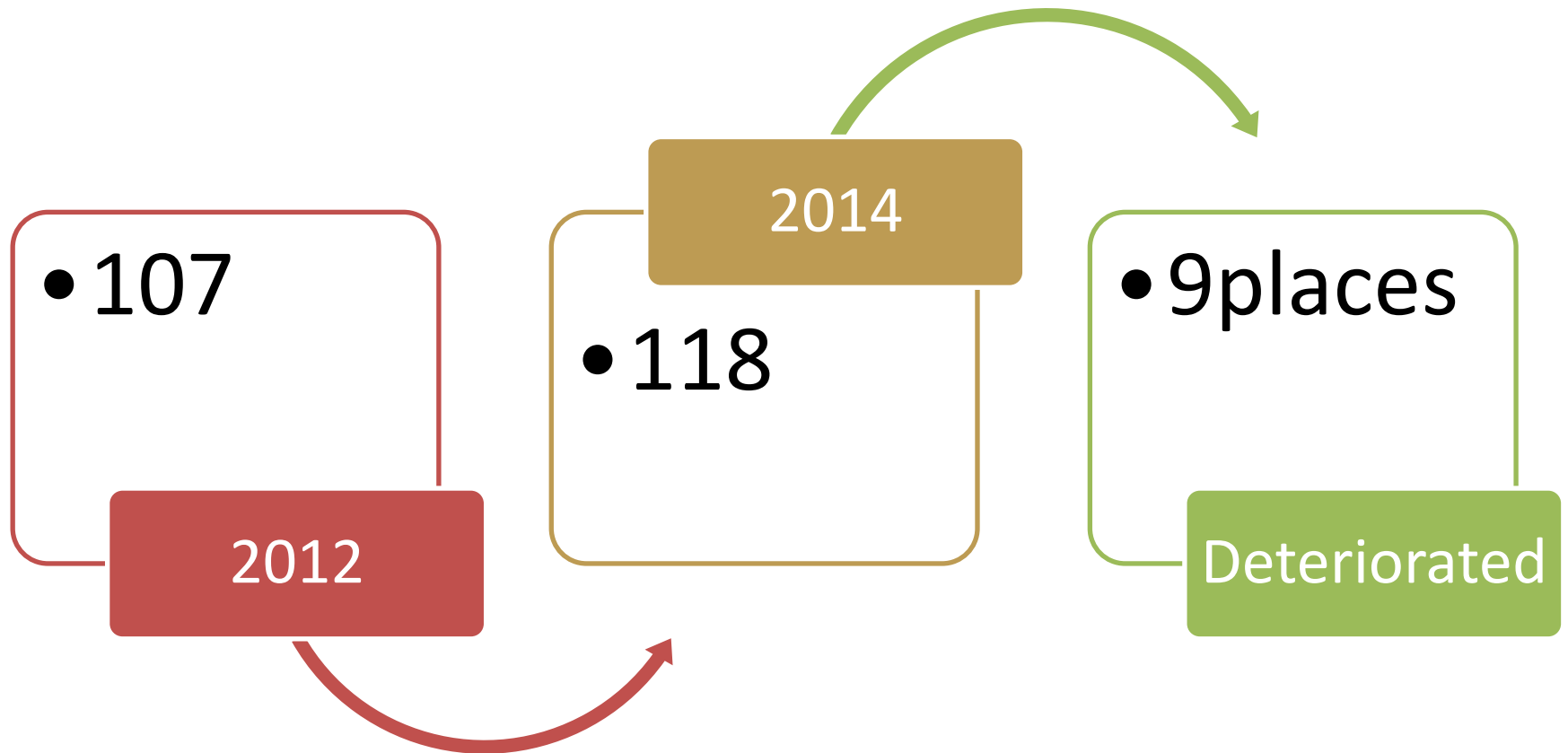
<i>Country</i>	<i>LPI</i>	<i>Logistics quality and competence</i>	<i>Tracking and Tracing</i>	<i>GCI</i>	<i>Quality of port infrastructure</i>
<i>Germany</i>	1	3	1	4	14
<i>Singapore</i>	5	8	11	2	2
<i>Spain</i>	18	12	26	35	9
<i>United Arab Emirates</i>	27	31	24	19	3
<i>Qatar</i>	29	28	32	13	24
<i>Turkey</i>	30	22	19	44	57
<i>Saudi Arabia</i>	49	48	54	20	40
<i>Bahrain</i>	52	51	42	43	15
<i>Oman</i>	59	73	80	33	33
<i>Egypt</i>	62	58	43	118	66

Source: Based on The Global Competitiveness Report 2014-2015. World Economic Forum
The Logistics Performance Index and Its Indicators 2014, World Bank

Logistics Performance Index LPI



Global Competitiveness Index GCI



6.2 CHARACTERISTICS OF EGYPTIAN PORTS

- **Infrastructure Deficiency**
- **Inefficient Port Operations and Logistics Services**

Infrastructure Deficiency

- Inefficiency of the national shipping fleet
- Weak port infrastructure
- Ineffective implementation of regulations
- Rigidity in price setting of port fees and services dues
- Over staffing and lack of trained personnel
- Low automation level

Inefficient Port Operations and Logistics Services

- Egypt shows a logistics gap compared to other Arab countries
- Bureaucratic procedures affect efficiency
- Time needed to clear customs
- Timeliness of shipments

Inefficient Port Operations and Logistics Services

Inefficiencies at Egyptian ports contribute to

- Higher logistics costs
- Less competitiveness of trade
- Higher imported goods cost
- Less competitive ports

6.3 ICT AT DP WORLD SOKHNA PORT

- ***One stop shop solution for customers:*** is a single entry/exit point via Customers Service Center.
- ***Mobile Telephony (SMS):*** The customer receives SMS with his customs inspection date to observe and release his container.
- ***Front Office Services:*** It includes data entry of Customs declarations, document scanning and transfer to transaction records, issuance, & delivery of Customs, payment requests, and delivery of customs clearance.
- ***Video Conferencing:*** It designed to facilitate settlement & arbitration negotiations. The Sessions linked to business transaction records.

6.3 ICT AT DP WORLD SOKHNA PORT

- ***Plasma Monitors***: Display on-line information
- ***An internal complaints system***: the customer can submit his complaint to the commercial department and follow it up until closed.
- ***Online services***: online services on the website (www.dpworldsokhna.com) where customers can calculate storage invoice and Performa invoice.
- ***Smart phone application***: track customer shipment.
- ***Customs EDI***: receive electronic cargo manifests and send customs clearance messages, in order to facilitate rapid ship and cargo processing.

6.4 SWOT ANALYSIS OF AUTOMATION OF EGYPTIAN PORTS

Strengths	Weaknesses
<ul style="list-style-type: none"> • Strategic location of Egyptian ports • Government awareness of importance of maritime sector in Egypt • Maritime transport and related logistics services play an important role in Egypt’s economy • Foreign seaborne trade represents about 90% of the Egyptian foreign trade volume • Government adopted the Landlord model to increase the competitiveness of Egyptian ports • Public port authority investment in infrastructure 	<ul style="list-style-type: none"> • Lack of port infrastructure and support facilities • Expensive system fees • Shortage of qualified personnel • Bureaucratic and regulative inefficiency in ports • Insufficient equipments • Inefficient maintenance and repair • Inefficient connection between marine and railway infrastructure • Inadequate technology

6.4 SWOT ANALYSIS OF AUTOMATION OF EGYPTIAN PORTS

Opportunities

- Improvement of ICT in Egypt
- Awareness of the importance of ICT to business
- Large number of ICT graduates
- Large number of ICT companies and experts
- ICT systems in world ports

Threats

- Unstable political environment
- Inefficient transport infrastructure
- Bureaucracy in public sector
- Traffic congestions
- Weak business environment
- Lack of innovation
- Low R&D budget
- Weak institutional framework

CONCLUSIONS

Egyptian ports performance need the following improvements:

- Reduction of ports operating costs
- Shortening the time needed for container movement
- Raising port capacity
- Real time monitoring and control operations
- Better marketing campaigns
- Coordination between transport modes

CONCLUSIONS (CONT.)

- Advanced ICT solutions
- Efficient automation
- Cooperation and integration within port
- Advanced and reliable information
- Fast exchange of data for decision making

RECOMMENDATIONS

A successful port information system needs the following procedures to avoid any bottleneck in system development and to ensure system efficiency:

- Legal regulations to ensure flexible business environment within the port
- Well established information technology infrastructure before implementation of the system to avoid system failures
- Updating business processes within the ports to be consistent with the system

RECOMMENDATIONS (Cont.)

- Upgrading ports equipments to operate in harmony with the new system
- Strengthening port infrastructure and support facilities
- Strengthening institutional support
- Coordination between public and private community members
- Upgrade port personnel language and technical skills including ICT skills as well as understanding of new technologies to be able to use the new system efficiently

THANKS