CHAPTER 11

Conclusion and Policy Recommendations

MASAHITO AMBASHI
Economic Research Institute for ASEAN and East Asia

This book, *Innovation Policy in ASEAN*, has addressed the fundamental question as to what kinds of innovation policies should be introduced in the Association of Southeast Asian Nations (ASEAN) and how ASEAN Member States (AMS) can promote innovation to achieve sustainable economic development.

The theoretical framework presented in Chapter 2 gives us a useful benchmark to design concrete innovation policies to provide possible solutions and prescriptions for such problems. First, it is emphasised that innovation policies need to make knowledge spillovers work smoothly and seamlessly among public institutes, universities, and private firms within a country. Knowledge spillovers should be appropriately integrated into the framework of sectoral, regional, and national innovation systems, taking into account both technological appropriability (i.e. private ownership) and opportunities (i.e. public access). Thus, the policy implication derived from innovation theory is that AMS should build a whole-of-government approach to help knowledge spillovers and innovation diffusion occur across various bodies by involving mediators, such as innovation intermediaries.

Based on this theoretical framework concept, Chapters 3–9 analyse past and current innovation policies implemented in China, Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam. These countries face the difficult problem of nurturing their innovation capability to help them advance from developing to developed country status in the mid-to-long term. These chapters conduct interesting analyses and present insightful recommendations on the innovation policies of individual countries according to their particular circumstances and development stages.

This concluding chapter attempts to summarise the key policy recommendations that can be applied more generally to all AMS that aspire to achieve innovation.

The key message is for AMS not only to increase investment in research and development (R&D) and innovative activities but also to enhance innovation capability and improve the environment in which innovation occurs.

First of all, the successful examples of China and Singapore, which have achieved economic development since the 1960s and the 1980s, respectively, serve as a useful reference for innovation policy in ASEAN. The common strategy taken by these two countries has been to attract foreign direct investment (FDI) by encouraging multinational companies (MNCs) headquartered in developed countries, such as the United States, members of the European Union, and Japan, to locate in domestic industrial zones (usually special economic zones) in the hope of receiving significant technology transfers from them. By tapping FDI with the aid of industrial policies, such as the formation of industrial clusters, a strong export orientation, and education biased towards science and technology, China and Singapore have steadily moved up the technology ladder and enhanced their innovation capabilities. FDI linked to new technology has been a foundation for the current innovative activities of these two countries.

More importantly, innovation policies based on technology transfers from FDI are even more effective for AMS now than they were in the past. As Baldwin (2016) illustrates, production networks embodied by the 'second unbundling', which disperses the processes and tasks of factories across borders using dramatically advanced information and communication technologies, have accelerated the offshoring of production activities from developed to developing countries since the 1990s. In addition to physically relocating production processes to developing countries, this active offshoring of MNCs has brought technology and knowledge of production skills, marketing, and management to local firms.

Hence, thanks to the globalisation of FDI led by the second unbundling, most developing countries, including AMS, can formulate new industrial development strategies to enhance their industrial competitiveness and innovation capability by integrating low-wage domestic workers with the advanced technologies of MNCs. Although further examination is required as to whether 'radical innovation' beyond such simplistic 'process innovation' is realised through technology transfer from MNCs, this is likely to channel much know-how, as well as the innovation base, to them. Moreover, industrial policies relying on FDI in the epoch of the second unbundling do not require countries to arrange all the production processes and tasks in one country. Rather, only part of the fragmented production processes and tasks in a particular industry can

be located there. This implies that governments' efforts to promote innovation can be reduced from a 'big push' to a 'small nudge' because the critical mass of technological development and innovation is relatively small (Baldwin, 2016).

In this respect, the FDI strategy adopted by ASEAN, which is symbolically represented as 'a single market and production base' and 'an integrated and highly cohesive economy' in the 2015 and 2025 ASEAN Economic Blueprints, respectively, is well-aligned with innovation creation. ASEAN and developing East Asia's production networks, particularly in the automobile and machinery industries deployed by MNCs, are among the most advanced in the world. As ERIA (2015) stresses, individual AMS can move up the development steps with the help of FDI by taking maximum advantage of this new international division of labour. Innovation policy in ASEAN should therefore be consistent with this newly proposed industrial development strategy in the hope that local firms receive knowledge spillovers from MNCs by participating in production networks in the region. In addition to continuously attracting FDI as an intermediary of technology, it is important for ASEAN to strengthen economic integration to realise efficient and effective production networks through, for example, infrastructure enhancement, the removal of non-tariff barriers, and economic partnership agreements, such as the ASEAN-plus-one free trade agreements.

Some AMS, such as Malaysia and Thailand, are very concerned about falling into the middle-income trap. If they do not significantly upgrade their industrial structures and competitiveness in the global market through their own innovation achievements, their economic growth may stagnate and labour wages may rise while they remain as middle-income economies. To avoid this scenario and progress to developed-country status, in the long run, these countries must implement forward-looking innovation policies in addition to attracting FDI for the purposes of technology transfer and knowledge spillovers. The necessity of valid innovation policies in ASEAN seems obvious given that progress in innovation has largely been less than satisfactory. For this reason, this chapter proposes three policy recommendations that individual AMS are encouraged to consider.

First, the biggest problem most AMS face is the absence or functional failure of a government organisation to control and coordinate the innovation policies that are formulated and implemented across various departments in a country. Simply put, systemic and systematic national innovation systems (NIS) have not yet been fully established. As an essential impetus for a workable innovation policy in ASEAN, Chapter 1 emphasises the importance of an NIS, which can be defined as a continuous

process by a government where institutions, learning processes, and networks play a central role in generating technological change and innovation via intentional, systemic interactions between the various components. The key point is that a government can be an endogenous positive actor that works for institutional systems where there are well-organised interactions among many agents, including public institutes, universities, and private firms, including both local companies and MNCs.

In ASEAN, Singapore is an exception for having succeeded in institutionalising its NIS. As Chapters 7 and 10 demonstrate, the Economic Development Board (EDB) of the Government of Singapore has systematically advanced technological development, world-class infrastructure, efficient public services, and the provision of incentives and grants for FDI. Effective control and coordination by the EDB, in collaboration with the Agency for Science, Technology and Research (A*STAR), resulted in the formation of the biomedical sciences cluster. Foreign pharmaceutical firms and talents were attracted; physical infrastructure was developed; public research institutes were located in the cluster; biomedical local firms, start-ups, and venture capital were promoted; and R&D links between universities and the healthcare services sector were encouraged. Most innovations that have been produced in Singapore to date are regarded as incremental and not comparable with those of Western countries or Japan and the Republic of Korea (hereafter, Korea). However, Singapore is steadily preparing the capability to create radical innovation under the auspices of the EDB and A*STAR, which constitute a formal, integrated, and well-functioning NIS.

Another useful reference can be found in Japan's NIS. In 2001, the government set up the Council for Science, Technology and Innovation (CSTI), with greater responsibility for setting and evaluating science, technology, and innovation (STI) policy, under the Cabinet Office to strengthen the coordination function within the government. The CSTI is attended by relevant ministers and professionals from academia and the private sector and chaired by the prime minister, vesting the CSTI with strong authority to determine the future direction of Japanese STI policy and prioritise the STI fields to which resources should be intensively devoted. While ministries still enjoy a degree of autonomy for their innovation policies, the CSTI has greatly contributed to improving coordination among them.

The first policy recommendation for AMS is therefore to vest responsibility for the establishment and/or reinforcement of their NIS framework in a government organisation, preferably a single body. This government body should hold unified authority with strong leadership under government control to lead and coordinate

innovation policies developed across various departments from a holistic viewpoint. Some AMS have already established initiatives or organisations to promote domestic innovation. Examples include the National Research Council in Indonesia; the Global Science and Innovation Advisory Council and the National Science Council in Malaysia; and the National Science, Technology and Innovation Policy Committee and the National Research Council in Thailand. But, as the chapter authors show, despite good intentions, weak coordination and implementation prevent most of these bodies from functioning as they should.

By employing such government organisations for the control and coordination functions, AMS governments can strategically drive and implement harmonised innovation policies; set priorities for measures, plans, and programmes to maximise the use of limited resources; and evaluate and monitor their effectiveness. By doing so, AMS should more rapidly tackle issues such as building science and technology infrastructure (including physical and human resources); enhancing intellectual property rights; and establishing favourable regulation climates for knowledge spillovers, technology diffusion, and innovation.

Second, governments need to do more to encourage the private sector (including both domestic and foreign firms), with appropriate monetary incentives to invest more in R&D to stimulate technological development and innovation. It remains essential for AMS governments to spend a larger share of their budgets on R&D and innovative activities since R&D intensity (as a percentage of gross domestic product), patent applications, and the number of R&D researchers have stagnated at very low levels in most AMS (except Singapore) compared with China, Japan, and Korea. There also seems to be scope for AMS to increase the research budgets allocated to public research institutes and universities, which currently have more research potential than private sector research institutes in terms of professional human resources. However, merely increasing government spending is unlikely to reverse the stagnation of R&D, innovative activities, and the resultant innovation achievements in AMS. This is because a permanent government spending increase can never be sustainable in the long run with limited budgets, and an approach that is too government-centric often fails due to government failure. Worse still, it unintentionally undermines the incentive of the private sector to innovate.

It is, therefore, recommended that the innovation policies of AMS be orientated more towards encouraging the innovative activities of the private sector to focus on areas that are always subject to the market mechanism, where resources are in principle

allocated efficiently. The government can then confine its responsibility to addressing market failures to achieving innovation, i.e. where the private rate of return to innovative activities is smaller than the social one. Possible inducements governments can provide to avoid under-investment by the profit-seeking private sector include subsidies and tax credits for R&D and human resources development, grants for targeted innovative activities, and patent grants. As Chapter 2 illustrates in the whole-of-government approach, other factors critical to mitigating market failure and promoting private sector innovation include sound competition and deregulation; indirect research support, such as information provision; and education.

One conspicuous area of market failure is the commercialisation of innovation achievements. Realising innovation from genuine interest is not necessarily the ultimate goal; providing commercialised products to the market to enhance consumer welfare is much more critical in most cases. In an extreme situation, the value of innovation, especially innovation created from applied research, might be null unless it is appropriately commercialised. It is, therefore, critical that AMS governments help private firms and public research institutes commercialise their innovation achievements.

To help achieve this goal, governments should create specialised public research institutes whose primary mission is to conduct R&D and technical support related to commercialising various types of innovation achievements. This policy recommendation is raised in Chapter 8 in relation to Thailand, but it is equally applicable to all AMS since they frequently encounter obstacles at the commercialisation stage due to a lack of adequate know-how. Such public research institutes can be modelled after existing similar institutes, such as A*STAR in Singapore and Fraunhofer-Gesellschaft in Germany. For example, Singapore's Exploit Technologies Pte Limited is a commercialisation arm of A*STAR. The company is strongly orientated towards driving the country's innovation and commercialising its research outcomes by translating them into marketable products, processes, and services. Other AMS should be able to create similar institutes to facilitate commercialisation in an effective manner, whether as a spinoff from the government department in charge of industrial technology or an entirely new body.

Third, AMS must further develop a conducive 'innovation ecosystem' in their NIS involving universities, public research institutes, and private sectors. The government-led approach mentioned above underscores the important role of the government as an endogenous, proactive controller and coordinator of its NIS. However, this approach will necessarily fail if other innovation bodies are left behind. University–industry

collaboration (UIC) is an integral part of innovation ecosystems that are conducive to technology diffusion and knowledge spillovers, and it occupies a central position in the NIS of many developed countries. UIC occurs when universities, while engaging in research and education activities, provide consulting services and license their technologies to industries, conduct joint research projects with them, and create academic entrepreneurship, such as spin-offs and start-ups in return for receiving specific research funds from them. It is worth noting that UIC can contribute to local-government-led regional development initiatives, as Chapter 5 highlights in the case of Bandung City in Indonesia.

Accordingly, AMS must nurture UIC as an effective instrument not only to enhance university-launched innovations but also to disseminate and commercialise them for private industry through close interactions in the region. To capitalise on the opportunities, policies and measures to expedite UIC must be formulated, similar to the Basic Law for Science and Technology in Japan and the Technology Licensing Organization Law and Bayh–Dole Act in the United States. Through such legal and institutional enhancements, AMS should further expand UIC best practices, such as those used in Bandung City, which have so far been observed in only a few regions.

To establish an innovation ecosystem, AMS could also aim to create public institutes or programmes similar to the local public technology centres (*kosetsushi*) in Japan. As innovation intermediaries, *kosetsushi* successfully foster the development of local manufacturing industries, particularly small and medium-sized enterprises (SMEs) (Fukugawa and Goto, 2016). Administered by local governments, they help clients, primarily private firms and individuals, innovate. In general, the main roles of the intermediaries are to (i) diffuse technological knowledge through testing, technical consultation, joint research, and seminars for engineering education; (ii) license patents, mainly to local SMEs; and (iii) act as network mediators connecting SMEs with external sources of knowledge. Although some developed countries have introduced such programmes drawing on Japan's experience, developing countries, including AMS, have yet to organise full-fledged public institutes or programmes to support regional innovation in manufacturing. Nevertheless, the lessons learned by frontrunners in forming their NIS can be a useful resource from which AMS can learn.

So far, this chapter has discussed innovation policies necessary for individual AMS. However, it is also important to examine region-wide innovation policies in the framework of ASEAN that can make the region as a whole more attractive as an innovation hub. To achieve this, three proposals are presented.

First, given ASEAN's collaborative efforts to engage in innovation policy at the ASEAN Committee on Science and Technology, it needs to formulate initiatives to promote innovation that entail more cross-regional synergies and positive feedback across AMS. Put simply, ASEAN-wide collaboration should be the desirable policy direction. As Chapter 10 indicates, possible initiatives include (i) innovation surveys or censuses for use in the planning, monitoring, and evaluation of innovation infrastructure; (ii) databases and platforms on R&D findings and innovation for the collaborative sharing of knowledge and convenient access to the knowledge pool; and (iii) optimised coordination of R&D grants and subsidies, technical and vocational training, and higher education programmes across AMS. In particular, is worth considering a comparison of AMS innovation policies by instituting a peer review system to assess countries' innovation stages and the speed at which their innovation capabilities are advancing. Such a system is likely to motivate each AMS to accelerate the establishment of an NIS. It will also allow AMS to learn from the best practices of other countries.

Second, it is important to further promote goods, investment, and service trade liberalisation and deregulation. Trade liberalisation, such as reducing both the tariffs and non-tariff barriers of goods, exposes local firms to market competition. According to a study by Aghion et al. (2009), although import competition may generally discourage innovation by reducing profits, top firms close to the technological frontier tend to increase their investments in R&D. In addition, investment and service trade liberalisation and deregulation within ASEAN has the significant potential to spur innovation in the region. Since service industries account for the majority (around 50%) of GDP in most AMS, and manufacturing industries currently take on the characteristics of services (so-called 'servitization'), innovation leading to productivity improvements in service industries may enhance economic performance as a whole. Unlike goods trade liberalisation and deregulation, service trade liberalisation faces many challenges in ASEAN despite its considerable potential. Hence, ASEAN is urged to consider further eliminating service trade restrictions in the ASEAN Framework Agreement on Services and the ASEAN Trade in Services Agreement.

Third, policies to facilitate the free movement of natural persons are recommended to encourage greater innovation. Freer movement is usually desirable because innovation is often promoted through person-to-person contact among people with diverse backgrounds. Knowledge spillovers are also brought about by people, especially scientists, who contribute to R&D investments. Highly skilled immigrants are more likely to have positive economic impacts on developing countries since, in most cases, immigrants and domestic workers complement each other. The freer movement

of engineering service providers, assured in the mutual recognition agreements, is particularly important given that the engineering workforce is a foundation for STI. Further improvements in domestic laws and regulations on engineering services are, therefore, needed to make it easier for certified engineers to work overseas. Moreover, since human capital with higher education qualifications is an essential component of operationalising the innovation ecosystem, ASEAN must strengthen collaboration among ASEAN universities through harmonising their curricula and degrees to spur new university-based innovation that transcends national boundaries. ASEAN must also ensure the interaction and exchange of students and researchers with outside universities.

This chapter concludes by raising two remaining issues to be explicitly addressed by future studies. One is the impact of the latest technologies, such as the Internet of Things, automation, artificial intelligence, and machine learning, which may change the face of innovation in the future. By leveraging such innovations, AMS may be able to achieve leapfrogging rather than step-by-step development.

The other is the gap stemming from the differences in innovation capability among AMS, as seen in the gulf between countries with high innovation capability, such as Singapore, and those where it is insufficiently developed, such as Cambodia, Lao PDR, and Myanmar. While AMS at a more advanced stage of innovation will enjoy more dividends from the innovations they achieve, those at a lower stage will fall further behind. The ASEAN Committee on Science and Technology may be able to play a major role in narrowing the innovation gaps among AMS.

References

Aghion, P., B. Blundell, R. Griffith, P. Howitt, and S. Prantel (2009), 'The Effects of Entry on Incumbent Innovation and Productivity', *Review of Economic Studies*, 91(1), pp. 20–32.

Baldwin, R. (2016), *The Great Convergence: Information Technology and the New Globalization.* Cambridge, MA: Belknap Press of Harvard University Press.

ERIA (2015), *The Comprehensive Asia Development Plan 2.0 (CADP 2.0)*. Jakarta: Economic Research Institute for ASEAN and East Asia (ERIA).

Fukugawa, N. and A. Goto (2016), 'Roles of Japan's Local Public Technology Centres in SME Innovation.' VOX CEPR's Policy Portal, 8 July. https://voxeu.org/article/japan-s-local-public-technology-centres-and-sme-innovation (accessed 22 March 2018).

SUMMARY OF POLICY RECOMMENDATIONS

The following policy recommendations aim to provide possible directions for the innovation policies of ASEAN Member States and ASEAN to promote their own innovation creation.

I. Innovation Policy for Individual ASEAN Member States

Fundamental strategy: Continuously attract foreign direct investment from multinational companies and receive the benefits of knowledge spillovers from them to promote process innovation, particularly in the use of production networks or the 'second unbundling'.

Strengthen economic integration to realise efficient and effective production networks (e.g. infrastructure enhancement, the removal of non-tariff barriers, and economic partnership agreements, such as the ASEAN-plus-one free trade agreements).

1. Strategically drive and implement harmonised innovation policies; set priorities over measures, plans, and programmes; and monitor and evaluate them.
   - Establish or reinforce a government organisation responsible for holding unified authority with strong leadership under government control to lead and coordinate innovation policies across various departments.
2. Encourage the private sector, including both domestic and foreign firms, to invest more in research and development (R&D) and innovative activities.
   - Provide subsidy and tax credits for R&D and human resources development, grants for targeted innovative activities, and patent grants.
   - Create specialised public research institutes with the primary mission of conducting R&D and providing technical support related to the commercialisation of innovation achievements modelled after other countries (e.g. Exploit Technologies Pte Limited of A*STARS in Singapore).
3. Elaborate on a conducive innovation ecosystem for the national innovation system.
   - Nurture university–industry collaboration to enhance university-launched innovations and to disseminate and commercialise them for private industrial sectors (e.g. by introducing laws analogous to the 'Basic Act on Science and Technology' in Japan and the 'Technology License Organization Law' and 'Bayh–Dole Act' in the United States).
   - Organise public institutes or programmes, such as local public technology centres, as innovation intermediaries to help private manufacturing firms, particularly small and medium-sized enterprises, innovate.

II. Innovation Policy for ASEAN as a Whole

1. Formulate initiatives for promoting innovation with more cross-regional synergies and positive feedback across ASEAN Member States.
   - Innovation surveys and censuses for innovation infrastructures; databases and platforms for R&D findings and innovation for collaborative knowledge; and optimised coordination of R&D grants and subsidies, and education programmes.
   - Compare ASEAN Member States' innovation policies by introducing peer reviews.
2. Accelerate goods, investment, and services trade liberalisation.
   - Consider, in particular, further eliminating services trade restrictions in the ASEAN Framework Agreement on Services and the ASEAN Trade in Services Agreement.
3. Promote the freer movement of natural persons, especially of highly skilled immigrants.
   - Enhance the free movement of engineering service providers and make it easier for certified engineers in the mutual recognition agreement to work overseas.
   - Strengthen collaboration among ASEAN universities through harmonising their curricula and degrees to create new, university-based innovation.

INNOVATION POLICY IN ASEAN

Innovation Policy in ASEAN is a first attempt at a comprehensive innovation study of ASEAN. The book includes not only an overall theoretical framework for ASEAN, but also individual country analyses based on detailed data, empirics, case studies including both those of success and of failure, and concrete policy recommendations ranging from national to ASEAN-wide regional innovation policies. For ASEAN it is important not only to increase investment in R&D and innovative activities, but also to enhance innovation capability's physical and intangible characteristics, and improve the environment where innovation tends to take place. In the face of this significant challenge, achieving innovation can help each ASEAN Member State sophisticate its economies and industrial structures in the years to come. The book aims to provide insights for all stakeholders wishing to examine innovation policies in the region.

ERIA

Headquarters:
The ASEAN Secretariat
70A, Jalan Sisingamangaraja
South Jakarta 12110, Indonesia

Annex Office (Mailing Address):
Sentral Senayan II, 5th & 6th floor
Jalan Asia Afrika No. 8
Gelora Bung Karno, Senayan
Jakarta Pusat 10270, Indonesia

Website: www.eria.org