Chapter 3. Towards regional guidelines for sustainable port development and improving port productivity in ESCAP member countries

The strategic vision for port development in the ESCAP region is to lead sustainable development and improve port productivity for current and future generations.

The regional guidelines would provide standards and requirements for sustainable and productivity port development. Meanwhile, they would ensure a high standard and cost-effective for port developments in the region, and development proponents as well. Moreover, the guideline would also encourage the incorporation of sustainable development principles and innovative design into new developments.

The objectives of these guidelines are to:

a) ensure a consistent general high standard of development across all ESCAP region countries
b) provide a safe working environment in all ESCAP member countries
c) protect environmental values of the port and reduce the environmental impact of shipping and port operators through specific environmental-friendly (soft and hard) measures towards greener, safer and more efficient port systems
d) improve the capacity of ports to plan and implement sustainable action plan

Notwithstanding, the integrated guidelines of port development may not suit each ESCAP member countries, because of the sub-regional and national variations. However, the integrated guidelines would promote a harmonized approach to sustainable port development for all member countries, particularly, for the countries which do not have a National port development plan yet.

3.1 Linkages between the Agenda 2030, Paris Agreement and sustainable port development

On 25 September 2015 the United Nations member countries adopted the 2030 Agenda for Sustainable Development. It is a new plan of the action for people, planet and prosperity, with 17 Sustainable Development Goals (SDGs) and 169 associated targets at its core. Additionally, the 2030 Agenda and the Sustainable Development Goals, as well as the Paris Agreement, have reinforced the commitment of international community to achieving a sustainable development path. Together, they underscore the importance of mainstreaming sustainability principles and climate action criteria into all economic activities and sectors.

At the other side, UNCTAD report that some 80 per cent of trade is channeled through ports. Port adds value to the economy and generates social gains, including by supporting trade, linking supply chains, enhancing connectivity, allowing for market access, generating employment and enabling business opportunities. Thus, ports play a key role in connecting the many developing countries and within the country itself that have port communities to trade. Meanwhile, Ports are nodal points in global supply chain. As a result, ports must respond to worldwide, regional and domestic challenges, such as climate change, mobility, digitalization, migration and social

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integration, whilst adding value to international supply chains. Hence, port development plays as an important role at the initial stage of the whole port sector, and it creates a support platform to port become globally connected entities and centres of key economic activity. it is positioned to take the lead in a significant contribution to the global agenda - the 2030 Agenda for Sustainable Development.

In these regards, the nexus between the 2030 Agenda, the goals, the Pairs Agreement and sustainable port development is strong. The Port development is linked to wide-ranging aspects of modern societies and economic structures and can bring a wide range of benefits. However, such benefits may be eroded if unsustainable practice continue in the port development. Adopting a triple bottom-line view, which promote balanced trade-offs that ensure optimum economic and social gains with minimum environmental damage, is key to resolving the growth and sustainability dilemma and supporting the achievement of Goals. Additionally, recognizing every port is different, the approach to aligning SDG would need to tailor to each port business to optimize outcomes.

3.2 Guidelines for sustainable port development

The guidelines aim to change and reform drive the strategic direction of modern port towards greater competitiveness and higher standards of performance. They are designed to streamline certain processes according to the existing best practices. These guidelines are opens to interpretation and national adaptation. There are distinct from policy, standards and procedures:

- They are more general vs. specific rules
- They provide flexibility for unforeseen circumstances
- They should not be mistaken with formal policy statements

With that in mind, the proposed guidelines for sustainable port development are composed of two parts: strategical considerations and action plan.

1. Strategical considerations:

Strategic considerations focus on establishing a clear link between port development and national development objectives. Generally, countries will have a wide variety of strategies that include resources from all the different parts, or sectors, of the community.

Sustainable port development tends to initially focus on efficiency reforms for port industry. Its scope gradually expanded to other dimensions, such as the economic, environment, social and institutional dimensions. Managing a port in sustainable manner requires, first of all, designing a strategy that will contribute to sustainability in all of its dimensions. Any strategic diagnostic review should focus on the factors that are essential for mapping a strategic agenda geared towards the sustainable development of a port system.

The following figure 3.2.1. illustrates the sustainable port development strategy from four dimensions: the substantive dimensions and the institutional one.
Figure 3.2.1. Strategic objectives for the four dimensions of port sustainability

Source: Authors, based on Octavio Doerr and Guía para la elaboración de memorias de sostenibilidad en el Sistema Portuario Español, 2008

Economic dimension covers:

- Improve efficiency of existing port facilities
- Promote responsible port redevelopment by providing integrated logistics services based on the latest logistics technologies and user demand
- Work with stakeholders across the supply chain to increase the speed of goods movement and the overall efficiency of end-to-end logistics systems
- Collaborate with all level of transportation agencies to promote and national goods movement policy that increases international trade
- Increase market share and profit by promoting port competitiveness
- Secure financial resources necessary for port development and operation from various sources including the central government
- Leverage public-private partnerships for cost sharing opportunities
- Proactively manage and minimize risk exposure
- Use performance-based budget management aligned with strategic goals
- Enable the long-term strategic growth and innovative goals of the port through effective use of information and digital technologies
• Collaboratively improve the port’s business process and enable access to accurate and use information systems to access data accurately and timely.
• Work with supply chain stakeholders to make a beneficial impact on the port city and regional economy
• Improve the flow of goods, rearranging the hinterland transport network and improving the urban transport system

Environmental dimension includes:
• Reduce health risks and polluted emission, including greenhouse gases, noise and light pollutions, from port-related activities through changes in policy and use of alternative equipment, technologies and energy sources
• Enhance the quality of Harbor water
• Upgrade and retrofit cargo equipment
• Promote increased indigenous wildlife in and around harbor lands and waters and prevent the introduction of invasive species
• Remove, treat or render suitable for beneficial use contaminated soil and sediments
• Promote enduring partnerships with the health and environmental organizations to strengthen the Port’s strategic planning process
• Create incentives for ships to use cleaner burning fuels or more efficient engines, such incentives can include reduced harbor usage fees. The incentive system can be based on port capacity
• Foster research, development, and integration of diversified, renewable Port-related energy applications

Social dimension focuses on the actions to:
• Promote and develop safe and efficient transportation systems
• Utilize design guidelines and physical branding opportunities to create a more attractive harbor district for working environment and habitation. The waterfront sector of the port area provides amenities for citizens and tourists, and the port makes it closely related to the daily life of citizens
• Implement the outreach to promote interest in and understanding of sustainable port development for the port city people
• Engage students and teachers with the port’s comprehensive education outreach program and implement innovative programs to foster opportunities for students to learn about maritime and port industry careers
• Utilize virtual port systems to create domain awareness and assist in the identification and control of threats to the port

Finally, the institutional dimension addresses the measures to:
• Develop and maintain port-wide policies and procedure that preserve flexibility while providing strong internal controls
• Foster relationships with local community, industry and key organizations and opinion leaders
• Advocate and collaborate with stakeholders to achieve common goals
• Build and maintain relationships with local, regional, and international institutions, agency leaders, as well as with community and industry partners
• Develop a local and national legislative agenda that educates and engages elected officials about port policies and initiatives
• Corporate with academic, international organizations and other research institutions, provide research, share knowledge and information platform, exchange pro and con during the sustainable port development process
• Enhance the ability to respond to various natural and social disasters through joint training and practice with related organizations

Sustainable port development and operation has limitations in achieving its goals by ports alone, and requires a multidimensional strategy that includes all economic, social and environmental factors such as cooperation with port cities, civil society and the central government.

2. Action plan

The action plan component is a long-term structural and strategic plan. It identifies problems and solutions to enhance the accessibility and sustainability of port systems. Furthermore, the port action plan fixes not only the goals to be achieved, but also a monitoring and evaluation system through the identification of a set of performance indicators. It elaborates in detail on how sustainable port development strategies will be implemented to accomplish the above-mentioned objectives. The goal of designing the action plan is to integrate it in the national logistics network and to establish the port terminal as a modern multi-modal unit by achieving high quality port services, provision of high level of safety and security, environmental protection and improvement of the conditions for fair competition between the different means of transport.

Therefore, the port action plan should be based on a long-term vision and maintain the coordination of the short-term executive plans and programmes by stimulating, guiding, monitoring and assessing their implementation; it should also encourage a wide diffusion and a continuous revision of the plan, as well as an increasingly participation of stakeholders and citizen in the planning process. Furthermore, it should refer to two elements: a) specific (community and systems) change to be sought, and b) the specific action steps necessary to bring about changes in all of the relevant sectors, or parts, of the community.
The sustainable port development action plan, as developed and presented in the proposed guidelines, will provide a general framework for the member countries and their partner’s sustainable policy in which the most important medium and long-term goals are defined and set out in a basic strategy, where appropriate including concrete measures. In particular, the action plan should be designed to support the port industry, and to implement its sustainability practices into its whole development progress.

The following table summarizes overall desk research and international good practice outcomes to provide some suggestions to be used in the development of sustainable port action plans.
<table>
<thead>
<tr>
<th>Sustainability Objectives (Goals)</th>
<th>Indicators</th>
<th>Action Plans</th>
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<tbody>
<tr>
<td>Economics</td>
<td>Economic development and relevant issues</td>
<td>GDP contribution</td>
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<td>profitability</td>
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<td>recycled waste (quantity)</td>
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<td>Social</td>
<td>People: society, employment &amp; safety</td>
<td>perceptions (survey)</td>
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<td>job market: skill, career development paths</td>
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<td>The natural environment</td>
<td>cleanliness index</td>
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<td>hectares of conservation area</td>
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<td>habitats and ecosystems</td>
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<td>Government &amp; stakeholders</td>
<td>Port development relevant policies</td>
<td>Land use</td>
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<td>financial indicators</td>
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<td>Supply chain responsibility and stakeholder engagement</td>
<td>meetings with stakeholders and customers</td>
<td>meetings</td>
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<td>Environmental</td>
<td>Air quality</td>
<td>emissions (greenhouse gas, including SOx,</td>
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<td>Sustainability Objectives (Goals)</td>
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<tr>
<td>Energy consumption</td>
<td>NOx, dust</td>
<td>designing support policy and framework to implement clean energy usage</td>
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<td>encouraging ships using green energy instead of fuel, providing limited subsidies/ discount on port dues/ incentive programmes to ships which are using new energy</td>
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<td></td>
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<td>adopting clean energy investments (renewable, LNG, methanol, wind)</td>
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<td>decarbonisation strategies</td>
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<td>building differentiated port charging systems</td>
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<td>providing onshore power supply</td>
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<tr>
<td>Noise</td>
<td>CO2 footprint</td>
<td>energy efficiency (CO2/output)</td>
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<tr>
<td>Water quality and management</td>
<td>emissions (surveys, maps)</td>
<td>ships waste: water ballast, oil &amp; oily water, chemical waste, sewage, garbage cargo spillage dredging sediment contamination oxygen conditions salinity nutrients levels chemical conditions emissions of metals and hydrocarbons alternative ways to use dredging sediments ship waste management plans cleaning tools and equipment</td>
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<tr>
<td>Water management</td>
<td>water consumption&lt;br&gt;clean shipping (ships waste)&lt;br&gt;dock litter (empty cans, plastic, wood, etc.)</td>
<td>port waste management plans (collection, transport, processing)</td>
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<td>Soil</td>
<td>soil contamination&lt;br&gt;(survey on soil pollution)&lt;br&gt;contaminated land</td>
<td>actions minimizing impacts</td>
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<td>Accessibility and mobility</td>
<td>modal shift&lt;br&gt;information provision to port users&lt;br&gt;commuting trips</td>
<td>promoting modal shift, also for commuting trips&lt;br&gt;technological tools providing information to port users and stakeholders&lt;br&gt;EDI systems and platforms involving port users and stakeholders&lt;br&gt;infrastructures upgrades&lt;br&gt;development programs fostering innovation (e.g. allocating port spaces to innovative companies), also in cooperation with the city&lt;br&gt;involving R&amp;D center in the sustainable port development plan</td>
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<tr>
<td>Innovation and R&amp;D</td>
<td>innovative companies&lt;br&gt;(numbers and allocated spaces)&lt;br&gt;R &amp;D investments</td>
<td>Source: The author, based on Guidelines for sustainable and low carbon ports, 2018</td>
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3.3 Measures for improving port productivity

The definition of port productivity at the container terminal varies, but most commonly refers to the throughput of the container per unit time. That is, the container handling performance in the port measured in TEU is measured in various ways, such as productivity per berth, yard productivity, or productivity per crane, depending on measurement standards and measurement locations. Port productivity is not just an infrastructure issue, it can be said that it reflects the overall capabilities of the port, such as operating system, workers' proficiency, and the hinterland connectivity, information technology and so on. The strategies that ports are adopting to increase productivity while oriented towards sustainable ports are well described in the context UNCTAD publication below.

“To minimize ship time in ports – for a given volume of cargo handled – ports, maritime authorities and policymakers may wish to adopt a multipronged approach featuring the following measures: port call optimization (ships should only arrive when they need to arrive, as arriving too early implies additional costs in port, as well as extra expenditures and more pollution, including air emissions); trade and transport facilitation (once a ship arrives at the pier, operations should start immediately, without having to wait for authorities to clear paperwork or carry out other procedures); and port operations (fast and reliable loading and unloading operations require investment in infrastructure and superstructures, as well as technological and human capacities)” (UNCTAD, Review of Maritime Transport 2019).

Against this background, this section examines key issues and response policies in terms of infrastructure and operation to enhance port productivity.

1. Infrastructure

Infrastructure is inseparable from the sustainable and productive port development.

The infrastructure layer involves exploitation of basic structures for both links and nodes in the transport system. “This is where the intrinsic accessibility is valorized since a port site has little meaning unless capital investment is provided. The availability of adequate infrastructure in transport nodes (seaports and inland terminals) and on the links/corridors in the network is a prerequisite for the development of activities by transport operators and logistics players. Infrastructure should act as a strong enabler of port-related market dynamics that lead to efficient and sustainable co-modal freight transport services. Ports commonly face a range of freight mobility challenges at the infrastructural layer.” A fundamental and direct way to improve port productivity is investment in port facilities. This is because it leads to the increasing of cargo handling capacity through securing new port facilities or expanding existing facilities. However, as discussed earlier, investment in port facilities is not easily made due to the following challenges, so most ports in developing countries are considering policies in terms of operation and institutional aspects in addition to capacity enhancement through port infrastructure investment.

Although port facilities are a key infrastructure for regional and national economic development, they are often overlooked by investments in other infrastructure, such as roads. In most cases, it takes a long time from consensus on the necessity of port construction to actual national planning. Since port construction takes a long time from start to completion, there are many cases where a step-by-step development strategy is taken in accordance with the trend of increase in cargo volume. In addition, private investment is being promoted to supplement insufficient government finance, but the private sector, which prioritizes profitability, often requires various incentives to recover investment costs, which is sometimes a problem in the course of the project.

In most developing countries, port development is implementing as a national project because it takes astronomical capital to establish port development plan, procure investment resources, actual construction, secure users including shipping companies, build an operating system, and construct hinterland transport network. In particular, developing countries in the region require large-scale investment to develop national ports and its supporting facilities, but securing investment resources is the biggest obstacle. Although it takes massive capital to invest, the payback period is long, so many countries offer various incentives to encourage private investment, and Public Private Partnership (PPP) based investment is also widely adopted.

Infrastructure investments to increase port productivity include building new terminals or automation, as well as investing to dredging the channels and supportive facilities for safety entry and departure of ships. In addition to investments in quay cranes suitable for larger vessels, yard crane, container transfer equipment and gate automation are also included in these facility investments. In particular, port digitalization, including the use of the latest IT technology to reduce the idle time of unloading equipment, is also considered to be an important factor in improving productivity. This should include an vehicle monitoring system to control traffic in port and an efficient connectivity system to road, rail and inland waterways. “The transport layer involves the operation of transport services on links and corridors between the port and other nodes within the multimodal transport system and the transshipment operations in the nodes of the system. It is a matter of volume and capacity.”37 In particular, in the case of a port and inland transport system, a modal shift that converts a road-dependent transport system to a railroad or inland waterway is widely promoted.

2. Facilitation and Operation

Frequently, it is often observed that cargo cannot be transported in a timely manner even after unloading due to delays or inefficiencies in customs and quarantine procedures, and one of the challenges that shippers and transport service providers complain about is the customs clearance and quarantine system. Port productivity should be ensured not only in terms of infrastructure, but also in terms of institutional aspects such as customs clearance and quarantine. Information sharing and processing systems using advanced IT, including EDI, are actively being introduced by many ports because they contribute to enhancing the transparency and efficiency of business procedures. One of the most overlooked aspects of port productivity enhancement is Human Resource management.

Despite the massive investment in infrastructure and hardware, sometimes the expected results are not achieved because of the lack of understanding and consideration of all stakeholders and port personnel who manage and operate these facilities and equipment. Therefore, education and training for those who are relocated by automation and those who operate new equipment are recognized as important factors in improving productivity. Port safety and security are becoming increasingly important because natural disasters such as typhoons, earthquakes and tsunamis are frequently occurring in the ESCAP region, and hacking and cyber terrorism are also recognized as factors that hinder efficient port operations.

In this light, it should be highlighted that the current diversity in governance models and management arrangements in port and supply chain business poses a problem for the development of systematic responses to negative impacts. In order to deal with these impacts, higher level authorities need to be involved and appropriate incentive structures are required. For example, pollutants emitted by ships and stevedoring equipment sometimes affect not only the port area but also the local community. In order to solve these issues, cooperation and dialogue between various stakeholders, including port authorities and local governments, is important. There are many policies to increase port productivity, from macroscopic, such as large-scale facility investments, to microscopic things like business process re-engineering. Most ports pursue a policy mix strategy that includes hardware, such as infrastructure investments, and software, such as information system improvements, and chooses the right policy for the current situation and future vision. Improving port productivity is a backbone strategy for achieving a mid- to long-term vision for the port, and it is also a key measure to enable sustainable development. Therefore, it is limited to achieve strategic goals such as sustainable development only by a strong drive of a specific entity such as top management, and it takes some time, but the participation and cooperation of all stakeholders is the key to improve port productivity.

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