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## Towards Sustainable ASEAN Port Development: Challenges and Opportunities for Vietnamese Ports\*

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### ABSTRACT

Sustainability agendas are challenging port authorities around the world to find ways of operating and managing their ports efficiently and effectively in terms of economic, social, as well as environmental development. In this respect, governments in ASEAN countries have been implementing various green activities seeking to reduce the environmental impact of shipping and related activities. In this connection, most studies in the existing literature mainly focus on the environmental aspects of sustainable development and have not clearly explained what sustainable port development exactly entails. Furthermore, most of these studies emphasized on the impact of port development and overlooked what factors influence sustainable port development. To address these gaps, this research aim to explore the main factors shaping sustainable port development. This was conducted through a comprehensive review of related literature as well as confirmatory in-depth interviews with port authorities. As a result, findings from this research would help identify key elements of sustainable port development from port authorities' perspective. The challenges, opportunities and managerial implications for Vietnamese ports are also discussed accordingly.

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### 1. Background

Increasing environmental awareness posits new challenges to the development of ports. In addition, climate change calls for adaptation of

measures that aim at minimizing its impact such as rising sea levels and increased flooded water heights, as well as safeguarding both accessibility

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of waterways and future sustainability for social and natural environmental conditions. In an attempt to minimize the environmental impacts and pursue sustainable operations in the long run, several legislations regarding the construction and extension of ports have been timely introduced at both international and domestic levels. For example, there have been related legislations in the EU (i.e. Classification Societies – Regulation (EC) No 391/2009, Ship-Source Pollution – Directive 2000/59/EC, Marine Equipment – Directive 96/98/EC and Directive 2014/90/EU), Australia (i.e. Environmental Protection Act 1986 (WA), New Zealand (i.e. Resource Management (Marine Pollution) Regulations), USA (i.e. Diesel Emission Reduction Act (DERA), Singapore (i.e. Environmental Protection and Management Act (Cap.94A), etc.). These legislations are aiming at incorporating environmental issues into core strategies of port development and are based on stricter standards. Therefore, sustainability is increasingly seen as one of the key drivers in port development in the next decades.

Ports must plan and manage their operations and future expansion (growth) in a sustainable way in order to cope with the limited or decreased environmental space and intensified interactions with their hinterlands. The recognition and accommodation of port development concept in harmony with the surrounding cities clearly render green growth and important economic driver (Black 1996). In this respect, a number of studies have been conducted aiming at measuring sustainable port's performance (Chin and Low, 2010; Tsinker, 2004; Wiegman and Louw, 2011). Nevertheless, there has been little literature known to us which describes clearly and comprehensively what sustainable port development actually entails. Therefore, there exists the need for a step towards an integrated approach to improve the evaluation validity in terms of a variety of sustainable port's development indicators.

## 2. Literature Review

### 2.1. Sustainable Development – Shipping

Shipping operations interact with environment in many ways, either accidentally or intentionally (Talley, 2006). Such interactions are not only generating substantial damages to natural habitats, but also affecting economic activities, especially along coastlines with the concentration of maritime-related economic activities such as ports (Heaver, 2006). The environment is always vulnerable from oil and chemical spills from ships either from their operational activities or catastrophic accidents which cause health hazards (Gupta et al., 2005). As a result of rising environmental awareness in business worldwide, shipping firms are increasingly expected to embrace green practices that promise to make their system and process environmentally friendly to the international community (Yang et al., 2013). A challenge for shipping firms is how to perform shipping operations profitably while reducing their negative impacts on the environment (Cheng and Tsai, 2009). There has been a change of emphasis over time in the focus of international regulatory bodies with the current attention on environmental sustainability management. For example, MARPOL now deals with the prevention of pollution from oil chemicals and other hazardous substances, ballast water treatment, reduction in the use of harmful paints, reduction in emission from ships, and ship recycling (Heij et al., 2011).

The environmental impact on water surface quality and atmospheric pollution caused from ship operations were studied by several authors. Frankel (1987) included the impact of ballast water on port design and

development plan. Maritime operations such as bunkering may engender oil spill risks with potentially catastrophic impacts on beaches, food chains, sediment and fishing communities (Edoho, 2008; Idemudia and Ite, 2006; Ray, 2008) while anchoring may damage irreplaceable environments (Backhurst and Cole, 2000). Gupta et al. (2005) studied various environmental impacts generated by various port activities and their sources. The impacts on surface water quality are caused by generated sewage, bilge wastes, sludge, waste, oil discharges and leakages of harmful materials both from shore and ships. The emission from ships would affect the air quality in the port and surrounding areas. Zonn (2005) studied the anthropogenic environmental pollution caused by shipping, ports and terminals, and the shipping and transportation of oil by barges, tankers, and etc. Matishov and Selifonova (2008) addressed the issue of biological invasions via waterborne traffic as a source of ecological danger for water resources. They indicated that there is an absence of a scientifically based and generally recognized methodology of ballast water in control in the port of Novorossiysk. Ng and Song (2010) assessed the environmental impact costs of pollutant generated by routine shipping operations.

Chin and Low (2010) identified atmospheric and water pollution as the two main negative environmental externalities generated by shipping. Shipping generates a range of atmospheric emissions such as NO<sub>x</sub>, carbon dioxide (CO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), and etc. It is reported that containerships are by far the most important source of CO<sub>2</sub> emissions in the shipping industry, in both absolute and per tone-km terms (Psaraftis and Kontovas, 2009). Bengtsson et al. (2012) evaluated the environmental assessment of two alternative pathways to bio-fuels, the diesel route and the gas route, in the shipping industry. From their study, it is found that gas route has better overall environmental performance than the diesel route indicating the use of bio-fuels as one possible measure to decrease the global warming impact from shipping. Walsh and Bows (2012) studied the correlation between ship emissions and size using UK shipping activities. It was highlighted that, although ship type is a crucial determinant of emissions, vessel size is also important, particularly for smaller ships where the variance in emission factors are the greatest.

### 2.2. Sustainable Development – Port

It is well acknowledged that the development of port facilities and their associated operations contribute significantly to the growth of maritime transport, economic development of coastal countries, and provide both direct and indirect employment to the region (Paipai, 1999). Ports, as part of a network or supply chain, are considered responsible for a wider set of impacts and seek to reconcile short-term views, private and public interests, and commercial and social objectives (Dooms et al., 2013). However, port development, operations and activities have adverse consequences on the environment responsible for a number of negative external effects (Acciaro et al., 2014; Dinwoodie et al., 2012; Gupta et al., 2005). Port activities would facilitate commercial and economic growth, but also likely cause deterioration of air and marine water quality in the surrounding areas (Grfoll et al., 2011; Gupta et al., 2005; Kroger et al., 2004). Port authorities, although being diverse in size, geographical surroundings, activity profile and administration, all have to satisfy economic demands and industrial activity with sustainable development, compliance with legislation and cost and risk reduction (Puig et al., 2014).

Most of the literature related to sustainable port development focused on ecological issues (Bateman, 1996; Berechman and Tseng, 2012; Dinwoodie et al., 2012; Liao et al., 2010) and monitoring environmental

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