This book presents an important and original compilation of current material investigating the efficient facilitation of major infrastructure projects in Indonesia and Australia, with an emphasis on infrastructure investment and a focus on port planning and development. This interdisciplinary collection—spanning the disciplines of engineering, law and planning—draws helpfully on a range of practical and theoretical perspectives. It is the collaborative effort of leading experts in the fields of infrastructure project initiation and financing, and is based on international research conducted by the University of Melbourne, Universitas Indonesia and Universitas Gadjah Mada.

The volume opens with a macroscopic perspective, outlining the broader economic situations confronting Indonesia and Australia, before adopting a more microscopic perspective to closely examine the issues surrounding major infrastructure investment in both countries. Detailed case studies are provided, key challenges are identified, and evidence-based solutions are offered. These solutions respond to such topical issues as how to overcome delays in infrastructure project initiation; how to enhance project decision-making for the selection and evaluation of projects; how to improve overall efficiency in the arrangement of project finance and governance; and how to increase the return provided by investment in infrastructure. Special focus is given to proposed improvements to the portal cities of Indonesia in the areas of major infrastructure project governance, policies, engagement, operation and processes.

By rigorously investigating the economic, transport, finance and policy aspects of infrastructure investment, this book will be a valuable resource for policymakers and government officials in Indonesia and Australia, infrastructure investment organizations, and companies involved in exporting services between Indonesia and Australia. This book will also be of interest to researchers and students of infrastructure planning and financing, setting a solid foundation for subsequent investigations of financing options for large-scale infrastructure developments.

As with all Open Book publications, this entire book is available to read for free on the publisher’s website. Printed and digital editions, together with supplementary digital material, can also be found at www.openbookpublishers.com.
7. Innovation in Port Development

The Quad Helix Model

S. Wahyuni

7.0 Introduction

A seaport is large infrastructure that is critical to a city’s economy. Large port projects are normally planned and initiated by the government of the day. However, this planning and project initiation approach may not always be optimal, since it is usually driven top-down. The early involvement of other stakeholders at the port-city interface such as the private sector, academia and the wider community may be useful in collaboratively developing a port project. This paper provides a comprehensive case study on how an Academic-Business-Community-Government plus bank partnership can be nurtured to create innovation through direct observation method to TAMA (Technology Advanced Metropolitan Area) in Japan and an analysis of the port development of Shenzhen. To develop a successful port cluster, there is a need for a systematic cluster strategy that includes: the cultivation of key persons...

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1 Some parts of this article have been published in Chapter 7, ‘Bagaimana Mmperkuat Kemitraan ABG: Studi Kasus Tama (Jepang)’ in S. Wahyuni and Wahyuningsih, Strategi Kawasan Ekonomi Khusus (Salemba Empat: Jakarta, 2018), pp. 129-142.

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for local industrial vitalisation; analysis for new industries; any kind of supports for planning industrial vitalisation plan; supports for collaboration with other areas; and overseas marketing.

Many small and medium-sized enterprises (SMEs), as well as port management, are struggling with developing their businesses due to the limits of resources, capabilities and network/linkage. The mushrooming development of ports in the world does not guarantee that their competitiveness remains the same over the years. Some ports which previously ranked top in the world have now been replaced by other ports. For example, Rotterdam — once rated the busiest port in the world — was recently replaced by Shenzhen, a relative newcomer in the port industry. The rank is now reversed. The Port of Shenzhen is now ranked as the fourth busiest container port in the world in terms of container throughput, only slightly behind Hong Kong in third (McKinnon, 2011). Shenzhen has seen double digit growth rates in its containerized cargo throughput for a number of years. This achievement is the result of high speed foreign direct investment (FDI), quick development of Shenzhen as a special economic zone, and close coopetition between all stakeholders: academy, business, government and community. These stakeholders are not only located in Shenzhen, but also in Hong Kong and in other cities across China.

Port competitiveness has been widely studied over the years. Interestingly, the nature of changes in and around ports is fundamentally different today: changes are often disruptive, and very often located outside the port area, and therefore often out of control of the pure port actors (Song, 2014). The challenge of the future development of seaports is the growing importance of hinterland connections, international logistics chains, the share of hinterland transportation and collaboration between ABCG (Academic-Business-Community-Government). A close partnership with all parties involved needs to be established to develop a successful port. To increase port competitiveness, there is a need to maintain both competition and cooperation among port management. As Notteboom, Ducruet and Langen (2009, p. 2) write:

Adjacent ports are typically fierce competitors, a competition that often contributes to the strong market positions of the respective seaports. However, the relationship between adjacent ports has also grown stronger in the sense that port executives as well as the private sector
stress that, while maintaining a healthy competition, opportunities for cooperation and coordination can be further explored.

The aim of this chapter is to provide a comprehensive understanding on how to develop a successful cluster with the help of ABCG (Academic-Business-Community-Government) plus banks. This strategy should include engagement of key stakeholders for local industrial vitalization, analysis for new industries, any kind of supports for creating an industrial vitalization plan, and support for collaboration with other regions. As our case study, we use a company in Western Metropolitan Tokyo: the Greater Tokyo Initiative, Technology Advanced Metropolitan Area (TAMA) association. The background and strategic support content of the Greater Tokyo Initiative will be introduced and discussed. In addition, we will also link the analysis with the development of Singapore port.

7.1 Port Strategic Development

Whenever discussing port development, we cannot neglect the importance of co-operation: co-operation built between ports, and partnerships built between ports and other stakeholders (communities, universities etc.). Nevertheless, we should also take into serious consideration a new strategic approach — “coopetition”, a term coined by Brandenburger and Nalebuff (1996). The term “coopetition” is a mixture of competition and co-operation, thus having a strategic implication that those engaged in the same or similar market should ‘collaborate to compete’ as a win–win strategy, rather than a win–lose one. Such is the inter-relationship between Hong Kong and South China ports, which ultimately increased Hong Kong’s competitiveness and also helped other ports in South China. Instead of competing with Hong Kong, Shenzhen developed a strategic partnership with Hong Kong to provide complementary rather than competing services, so that competitiveness of both ports can be leveraged up. Brandenburger and Nalebuff (1996) name this group as ‘complementors’, a counterpart to the term ‘competitors’. From this study it was revealed that there are several potential areas for collaboration. From Table 7.1 we can see that port competitiveness is not only dependent on maritime connectivity, efficiency and quality of port operations, but also highly dependent on
hinterland connectivity and local goodwill. It is clear that a competitive port must create economic value not only for the direct port stakeholders, but also for the community.

Table 7.1 The determining factors of Port competitiveness

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Instrument</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Maritime connectivity</td>
<td>Transshipment</td>
<td>Singapore</td>
</tr>
<tr>
<td></td>
<td>Nautical access</td>
<td>Deep sea ports</td>
</tr>
<tr>
<td></td>
<td>Internationalisation strategies</td>
<td>Rotterdam, Antwerp</td>
</tr>
<tr>
<td>2) Port operations</td>
<td>Quality of inputs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skills mapping and matching</td>
<td>New York/New Jersey</td>
</tr>
<tr>
<td></td>
<td>Training and education</td>
<td>Singapore</td>
</tr>
<tr>
<td></td>
<td>Social dialogue</td>
<td>Antwerp</td>
</tr>
<tr>
<td></td>
<td>Upgrading equipment</td>
<td>Hamburg</td>
</tr>
<tr>
<td></td>
<td>Land availability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port planning</td>
<td>Rotterdam</td>
</tr>
<tr>
<td></td>
<td>Port information systems</td>
<td>Valencia</td>
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<tr>
<td></td>
<td>Competition</td>
<td>Most large ports</td>
</tr>
<tr>
<td></td>
<td>Coordination between ports</td>
<td>Copenhagen/Malmö</td>
</tr>
<tr>
<td>3) Hinterland</td>
<td>Links port with other transport modes</td>
<td>Rotterdam</td>
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<td></td>
<td>Dry ports and extended gates</td>
<td>Gothenburg</td>
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<td></td>
<td>Freight corridors</td>
<td>Beterwe line</td>
</tr>
<tr>
<td>4) Local goodwill</td>
<td>Port centres</td>
<td>Genoa</td>
</tr>
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<td></td>
<td>Maritime museums</td>
<td>Antwerp</td>
</tr>
<tr>
<td></td>
<td>Port events</td>
<td>Rotterdam</td>
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<tr>
<td></td>
<td>Information and social media</td>
<td>Incheon</td>
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<td></td>
<td>Public access to port</td>
<td>Hamburg</td>
</tr>
<tr>
<td></td>
<td>Other goodwill projects</td>
<td>Valparaiso</td>
</tr>
</tbody>
</table>

Source: Merck (2009).

In Figure 7.1, we can observe the maritime cluster composition of services that has been followed by many ports worldwide. The ports of London, Singapore and Rotterdam have the most complete composition: they are not only supported by hard infrastructure, but, most importantly, by soft infrastructure like research, education and training, ICT, maritime culture and heritage.

Despite the completeness of services, a high value creation port must consider the importance of building market power so that there will be economies of scale for cargo transshipment. The market power theory provides a useful tool by which we can explain the current situation and predict the future trend for container ports in the region. In a broad sense, market power is the ability of a market participant or group of participants (i.e. persons, firms and partnerships, etc.) to influence price, quality, and the nature of the product or service in the marketplace (Shepherd 1970). The fact that a terminal operator has a high degree of market power, by definition, means that the operator has a high degree of control over pricing and services decisions in a port service market.
Under the assumption that the container port operators in this region are profit maximisers, they will attempt to improve their competitiveness by securing stronger positions in their market, so that they can enhance their market power.

Figure 7.2 shows how market power can be increased significantly through joint venture, strategic alliances, merger or even acquisition. This model (which has been implemented in Hong Kong) threatens the profitability of the container ports and weakens the firm’s market power. Co-operation between two firms apparently could enhance the
competitiveness and market power of the firm. Rather than utilizing competitive strategies alone, the terminal operators may adopt a co-operative strategy as a useful option to develop a stronger position in their market. In other words, a co-operative strategy may offer a mutually beneficial opportunity for collaborating units to reshape their positions in the industry. Furthermore, it may allow them to increase their market power.

7.2 Case Study TAMA (Japan)

The TAMA-Greater Tokyo Initiative is a public-benefit association located at Hachioji City, Tokyo, Japan. It was created in 1998, with the aim of vitalising industries in TAMA through innovating collaborations among industries, universities, governments, and financial institutions. Geographically, it covers western parts of the Greater Tokyo Metropolis, including the Prefectures of Tokyo, Kanagawa, and Saitama.
The TAMA-Greater Tokyo Initiative is a cluster that consists of 602 affiliates, including 41 universities, 20 local governments, 36 chambers of commerce, and more industry groups, financial institutions, and industrial companies, since August 2014. Approximately 300 members of the cluster are companies focusing on innovation using advanced technologies.

To serve its role as a supporting association, the TAMA-Greater Tokyo Initiative promotes innovations and collaborations throughout a network of ABCG (Academic-Business-Community-Government) plus banks. Their unique aim is not only to develop the regional network so that some projects can run smoothly supported by ABCG, but also to create collaborations with other clusters in Japan and globally, in order to contribute to global innovations and strengthen their network. These aims and networks are illustrated in Figure 7.3.

Figure 7.4 shows that TAMA’s primary concerns are not only to nurture collaboration, but also to generate networks and expand business. Due to this strong linkage, many Japanese SMEs have been able to expand their business abroad, ultimately becoming multinational companies all over the world.
The network generation from industry, university, government and bank provides a strong valuable linkage for any kind of collaboration and development of new business. As Douglas and Nancy (2008) observe, when collaborations work, they are synergistic in that they produce more than they cost. More specifically, like any asset, collaboration across organizational boundaries requires an investment by boundary spanners and their organizations. Both organizations must be willing to engage in some risk taking and invest some human, social, and financial capital. Maturing the asset requires patience, goodwill, and time. Yet even with these investments, the collaboration asset will not form in the absence of boundary spanners. They are the primary active ingredient that pulls people together; they instigate, manage, and grow the collaboration asset. For this reason, the principal boundary spanners of any collaboration must trust each other and be trusted by their respective organizations if the collaboration asset is to survive the process of cross-organizational learning.

7.2.1 Financial Resources

Since its establishment in 1998, the TAMA-Greater Tokyo Initiative has received large financial support from the Kanto bureau of the Ministry of Economy, Trade and Industry (METI). During the early stage of its operation, the association’s supporting programs were mainly financed by grants from the Kanto METI, in addition to its membership fees.
Followed by the growth of its members and service menus, the TAMA-Greater Tokyo Initiative is in need of more grants to provide integrated support for its member companies. Besides funds from the METI, grants have also been obtained from both national and local authorities such as the Ministry of Education, Culture, Sports, Science and Technology (MEXT), the Ministry of Internal Affairs and Communications (MIC), the Small and Medium Enterprise Agency, Tokyo Metropolitan Governments, and other local governments.

7.2.2 Five-year Action Plans

A series of action plans have been carefully designed to accomplish the TAMA-Greater Tokyo Initiative’s objectives, as well as to assist its member companies. Those action plans have been divided into four stages: networking; new research, development projects and business; eco-friendly manufacturing; and eco-clustering.

The first five-year action plan for the period of 1998 to 2002 focused on “networking”. When the TAMA-Greater Tokyo Initiative was newly established, it did not possess enough solid fundamentals in terms of technologies, infrastructure, and partnership. In recognition of this, the TAMA-Greater Tokyo Initiative’s first five-year action plan began with infrastructure development and network construction. Several activities that supported the construction of the network infrastructure were the development of an information network, meetings between academics and industry, exhibitions of TAMA technology, the development of search engines for academic and industry integration, business fairs, and the development of a virtual laboratory.

After constructing the network, the TAMA-Greater Tokyo Initiative concentrated on creating new research and development (R&D) projects by promoting academic and business partnerships in the second five-year action plan (2003 to 2007). This involved the invention of new technology, and the development of products that met market needs.

The TAMA-Greater Tokyo Initiative is currently under its fourth five-year action plan (2013–2017) and is focusing on “Eco-cluster in TAMA” (Figure 7.5). Besides continuing to develop the previous five-year action plans, it intends to promote TAMA globally by creating ten global niche top (GNT) companies — companies that possess high market shares in global niche markets.
Fig. 7.5 TAMA-Greater Tokyo Initiative’s Five-year Action Plans. Source: adapted from TAMA-Greater Tokyo Initiative (2017).
To realise the above five-year plan, TAMA developed an integrated strategy which is shown in Figure 7.6. First, the national government sets policies for industrial supports. Second, according to the policies, grant aid and supports from clustering policies are set for focused areas. This can be “high octane gas” for companies in the area of focus. Third, the cooperation amongst local supporting agencies, such as local governments, chambers of commerce, Kanto METI, and TAMA, offers support to the target industries. Fourth, this support vitalises the industry by accumulating industries and boosting networking. Fifth, this leads to increases in employment, and in tax revenue. Sixth, since the tax revenue increases, the government can therefore increase the amount of grant aid. This cycle acts as an engine for industrial vitalisation.

Figure 7.7 delineates the steps for business development from the earlier to the later stages, and shows how the TAMA association supports each step. In each stage, TAMA provides a variety of support menus from R&D by collaboration between industries and universities, to marketing by business fairs or investments (TAMA funds), and, additionally, human resources and training.

In implementing this strategy, TAMA provides the following support:

1. Cultivation of key persons for local industrial vitalization.
2. Supporting strategy formation and analysis for new industries.
3. Support for planning the industrial vitalization plan.
4. Projects for solving social issues in the region.
5. Support for collaboration with other areas.
7. Supports for overseas marketing.

From the above example, we can see that it is not enough to develop Tokyo solely through government initiatives. A comprehensive collaboration between ABCG and banks is ultimately needed. The same approach has been taken by the Port of Singapore (see Box 1), which has been able to maintain its competitive position through time. Singapore’s high performance is not only due to its innovation policy, but to the existence of an epistemic community. Singapore shows the most rapid
Fig. 7.6 TAMA strategy. Source: adapted from TAMA-Greater Tokyo Initiative (2017).
7. Innovation in Port Development

Fig. 7.7 Strategy 2: TAMA support measures. Source: adapted from Wahyuni and Wahyuningsih (2018).
growth in terms of generating local innovations. The Government has provided a set of grants to encourage enterprises to invest in local R&D (e.g. the Productivity and Innovation Credit (PIC) provides significant tax deductions or payouts for investments in research and development, innovation, automation and training).

The Maritime and Port Authority of Singapore (MPA) has established a SGD 250 million Maritime Innovation and Technology (MINT) fund (mpa.gov.sg/web/portal/home/maritime-companies/research-development/Funding-Schemes/mint-fund) to support their long-term vision to be a research-intensive, innovative and entrepreneurial economy.

**Box 5. Maritime Cluster Building in Singapore**

In the past, Singapore had been over-reliant on the conventional port functions of providing cargo handling, ship-related services and storage. However, in light of the need to diversify its business operations and thus maintain its position as a logistics hub, the government of Singapore has embarked on establishing Singapore as a maritime logistics hub. Singapore is now a home to more than 5,000 maritime establishments, with S$ 28 billion gross receipts, employing a workforce accounting for 5 per cent of Singapore’s national employment and whose output account for 7 per cent of Singapore’s GDP. Singapore has attracted a number of shipping groups to register in its Registry of Ships.

To increase the value-added of the port of Singapore, the Singapore government has undertaken a number of fiscal measures and other incentives to attract advanced logistics companies to locate around the port of Singapore and form a maritime cluster. The strategy is to build a maritime business cluster to enhance position as a logistics hub: a clustering of port and maritime-related activities complementary to the trade in goods and services (linking port Operations to international trade) and a one-stop service for customers by providing an integrated maritime logistics services and attaining the economies of scale and scope. Apart from maintaining transparency of regulations, provision of world class infrastructure, provision of adequate supply of skilled logistics professionals and provision of a foreign-friendly environment, fiscal measures and other generous incentives have played a major role towards attaining a maritime logistics hub status. The major tax incentives include the Approved International Shipping Enterprise (AISE)scheme, Approved Shipping Logistics Enterprise (ASLE) tax benefits for Ship Registration and Business Development Support. The AISE offers income tax exemption for 10 years for foreign flag ships
provided that the owner or charterer controls a significant amount of ships and have a significant operation in Singapore. In the past only Singapore flag ships were given income tax exemption, and this exemption assisted in the substantial expansion of Singapore fleet in the 1970s and 1980s. However, in many cases there was very little further benefit for Singapore and its economy since a large of that fleet was operated, commercially and technically, outside Singapore. To increase the use of Singapore as a base for the management and control of their shipping operations, Singapore introduced in 1991 a tax incentive under the AIS incentive scheme to exempt shipping lines awarded a AISE status from tax on the income from vessels operated by them, whether registered under Singapore flag or elsewhere. The ASLE provides a concessionary income tax on qualifying incremental income for established ship management, ship agencies, freight forwarders and logistics operators. To encourage foreign vessels to register with Singapore’s Registry of Ships, profits of a shipping enterprise derived from the operation of a Singapore-registered ship are income tax exempt. This applies to income derived from the carriage in international waters of passengers, mails, livestock or goods or from towing or salvage operations carried out in international waters by Singapore ships, and includes charter of Singapore ships. It also exempts shipping companies registered with Singapore from withholding tax on interest payments with respect to offshore loans to finance ships. Under this incentive scheme there is also no tax on gains from vessel sales. The government also extends business development support to ship-owners and maritime auxiliary service providers by providing grants and defraying expenses at initial development on reimbursement basis.

To foster innovation within the maritime industry, the government has established since 2003 the Maritime Innovation and Technology Fund (MITF) and to address the shortage of supply of skilled logistics professionals, the government has established since 2002 the Maritime Cluster Fund (MCF). The MITF includes the Maritime Industry Attachment Programme, the Joint Tertiary & Research Institutions and MPA R&D Programme, the Maritime Technology Professorships and the Platform for Test-bedding, Research, Innovation and Development for New-maritime Technologies (TRIDENT). The MCF was established by Singapore’s Maritime and Port Authority to support the maritime industry’s manpower and business development efforts.

Box 1 Source: Merck (2009).
7.3 Conclusion

This study demonstrates that, in order to develop a successful cluster, a systematic cluster strategy must incorporate the following: the banks, the cultivation of key persons for local industrial vitalisation, analysis for new industries, support for planning the industrial vitalisation plan, support for collaboration with other areas, and also overseas marketing, so that the port project not only runs smoothly but also creates collaboration with other clusters worldwide to strengthen their network.

In this chapter, we have demonstrated how the TAMA association helps businesses become internationally competitive by implementing a strong partnership between Academics, Business, Community and Government (ABCG). In doing so, we have illustrated the profile and support activities of the TAMA-Greater Tokyo Initiative, which include network generation, collaboration, and expansion of business, both domestically and overseas. The case study of Singapore port development highlights the importance of R&D and support from communities in providing value creation.

Because port-cities face common challenges, regions with many different neighbouring port-cities need to develop regional networking. Port-cities require large amounts of capital to finance state-of-the-art infrastructure and must increasingly compete for different sources of funding not only nationally, but even at regional or international levels. The economic benefits from ports are manifold: firstly, ports play an essential role in global supply chains, and, as such, act as facilitators of trade between port-regions and countries. Secondly, port competitiveness also depends on their network and market power. Thirdly, ports could provide value-added services through the economic activities stimulated by an ABCG partnership. Finally, ports are also spatial clusters for innovation, research and development.

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