



CHALLENGES OF DEVELOPMENT AND OPERATION OF PORT IN 21ST CENTURY

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ABSTRACT

It is time to rethink of national port development strategies in contest of globalization. There is a need to define new partnerships concept between the public and private sectors regarding port development, operations, investments, financing and assets management issues. Today's ports need to calls for a clarification of the mandate of the public sector and simultaneously of the missions which need to assume and define. In the 21st Century, global logistics organization in worldwide has made it mandatory for shippers to rely on seamless transport chains, where the ports is a prominent central node and pivotal point. It is necessary to allow national port systems to provide services to local, regional and global economies as they demand. In the 21st Century, every country needs to do realistic, optimistic, unbiased and balanced national detail study in order to develop sustainable port expansion and integrated transport network master plan for the nation. Otherwise, any ad-hoc, piecemeal, or short-term development plan will jeopardize the nation's whole economic and business system. It's an analytical article to evaluate the challenges to developing and operating a local port in a more effective and efficient way to fulfill the global demand in the 21st Century.

KeyWords.

Globalization, central node, logistic chain, integrated transport network.

INTRODUCTION

1. In the 21st Century, the ongoing process of change in international transport management, from a segmented modal approach towards a much more integrated concept, customized to better meet the needs of industries and trades. This process is increasing pressure on ports to adapt their role and function in such a more demanding operational environment. It is time to rethink of national port development strategies in contest of globalization. As a result, extensive reforms in the governmental, regulatory and managerial environment within which commercial ports need to operate are essential. In meticulous, there is a need to define new partnership concepts between the public and private sectors regarding port development, operations, investments, financing and assets management issues. It also needs to review the respective guideline, roles and regulations of public and private players. More specifically, Today's ports need to calls for a clarification of the mandate of the public sector and simultaneously of the missions which need to assume and define. However, these missions are likely to be more of a catalyst and facilitation nature. Again there is a stress on assistance to public constitutional duties regarding transport safety and environmental protection.¹ At the same time, the efficiency of both modes of transport (rail and road), including inland, to serve an increasing and most often disputed hinterland has become a critical factor regarding future port potential and overall trade growth prospects.

2. In this Century, global logistics organization in worldwide has made it mandatory for shippers to rely on seamless transport chains, where the ports is a prominent central node and pivotal point. Smooth interaction is a prerequisite for the effective delivery of integrated logistics services between the port and the

city in terms of transport network requirements, environmental protection, and overall safety. Usually, port authorities have a major role to play in nurturing the development of practical cooperation between interested public and private players. This is indispensable to achieve the expected profits of integrated transport and logistics operations. The institutional scaffold, assets ownership and managerial framework must be favorable to optimal cost-effective utilization of port facilities. Today's market conditions make it essential to physical and regulatory integration of transport networks² and comprehensive strategies for addressing development planning, safety, environmental and social issues. In this Century, every nation considers a global village, and it is necessary to allow national port systems to provide services to local, regional and global economies as they demand. It's an analytical article to evaluate the challenges to developing and operating local ports in a more effective and efficient way to fulfill the global demand in the 21st Century and find out a sustainable solution.

PORT REFORM ELEMENTS

3. In the 1960s and 1970s, international support for port improvement schemes was generally simple and clear-cut. However, at that time, port infrastructure in most developing countries needed to be better maintained and often scantily managed. Therefore, the immediate needs were such that ports had to be kept open as a key prerequisite for maintaining trade flows, as well as smooth business and commerce. The provisions for port assistance during those periods were centered on infrastructure, mainly on engineering and related construction aspects, financing management issues, institution building and human resource development. The scenario changed drastically from the early 1980s onward, when changing shipper practices particularly rapidly progressing technology and advancement.³ Cargo containerization, ship design and building technology refinance induced the ocean transport industry to fundamental restructuring in service networks.⁴ Surprisingly there were no differences found between ports in developing and in industrialized nations. Interestingly it is observed in all ports worldwide. There are a few key points always addressed in port sector reform programs, and those include:

- a. National port system development strategies reformulation.
- b. Governmental, institutional and procedural provisions for port systems planning and regulation reform.
- c. Port management arrangements and process reorganization.
- d. Innovative financing and cost recovery schemes introduction.
- e. Automation and technology adaptation.
- f. Solving new dimensions of safety, security and environmental issues.
- g. More trade and business friendly approach to reformation.

4. There is acute demand to reformulate national port system development strategies. The configuration of cargo and container goods generating hinterlands has changed, and as a result, ocean transport networks have undergone a reformation. However, the nature and pattern of demand for services in many ports have become different. Interesting to know that, in some cases where the physical layout of ports is no longer in line with user requirements, these ports will need to be adjusted to a changed task and function.⁵ In limited cases, ports with formerly low importance for international ocean transport have been confronted with unforeseen direct service demand. In such circumstances, governments in maritime nations have to reconsider their national port system development criteria to ensure demand responsiveness to the changing needs of trade and transport. It is true that today, budget constraints and limits to capital market exposure are common among both developed and developing countries. Actually, there is a severe need to search for cost-effective solutions that optimize investments and attain sustainability.

5. It is mandatory to reformulate national port development strategies, and it requires reforms in the governmental, institutional and procedural provisions for port systems planning and regulation.⁶ In early dates, in the case of planning, the main issue was overly concentrated decision-making in central government bodies with little participation of port management and mostly no consultation of port users. On the other hand, in the case of port sector regulation, the provisions were commonly obsolete, reflecting market conditions customary at the time of their circulation. It is amusing that, sometimes, those dates back regulations for more than a generation found useless.⁷ As a result, port sector regulations in many countries needed to be made aware of the special requirements of the changing trade markets and transport industry organization. These regulations often represented severe obstacles to trade performance for the nations in a contest to globalization.

6. The most disputed issue within the public administrations and port communities in maritime countries relates to options for improving the provision of port services through reorganization of port management. Today it has been observed that there is gradually increasing awareness to adjust port system development strategies with the changing trade and transport market environments. Nations are trying to make port service provisions more responsive to user demands.⁸ However, Today, most of the ports of developing nations have some common areas for improvement. Those are; cumbersome organization structures, complicated lines of command, lack of incentives and accountability, outmoded management practices, lack of automation, lack of business-friendly approach, old days security concept, lack of trained and professional people and excessive employment. In fact, bureaucracy, reluctant mood, the culture of public administrations, not perfect attitude, inborn legislative provisions, and imprecise employment objectives² are usually the root causes of these problems.

7. In this Century, either corporate management practice or privatization may be the right approach to solve this problem. In corporate management culture, it needs to delink the administration of ports from central government or control. There are various forms of proceeding along these lines can be observed around the world. In the 20th Century some countries, the management of regional ports was put under the jurisdiction of provincial or municipal governments. At the same time, substantial autonomy is granted to individual ports in arranging their day-to-day services. China and India are following this concept. In other countries, previously state-run ports are pooled and transformed into public corporations with full accountability for the conduct of their business. Singapore, UAE, Indonesia, Malaysia, and Thailand are following this concept. However, national ports need to reform and formulate their rules and regulation so that they should come on a more business-oriented and globally accepted footing.

8. In the early of 21st century, rearranging port organizations and the growing participation of private parties in the provision and management of port services is the most striking trait. These rearrangements have a long tradition in North American and West European ports, and that is known as the landlord model. Here, private concession holders organize and conduct a variety of services to fulfill both local and global demand. The performance characteristics of such services have been superior and very beneficial to individual ports, tackled with continued low productivity of their state-run ports and in view of the productivity gains. It is possible for medium to long-term concessions, contract-based regulation, where rules implementation and enforcement means are provided for in the concession contract itself—an adequate way to ensure and monitor compliance under the supervision of the individual port authority. However, for more short-term contracts or agreements, such as working licenses, the standard regulatory set enacted at the ministerial level can be applied to the individual port authorities.

GLOBAL TRADE AND INTERNATIONALIZATION TRANSPORT OPERATION

9. Globalization of business and commerce, as well as the development of larger trade areas, has led to shipping and intermodal alliances to handle the global nature of the logistics and supply chain. Today, shipping companies have merged with other shipping lines to expand their geographic contact to create global service networks. As a result, terminal operators have kept pace with globalizing operations to offer their shipping customers consistent services over diverse trade routes. Today, DP World of UAE operates 82 ports/terminals in a few dozen countries on all continents around the world. The Port of Singapore Authority (PSA) operates in China, Cambodia, Indonesia, Thailand, Vietnam, Yemen, India and other dozen of ports around the globe. Stevedoring Services of America (SSA) operates terminals in Mexico, Panama, Thailand, India and Indonesia. Activities of such companies as DP World, PSA, P&O, SSA, etc., clearly indicate a new trend towards increasing internationalization of terminal operations. In terms of diversified container handling worldwide, DP World considers among the most diversified operators in the world. DP World operates more than 82 container terminals around a few dozen of countries within five continents of the world. Actually, the top ten private terminal operators handled 30% of the world's container traffic in 2018. It is estimated that almost 20% of the world's container traffic has been handled by the top five private terminal operators alone. It is interesting to say that, among the top ten largest container handling ports, China has seven ports that handled the largest number of containers in the year 2018. Hence the thrust towards improved global network management practices by shipping and global operators alike, which is increasing demands on intermodal land, interfaces to make available as large a selection of transport routes as possible.¹⁰ As a result, it benefits both by increasing flexibility in the management of international transport operations.

10. Modern and efficient ports are necessary and powerful tools for facilitating and nurturing the trade and development processes. Today, ports must offer efficient and reliable services to ships, containerization and cargo, including communication systems, documentation and customs procedures, to allow the timely flow of goods and logistics through the transport chain. Actually, it becomes a production chain. To assist in this flow, some countries have developed distribution or logistics centers in the port area, which are used for the storage, preparation and transformation of cargo and containers. Therefore, ports are no longer simply a place for cargo and container exchange rather, ports are a functional component in the dynamic supply and logistics chains through which commodities and goods flow. On the other hand, an efficient transport system is also a prerequisite to attracting foreign direct investment.

11. Moreover, ports can be a crucial factor in developing a competitive advantage for a nation, and therefore, governments and port authorities need to adopt suitable port plans and policies to allow the nation to harvest this potential advantage and factor. It is well known that the intermodal integration of distribution activities is consequently utilized to facilitate business transactions that move goods from origin to destination. The major objectives of the intermodal system are to increase the speed of cargo and container distribution and reduce the amount of unproductive capital, whether in exaggerated inventory levels or vessel delays at ports and depots. Intermodal operations make use of long-distance inland transport services that greatly extend the hinterlands of ports, besides usual road and rail services.

12. Usually, ports are called to play an economic role which proves to be far more extended than it used to be beforehand. UNCTAD describes this evolution by the term *third generation ports*, which is defined as, at first, merely an interface location for cargo between land and sea transport, next a transport, then to industrial and commercial service centers. However, the third-generation port is a dynamic node in the international production and distribution network. Therefore, port management appears as switching from a rather passive policy of the mere offer of facilities and services to that of active concern and participation in the overall international trade process. These efforts are directed towards promoting trade and transport activities, which generate new revenue-making and value-adding businesses in turn. As a result, ports are more and more turning into integrated transport centers and logistic platforms for international trade. But we know that it is easier to say than do.¹¹ So, the public sector's responsibility is to help this happen or hamper it, and that must not be overlooked.

TRADE, SHIPPING AND LOGISTICS TRENDS

13. Today's global logistics organization makes it mandatory for shippers worldwide to be able to rely on seamless transport chains, of which the port is a prominent nodule. Smooth interaction between the port and the city often surrounding it, in terms of transport networks requirements, environmental ensure fair competition, as well as avoid monopolies and rent-seeking activities and assisting port authorities in dealing with unemployment issues, possibly in financing socially adequate redundancy schemes and policies.¹² The public sector's role needs to help governments and some of their statutory duties as national authorities. Virtually, this will deal mainly with transport safety, environmental protection, coastal management and port or city relationships. Specific involvement may include as follows.

- a. Navigation safety: navigation aids, vessel traffic services, hazardous cargoes transit management.
- b. Environmental protection: compliance with international conventions on maritime environment, on dredging and exploitation of marine resources, adherence to regional agreements to enforce and monitor international regulations and agreements.
- c. Coastal management: shore and coastline stabilization, beach provisions and coastal defense structures, seashore defense policy.
- d. Fostering common development policies between ports and cities: helping in setting up common planning boards or consultation committees on land development issues, assisting in designing port relocation operations and relating legal and financial arrangements for the disposal of surplus port facilities.

14. The public sector's role is also to assist governments and aim at improving the effective use of all modal transport networks, primarily by addressing the basic issues relating to the ports' nodal position in the international trade pattern. The Public sector's facilitation mission may include the following tasks.

- a. Strengthening public governance: improving the institutional ability to monitor new public or private partnerships and oversee operations without interfering in the commercial sphere, innovate and implement clear mechanisms to manage transactions between public and private bodies without obstructing open competition.
- b. Helping the trade facilitation process: improving customs regulations and fair practices, assisting design and implementation of efficient, superior communication systems, assisting trade documentation and synchronization activities.
- c. Leading initiatives to help trade integration: assisting design and implementation of first development initiatives to encourage value-adding activities; resolving in port areas; helping finance facilities aiming at attracting distribution and logistics services within the port complexes; assisting finance for development phases of potential dry ports facilities and related intermodal connections.

PORT OWNERSHIP CHALLENGES

15. We know that in every logistic chain, assets ownership, management and operations are three different aspects. However, there are combinations of ownership, management and operations structures that have proved over time to be more or less favorable to cost-effective use of assets and to overall efficiency in the delivery of port services. Moreover, the corporate structure of the port enterprise itself can have a significant bearing on the assets management policy. In 2018 world review of the top 100 container ports by Lloyds demonstrates that more than 90% of ports conform to the landlord port model. Where the port authority owns the basic infrastructure only, land and access, security and protection assets, and leases it out to operators; on a medium and long-term concession basis while retaining all regulatory functions. The Landlord port model is the standard and proven practice in this Century.¹³ More interesting to know that Today's landlord port model is mainly based on profit sharing between both parties; as a result, both remain in a win-win situation.¹⁴

CORPORATE STRUCTURE

16. Most port authorities or enterprises, once they are separated from governments' administrative departments and whatever their operational pattern may be, can basically adopt two main corporate setups. Those are as follows:

- a. Public institution formula: financially autonomous, with a board comprising representatives from central and local public powers; and from port users or customers, working with commercial accounting philosophy.
- b. Joint-stock Company: share stock finance, with a board comprising representatives from public and private shareholders, working under common commercial rule and regulation.

17. The public institution formula makes quite explicit the separation between constitutional public management and monitoring duties on one hand and commercial activities left to the private sector on the other. Port users would have to be represented on the board, with the shortcoming that nobody has a direct financial stake in the port enterprise itself. However, close-minded interests can sometimes beat over long-time interests of the port community at large, which in some cases may include a significant part of the national economy. On the other hand, the joint stock company formula presents the distinct advantage of setting up a more business-friendly corporate framework, where shareholders will indeed have a financial stake in the port enterprise. Even if the shareholding structure has to be programmed to meet the public ownership criteria, where the majority of shares belong to public bodies, like central, regional or municipal. Someone can expect this corporate set up to inspire a more direct sense of financial responsibility among shareholders. An associated issue will then relate to private shareholders to keep up with the principle of separation between public monitoring duties and private commercial activities. Private port operators would have to be disqualified from owning shares in the port enterprise, as the port enterprise would not be allowed to own shares in any private company operating within its dedicated area.¹⁵ In cases where port operators will be prevented from owning shares of the port enterprise, a complementary body would have to be set up, in the form of a port council, to allow port users to voice their views and concerns to the port authority. The role and functions of this port council will have to be openly and elaborately explained by the port authority through rules and regulations.

18. In the 21st Century, the landlord-type port authority, as a popular model of port operational organization, leaves the commercial operational field entirely to private operators. Since this formula is now being implemented even in ports with limited traffic levels and this raises the issue of competition conditions. The concession formula, which involves the allocation of a determined portion of the port area to an operator for a specific period of time, with or without the requirement to build or develop new facilities, physically affects on a continuous basis the organization of operations in the port. If someone can establish fair competition within a single port under these conditions, they need to set up several operators with equivalent handling capacity to serve the same traffic. However, it is usually possible in large multipurpose ports. In fact, concessions will generally be implemented mostly in the cases of homogeneous traffic, which lend themselves more easily to rationalization of the operational environment. Such as unitized cargoes or containers, industrial bulks (ores, cement, grain, petroleum products) and other liquid bulks. Industrial bulk terminals will generally be part of integrated industrial processes, which makes them natural candidates to be concessioners to the main industrial operators.

19. The actual competition takes place at another level; on the output side, container terminals are much more subject to direct competitive pressures at the transport level, provided there is enough traffic through one single port to set up a competitive environment. Where the traffic level is such, at least at the time when the concession is considered, it would just support a single operator to ensure financial viability, but the question may come as a natural monopoly situation. This will require a clear regulatory framework to be enforced by the port authority. However, even in this case, two kinds of situations may happen:

- a. If there is competition between alternative transport routes involving different modal combinations and possibly using foreign ports, in which case the lack of competition within the port itself is not so much of an issue. The corresponding regulatory framework needs not being exaggeratedly developed.
- b. If the traffic is actually confined, that creates a monopoly situation. It will require careful regulatory action, including productivity and tariff controls, to avoid rent-seeking development. In addition, the concession contract should be open again for rebidding at regular intervals, and the time frame should be defined according to the decline period of the assets.

20. In the second case, the role of the port authority, as far as the growth in traffic would allow for it, would be to make room for another competitor to step in as soon as the traffic level would make it viable. Usually, the first concessionaire will try to protect itself against this eventuality by building safeguards in his concession contract. But the port authority should have to carefully check that these proposed safeguards do not go over; that can be considered as a reasonable protection to start up a new operation without granting exclusive traffic rights. If possible, to institutionalize this countervailing power, the participation of port users and customers on the board of the port enterprise should be encouraged. If not possible, because of the corporate structure, a port council made of port users with specific attributions and powers spelled out in the port enterprise by rules and regulations need to be set up. However, the concession is not the only way to bring the private sector into commercial port operations, especially in the case of medium to small-scale multipurpose port facilities. These ports will generally handle limited levels of general cargo traffic, sometimes mixed with a small proportion of containers or unitized cargo. Assuming optimum tons of general cargo would be a minimum for an independent cargo handling company to be financially viable, including heavy equipment costs. This would put the floor for possible competitive concession. The tool port formula may appear appropriate in such instances where the port authority would remain responsible for providing the main STS handling equipment, including other container handling equipment such as SC, RTG or RMG in the case of the container terminal. On the other hand, various multipurpose cranes need to be provided by the port authority for cargo handling in the case of the cargo terminal.

21. Under this operating scheme, the port operational areas remain open to all licensed operators who supply yard equipment and may just rent warehouse spaces in the port area. The private operators, who own and operate all yard equipment, will compete for cargo through contracts negotiated with the ships or shippers' agents; and the port authority will have to ensure that safety regulations are complied with. In granting licenses, the port authority should refrain from spelling out operational technicalities, such as the number and type of equipment to be used, which should be left to the operator's choice. However, the port authority should grant licenses under conditions of minimum productivity performance and reasonable financial guarantee. The public service port itself can actually offer scope for the private provision of

services. Although the combination of low traffic and the social requirement to keep the transit cost low will usually preclude any short-term financial profitability. Public authorities can still look for private operation of the port facilities under a management contract. In such case, the operator will be paid a management fee to operate the port under specific conditions in terms of tariff, operating and maintenance practices. Although there is no real transfer of commercial risk to the operator, it is possible to build efficiency incentives by indexing part of the fee to cost-effectiveness indicators in the management of the facilities. An alternative option may be the negative concession method, as already been successfully experimented in various public transport operations, where a concession would be awarded to the operator requesting the lowest subsidy under the same set of operating and tariff conditions. A larger risk is then transferred to the operator, which will be under pressure to increase port throughput to maximize its revenues or profit.

GOVERNANCE AND REGULATION

22. To provide for a clear separation of policy and regulation, responsibilities at both the central and local levels, very often a three-tier institutional pattern will prove to be quite an effective and efficient solution. In the case of landlord port setup, with commercial activities fully carried out by private operators, the new public management framework could then be developed. A central body at the ministerial level, comprising top representatives from relevant ministries, mayors of port cities, and port authority's managers, works out national port policy and strategic planning objectives and defines main sector regulations to be enforced by the port authorities. The port authorities, autonomous public institutions or public joint stock companies are granted the right to use state-owned land, administer, maintain and develop port infrastructure assets to the extent required by port activities, manage and enforce navigation safety measures, enforce environmental protection regulations, monitor the concessions and leases contracts, governing private sector activities in the port area, and market the port facilities to attract new investors. The private operating companies usually carry out commercial activities related to cargo traffic management and handling activities. Before formulating and implementing roles and regulations, extensive study and global conditions need to be monitored and considered.

LEGAL ASPECT OF PRIVATE PUBLIC PARTNERSHIPS

23. To ensure credibility, openness and transparency in the transformation process, sound and precise legal teamwork defining how private-public partnerships can be set up and organized appears as a prerequisite to getting international participation and long-term financial commitments from potential investors. However, prior to any kind of Build Operate Transfer (BOT) or Design Build Operate Transfer (DBOT) operation, a concession law spelling out the principles of the process and establishing rules and responsibilities for each party, possibly balanced by a set of regulations describing the practicalities of the approach, will be a significant step towards the success of imminent concession operations. Since there are also other ways than concessions of securing private participation in port activities, the national legal framework for private-public partnerships must also incorporate these formulas or at least establish a realistic entity which will be responsible for monitoring them. The basis of the licensing process, for any instance, must be made clear in the rule and regulation; which can specify that port authority regulations will further precise execution criteria. During the formulation of any partnership roles and regulations, we need to be remembered that the risk of trade and business should be shared by both parties judicially.

REGULATION POLICY

24. It is always the same for rules and regulations that, those are typically involved both economic and technical issues. Economic regulation usually aims at monitoring tariff and pricing policies, and it is more necessary than competition. As soon as competition develops, either internally or externally, the need for strong economic regulation decreases. Indeed, when competition pressure is well established, there is no reason to maintain any confined pricing regulation other than timely monitoring of tariff practices to assess the soundness of market processes and prevent any potential collusion from developing among competitive service providers. On the other hand, technical regulation is required to ensure compliance with generic safety, security, employment and environment protection standards. Again to implement those, the port authority may believe to be appropriate minimum performance requirements, especially when competition is weak. Traffic safety is a major concern with ship movements in and around port mooring and berthing areas; and with cargo handling operations ashore. Dedicated provisions for handling and storage of

hazardous cargo must be defined in port regulations based on international conventions, such as International Maritime Dangerous Goods (IMDG Code) and keep allowance for specific local conditions.

25. Environmental protection standards will have to address the different potential environmental risks pertaining to local port activities. There should be a balance between explicit regulation and implicit market forces. Usually, there is a natural asymmetry in information among operators, public authorities and port customers. The decision-making process for concession and licensing agreements should be based on reliable information, actual costs and service quality. There may be a strong incentive plan to perform efficiently and eliminate rent-seeking practices. An explicit public disclosure policy, making mandatory the release by port operators of relevant productivity and cost-effectiveness indicators, may well help in keeping with optimal efficiency in commercial port operations without having to rely only on clumsy economic controls.

26. Other critical decisions in regulatory design are where to regulate private port activities. Such as; central versus local authorities and universal administrative regulation versus contract-based regulation. It is fairly logical to have national policies on traffic safety, environmental protection, security aspect, labor and competition rules designed and adopted at the central level. Their execution would as logically be the mandate of the local landlord-type port authorities. These port authorities would also design and implement locally warranted operational regulations depending on specific traffic or local constraints. In the case of medium to long-term concessions, contract-based regulation, where rules, implementation and enforcement means are provided for in the concession contract itself, seems to be the adequate vehicle to ensure and monitor compliance under the supervision of the port authority.

INTEGRATED TRANSPORTATION CHAIN

27. Since new trade patterns require quicker, cheaper and safer transport of goods than in the past. The main obstacle was found to be at each transport mode interface, which caused delays and increased the cost of the whole transport chain. This is a point where the interaction of ports and cities' traffic management policies can make a difference. Modernized port facilities themselves are only part of the solution. Inland distribution networks have to be improved and well integrated with ports, both at the local level for efficient direct access connections and nation or region-wide. The concept of logistics is widely accepted. The logistics procedure needs to optimize all activities to ensure cargo delivery through a transport chain from one end to the other. In order to optimize the whole system, the logistic approach is to decide what, when, where and how actions should be taken. The key elements to developing an advanced logistics strategy will usually include a few factors. We need to understand the cost behavior of the entire logistics system and incorporate it into the off-shore sourcing, manufacturing and decision-making process. We need to promote strong relationships with carriers and vendors that include quality certification procedures. We need to design a flexible transportation system that allows for quick routing and mode selection changes. We need to develop a supportive logistics information system that is effectively integrated with manufacturing and purchasing processes.

28. To implement of an efficient logistics system, we need to be ensured some basic characteristics of the main infrastructure facilities. On the port side, the main requirements of modern traffic should be:

- a. Direct and rapid access to the sea.
- b. Quays with long berths, deep water and large back areas.
- c. Direct, easy and safe connections to main inland transport networks, highways, railways and waterways.

29. Again on the city side, these demands will usually translate into additional constraints. There are some important urban management issues:

- a. Direct access to the sea may come in conflict with other uses of the seashore for accommodation or recreational purposes.
- b. Large operational areas may conflict with landuse plans for city expansion or modernization of public services.
- c. Direct connections with inland transport networks will require close cooperation between port managers and city managers who are in-charge of urban traffic infrastructure.
- d. Port industrial traffic often does not merge easily with urban road traffic. So safety and environmental issues may be at risk.

30. Physical limitations make the situation unsustainable. A drastic move by the port can be possible to relocate its facilities, moving further away from the city center, to find a viable and more appropriate location. Some ports have already begun to address this issue by considering and implementing relocation programs. This kind of move usually offers new development opportunities for both the port and the city. The latter is often in a position to recover former port operational areas, while the former can set up new facilities better customized to modern trade requirements in terms of ship handling and connections with inland transport networks. Such a situation is commonly found in estuary ports. Here the historical part of the port, virtually trapped at the core of the city, does not lend itself to significant structural changes. The port then will try to move closer to the mouth of the river or near to sea coast, where it can expect to find deeper water, easier access and more space available at an affordable cost. Examples of this scheme can be found in Baltimore, New York, United States; Bristol, London, United Kingdom; Melbourne, Australia; Copenhagen, Denmark; LaemChabang, Bangkok, Thailand; Port Qasim, Karachi, Pakistan; NhavaSheva, Bombay, India. Chittagong Port will be considered in the same category. In a recent study, it has been found that the main port operation and customs facilities of future Chittagong Port will likely be shifted to the Bay Terminal area very soon. Again, moving port traffic away from the city center will significantly improve inhabitants' daily living conditions and will make it easier to manage urban traffic. However, former port facilities made redundant, close to the city center, will usually provide very valuable land to develop new urban activities. Those activities are shopping malls, hotels, golf grounds and public recreational activities.

31. The port will usually not move that far away from its previous location, so the benefits in terms of induced activity and employment for the city will remain without the urban disadvantages of an industrial environment. However, the relocation option is definitely an expensive proposition, even when existing facilities can be somewhat traded with the city against new land and is not by far implementable everywhere. So in most cases, ports and cities will have to face together the two main problem areas of space and access. Beyond their original need for large operational areas stemming from the technological evolution, space will have to do in the first place with the new logistical functions. Ports have now to undertake to keep up with the requirements of international trade. There are a significant number of activities that can be classified as value-added services in the field of logistics. It is, therefore, useful to give an overview of these activities and an insight into their functions and relations. Value-added services can roughly be divided into logistics activities and general value-added services. The logistics activities again fall into two categories: General Logistics Services (GLS), which includes storage, loading-unloading,stripping-stuffing, group age, consolidation and distribution. And Value Added Logistics (VAL) include repacking, customizing, assembly, quality control, testing and repair. General value-added services will include a few other services. Those are equipment maintenance, equipment renting and leasing, cleaning facilities, tanking, communication, safety, security services, offices, etc. A continual tendency can be observed toward the growing importance of VAL activities.

CONCEPT OF DISTRIPARK

32. We know that Producers are concentrating on their core business in line with customers' demand for high-quality, specialized products. New players in this field may appear, such as the logistic services providers. These parties take over parts of the production chain (assembly, quality control, customizing, packaging, etc) and of the after-sales (repair, reuse, etc). Certainly, containerized and general cargo has the highest VAL potential. The challenge for ports is to offer the possibility to welcome these activities and services. When grouped together in a common, dedicated area, GLS and VAL activities become something new concept sometimes called a Distripark. Rotterdam, Netherlands; Wakefield, United Kingdom; Verona, Italy; Bremen, Germany; are few examples of this kind of arrangement. General cargo ports are generally a preferred choice for setting up Distriparks. They are already intermodal transport nodes and main traffic gateways. But such a facility demands significant space. However, actual requirements will obviously depend on the traffic nature and volume. Usual figures show existing Distriparkswithin 100 ha, and with around 50 separate companies. That's why, during the implementation of this kind of facility, the port and the city must obviously work together to find out the optimum land-use plan which meets both the port's logistical objectives and the city's development concerns. But logistical services are dynamic activities, and they generate significant traffic flows. Average truck movements per day in European Distriparks are around 5000. So accesses to the distripark, as well as connections between the Distripark and the port, must be properly designed to accommodate such traffic flows. However, close cooperation between the port and the city on access design and implementation is mandatory for such an arrangement.

33. On the management side of these logistics facilities, the landlord port model, therefore, withdrew from direct commercial operations to concentrate on their core public statutory duties. It could well be the most suitable body to initiate the planning and implementation, then marketing and management of such Distriparks. However, port authorities and municipalities could also form together specific companies to develop and promote these activities. In fact, accesses are critical for the port itself, with or without a Distripark. This is certainly an invasive issue Today in many ports worldwide. In many countries, to make things worse, priority in land access to ports was often given prominently to railways at the expense of road traffic. Again, the limitations in road access to ports quickly became one of the most conspicuous bottlenecks of the transport sector. A potential way for cities and ports to address together the space constraint could be to manage space and access in a more dynamic way. Most logistics services, if they can benefit from being carried out close enough to the port, do not need to take place physically in the port itself. In fact, it will often be preferable to set up the logistics services area outside the port itself. Here it will be easier to find adequate land available at a reasonable cost. The main criteria are easy connections with the different land transport modes. However, the connection with the port will remain the critical issue to make the whole system work. But in many instances, solving this specific connection problem may well prove to be cheaper or to make more economic sense for both the port and the city than trying to expand port land at a high cost. The traffic generated by this expansion would require higher capacity accesses and would just concentrate the traffic management problem at the single port or city interface.

34. This consideration leads to the development of inland logistics centers, or dry ports, inland container depots (ICDs), where all logistical operations in the port itself can take place. The concept relies on the possibility of shuttling cargo or goods between the seaport and the dry port as efficiently as possible. A few examples of this arrangement are; the Virginia Inland Terminal from Virginia Port Authority in the United States, the Manila Inland Container Depot and rail link of ICSTI in the Philippines, the Harbin Inland Port and Harbin Dalian rail link in China. The concept is also appropriate, in particular with customs, to allow for the quick removal of imported goods from the port grounds. However, final clearance procedures take place at the dry port or even later at the receiver's place. So the future of ports will pivot more and more on their capacity to develop their offer of logistics platforms associated with their regular transit operations.

35. The development mission consists of planning, designing, and financing the basic infrastructure. However, port authorities may be well suited to take the technical lead in these operations since cities are their fortunate partner in these undertakings. A mixed port city company could be a vehicle to implement this kind of program. Actually, municipalities are already becoming much more directly involved in port management worldwide. However, the execution of the decentralization reforms is taking root in many countries. The new port authorities, either public authorities or joint stock companies, were modeled after the corporate setting of private businesses. Today this makes room for the cities as one of their main partners in long-term strategy and decision-making. Whether municipalities sit as a shareholder on the board of the port authority or as a partner in the port council, they are now at the core of the development strategy of the port. Today, this strategy clearly must look beyond the port's gates and that included in the overall local community's development program. Undertaking such a strategy requires effective cooperation between public and private actors. However, the private sector can bring its professional knowledge in setting up integrated logistics and transportation systems, including its own assets financing capacity.

36. Public authorities, at both national and municipal levels, have to provide an appropriate legal framework. Sometimes, a basic set of adequate infrastructure to spearhead the process and make it possible for the private operators to play the part. Consequently, it needs to be addressed the issue of transport is a major element in a country's external trade competitiveness. And which makes it mandatory to take a comprehensive look at the management of the interface between transport modes. The port usually is a critical node in international transport systems, its integration in a country's transport networks assumes few questions and those very much of a public nature, and those have been appropriately taken care of. And it is the duty of the government to ensure and handles it professionally.

PHYSICAL INTEGRATION

37. Today, the quality of road, rail, and inland waterway connections are critical factors of port efficiency. Whatever the institutional setting is for management and for operations of port facilities, the responsibility for the provision of these physical accesses will normally remain with the public authorities, either local or national. Beyond immediate access to port areas, integration of the sea-land interface with inland transport modes may entail setting up of dry terminals inland, like Inland Container Depots (ICD). This will also require appropriate intermediate transport infrastructure. It also requires adequate regulatory setting, mainly for customs procedures. It may well become a prominent actor in nurturing the development of these inland terminals. This will help in making efficient use of the port facilities themselves by increasing transit speed through the port area and transferring clearances and dispatch operations to an inland site. It is usually less expensive to set up and operate. It will reduce the need to expand operational capacity at the sea-land interface itself, which requires, in most cases, significantly greater investments than an inland location. As a node in the transport system, the port authority is also likely the best possible player to investigate the needs for these developments, including inland access connections. It would have to stimulate actions from the public authorities to spearhead appropriate investment programs and corresponding regulatory adjustments.

REGULATORY FRAMEWORK

38. Trade facilitation aspects, such as streamlining export and import documentation and simplifying and adapting customs regulations and procedures to allow traffic flows to make efficient use of infrastructure facilities instead of having to expand facilities. However, to cope with procedures developing Electronic Data Interchange (EDI), automation and associate facilities, are the prerequisites for a seamless international freight transport pattern. Again, to develop updating existing legal frameworks to give recognized legal status to professions like freight forwarders or multimodal transport operators is also sometimes required to allow efficient intermodal operations to be implemented. In this esteem, port customers and representatives of the transports community should be given the possibility to become members of the board of public port authorities or of the port council. It would ensure the availability of a constitutional channel to forward it to policymakers and get the views.

PERFORMANCE INFORMATION

39. The public authorities, mainly port authorities, must collect and update international operational data on port activities on a regular basis and establish their own performance standards accordingly. Main reference indicators should be used to monitor private concessions. It will include cargo and container handling productivity by cargo and goods categories, average cargo and goods dwelling time in port, mainly for containers, and as far as efficient use of infrastructure and equipment is concerned, congestion rate of berthing facilities, illustrated by ship waiting rates both waiting time and time at berth. All concession contracts must include provisions by making mandatory the transmission of comprehensive operational statistics to the port authorities on a regular basis. It will be part of the public information disclosure policy.

NATIONAL PORT AND TRANSPORT SECTOR STRATEGIC PLAN

40. Forward-looking planning will remain a critical responsibility of government in the port and transport sector as usual. Ensure that national economies can achieve optimal competitiveness in external trade markets and means implementing and maintaining a cost-effective transport system, with the port interface ranking high in international trade-related issues. The central body would be in charge of taking this long-term view when devising national waterfront and coastal development plans. However, following the physical integration requirements, allocation of land not only for the prospective development of port facilities but also for the establishment and expansion of transport corridors linking ports to inland transport systems must be at the forefront of public authorities program when devising future land use plan and programs.¹⁶ That needs to be included in the various stakeholders' interests in the long-term development of coastal areas within the framework of a national Integrated Coastal Zone Management (ICZM) strategy. Such a strategic plan should be visionary, defined, sustainable and achievable.

41. It is really a challenging task for every maritime stakeholder, particularly port authorities and vessel owners, to reduce CO₂ emissions up to zero levels. Now it is our holy duty, and we are committed to the integration of the UN sustainable development Goals (SDGs) in its daily activities and support every opportunity to exchange best practices in order to improve the sustainable development of port environments globally. According to OPEC's World Oil Outlook, the IMO 2050 emissions target may only be achievable if CO₂ emissions from fuel are cut by 80% from CO₂ emissions levels of LNG (source: Lloyd's List/OPEC).

CYBER ATTACK AND SURVIVAL OF MODERN PORT

42. Modern ports are almost automated in nature and operated on web-based application software. Again Terminal Operating Software or System (TOS) is the backbone and nerve system of modern port-operation. Any sort of cyber-attack can be stuck to port operations without any warning notice. Today in a global scenario, cyber-attack is a great challenge¹⁷ for any port, and it is even related to the survival of the port business. A single cyber-attack on a major Pacific port could cost US\$ 110 billion, roughly equivalent to half of all losses from natural catastrophes in 2018. It is according to new research from the University of Cambridge, Centre for Risk Studies entitled "ShenAttack: cyber risk in Asia Pacific port". The estimate was based on an extreme scenario in which a computer virus carried by ships scrambles cargo databases at 15 key ports across Japan, China, Malaysia, Singapore and South Korea, leading to server disruption.¹⁸ So, it is the best time for every modern port to make a recovery plan and protection system to fight against cyber-attack.

MARITIME SECURITY CHALLENGES

43. There are many maritime-related security challenges which any port may face anytime without prior notice. Those are oil or chemical pollution incidents, drug trafficking, extreme weather damage, cyber-attack, corruption incident, theft or robbery case, etc. Being often the first port of call when something goes wrong, as mentioned above, port authorities need to invest in their reputation and that of the wider community they represent.¹⁹ The hands-on reputation management stream will explore how ports and stakeholders can collaborate to operate for and recover from threats that compromise their business continuity, safety, reputation and ability to serve customers.²⁰ We must remember that such maritime security challenges are both global and diversified in nature. So it should be handled together globally as well as instantly.

MARITIME DIGITALIZATION CHALLENGES

44. In the 21st Century, modern ports are highly digitalization rather than almost zero analog systems. Now a day's volume of data is measured in Terabytes, and every application program is based and operates on wave or net. The biggest hurdle in digitalizing the maritime and logistics sectors is not in technological nature.²¹ It is about bringing parties in the logistics chain together to build trust in sharing data to optimize efficiency, reduce emissions, and improve safety and security. Today, the Internet of Things (IoT) can be considered an important technological revolution related to smart cities, smart homes, smart factories and as well smart port applications. As the presence of smart sensing systems in ports becomes a reality, different operation areas are working Today in automatic mode.²² So, IoT is a useful tool for present and future port operations. Again, Artificial Intelligence (AI) is a key technology for smart ports and the reason for port automation. In fact, without AI, Smart Ports could not exist. AI has already impacted global logistics companies and will continue to impact the development of the maritime and shipping industry. So, AI is another useful tool for present and future port operations.²³

SISTER PORT CONCEPT AND FEW SPECIAL CHALLENGES

45. Diversified innovation in port business may look like a usual business from the outside. Few port cities seem able to outgrow their cargo handling location to become thriving maritime cities. Most ports in the world have been operating under the landlord model for years.²⁴ Cross-border collaboration seems to remain stuck in non-committal "sister Port" agreements. A few interesting questions arise: will port cities become successful and reliable partners for the maritime industry? Can port communities and cities foster

innovation together? How can port authorities maximize sustainable value from port land and infrastructural assets and more beyond being pure asset holders? Is it the appropriate time for a new and radical wave of privatization? Is it the right time for commercial port networks to really take off and claim their place in global supply chains? Has the time finally come for a fully automated port instead of a semi-automated or manual Port?

PPP AGREEMENT AND CONCESSION CONTRACT

46. Public Private Partnership (PPP) agreements in the port sector may be in long-term investment plans for infrastructure development like jetty, yard and breakwater construction, capital dazing, equipment purchase for both waterfront and yard side operation, up-gradations/ modernization of existing equipment and service, install a modern terminal operating system, etc. It also includes creating an intermodal terminal and logistics center with rail, road, and inland waterway links to connect the ports to the cities or whole nations or regions.²⁵ A concession contract, usually around 25 years, with an option for renewal on expiry, is an integral part of such an agreement. This process starts with the signing of the MOU by both parties. This type of PPP agreement usually signs between inferior port authorities and world-renowned terminal operators to improve the productivity and efficiency of port operations. It boosts up the inferior port authorities with respect to the capacity, operational ability and enhanced. This agreement definitely improves port connectivity around the globe. It definitely adds value to customers and partners in getting goods and cargo from local, regional and international markets.²⁶ For land-locked countries, the tri-modal inland ports will be an important model point for containing shipping within the country, even extending up to the adjacent region.²⁷

CHALLENGE OF GLOBALIZATION

47. Today all countries are treated as global villages. Every innovation and service is global in nature. We cannot hide or restrict any facilities from humans mankind. Similarly, every local problem also travels to another country and pollutes other nations. In such a global scenario, we need honest and balanced global business leaders. Actually, Today's business leaders are engaged in successful and sustainable cross-industry collaboration reliability both externally and internally. But, like other sectors, the port sector also has an acute shortage of honest, professional and balanced leaders both locally and globally.²⁸ So, there are a few global issues that need to look after by every port authority and other maritime stakeholders, such as energy transition, carbon reduction plan, design of zero-emission vessels, data collaboration in the port sector, green port concept, risk and reputation, port business innovation, more AI and IoT friendly port, smart port concept²⁹ etc. We need to bring together maritime and logistic stakeholders for better port management, optimization of the transport network, sustainable growth in port indexes, profit maximization, safer and secure port operation, and zero maritime accidents.³⁰ In the global and broader maritime scenario, those mission and achievement is really a big challenge for us.

HUMAN RESOURCE DEVELOPMENT

48. A happy, healthy and peaceful workforce is a productive and useful asset for any industry. The maritime industry is much diversified in nature, where employees work in different ways, and that is peculiar in nature. Here people may work the whole day long with minor rest and recreation.³¹ Again people may spend his/her holidays throughout the week or even month. Again maritime environment is very challenging and monotonous in nature. Any maritime worker may be frustrated at any time and act peculiarly. Keeping that entire shortcoming into consideration, we need to develop and build up our human resources effectively and efficiently.

SELECTION OF SUSTAINABLE PORT DEVELOPER AND OPERATOR

49. To select suitable port developers and operators for any nation, they must do some homework and identify a few viable criteria. Every country needs to do a realistic, optimistic, unbiased and balanced national study that encompasses local and global demand forecasts, regional and global development patterns, technological development, future trade development trend, national short, medium and long-term development plan and policies in line of local, regional and global requirement.³² Detail phase by phase development plan with realistic financial and risk analysis is mandatory. All should be legally and commercially viable and sustainable both in the global perspective and in the long run concept. So country

should have some realistic and viable master plan both for port and transport network development.³³ Again nations need to find out viable and realistic criteria for selecting suitable global port development³⁴ and operation partners. Those criteria are as follows:

- a. National interest, mission, vision and plan.
- b. National and regional safety, security, economy and strategic plan.
- c. Evaluation of performance as port developer around the globe.
- d. Evaluation of performance as port or terminal operator around the globe.
- e. Technical know-how and reliability as port developer and operator.
- f. Analysis of their success in different countries and environment.
- g. Cultural, demographic and social similarities and adoptability.
- h. Financial analysis with realistic assumptions and limitations.
- i. Risk analysis and risk management plan.
- j. Relation with national strategic and master development plan.
- k. Viability with local and global trade development trend.
- l. Legal assessment in respect with national and international roles and regulation.
- m. Government desire and fund allocation.
- n. Budget and fund management plan.
- o. Optimization of asset management.

SMART PORT TRANSFORMATION IS THE EASIEST AND BEST SOLUTION IN THE 21ST CENTURY.

50. As we know, a smart port is a digital port. Actually, the meaning of smart is being more attractive and innovative in a competitive sense³⁵. Today's smart port is green, digital, and more connected to diversified geography³⁶, logistics, industrial environments, and sustainable development resources and capable of fulfilling the demand of global needs. They are automated ports using new technologies while caring more for the marine environment. Today seaports around the globe are facing challenges every moment due to infrastructure, global trade, geo-political situation, regional relations, global dynamics³⁷, production capacity, finances, regulation compliance, safety and security, sustainability, digitalization, and lack of community support. So, with globalization and a growing maritime transport industry, these challenges will only become more apparent and have a stronger impact with time.³⁸ Such maritime challenges, however, can be converted into opportunities through Smart Port transformation so long as ports remain open to change with the digital transformation taking place in the maritime and shipping industry. As we know, a smart Port is a port that integrates new digital technologies, like big data, Artificial Intelligence (AI)³⁹, Internet of Things (IoT)⁴⁰ and a 5G network care for the environment, cares for the community, ecosystem, and stakeholders. However, as ports are a major node in the supply chain and must keep up with digital advancements to remain competitive, Smart Ports are seen as the way of the future for sustainable maritime industry development.

CONCLUSION

51. In the 21st Century, ports and terminals are facing quite different challenges than the ones they used to deal with in the previous Century. The new distribution of roles between public and private actors calls for an appropriate allocation of duties and responsibilities, of risks and rewards, to make the global transportation system work to its best efficiency. Commercial terminals handle the operational side of the business, attract and serve the traffic, and manage commercial risk. Relying on doing so on extended transport networks allows them to market their services within the same work of an increasingly integrated transportation and logistics sector. Operational investment policy, transport chain organization, and intermodal combinations remain under their control, in cooperation with transport operators, which are themselves sometimes their clients and sometimes their shareholders. Public port and marine authorities handle all constitutional duties relating to transport operations, in particular traffic safety issues and technical regulatory matters. In addition, they have to make it possible for commercial operators to unfold their activities by providing the basic infrastructure assets required in terms of access, protection, and connection between networks. A main public responsibility remains the establishment of a transparent and reliable administrative framework to handle official trade document processing along with the implementation as needed, as well as trade facilitation improvement programs. Against this backdrop, port

authorities will also likely become major players in helping develop new logistical multimodal platforms outside the boundaries of the port.

52. The challenges in port development, operation and ownership pattern will be much more diversified and most unusual in nature. So we need to prepare and equip ourselves together to fight against such future challenges, as described above in a few paragraphs. Again, to select a suitable port developers and operators from the globe for any nation, we must do some homework and identify a few viable criteria as described above paragraph. In the 21st Century, every country needs to do realistic, optimistic, unbiased and balanced national detail study in order to develop sustainable port expansion and integrated transport network master plan for the nation. Otherwise, any ad-hoc or piecemeal or short-term development plan will jeopardize the whole economic and business system of the nation. As we see, the smart port is an automated port using new technologies, environment-friendly, more effective, more efficient, and more economically competitive ports; so, such ports will serve the purpose of global demand in the 21st Century.

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