“Asian Challenge”

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Global innovation landscape has been undergoing a drastic transformation in the past decade. While traditional “Innovation Leaders” of the U.S., EU and Japan have maintained the leadership position in various measures of innovation, the new emerging economies, notably from Asia, have made remarkable progress. Are rising tigers, in particular, China, about to catch up with the traditional leaders? Will they overtake their positions, by capitalizing on their recent entry into the global playing field and the huge growth potential of their own domestic market and in the region? Are they still struggling with the absence of well established infrastructure and legal systems?

What are the main drivers behind the recent phenomenal emergence of these countries into the innovation space? Will these newcomers in the global innovation space be a competitor or collaborator against the established innovators such as the U.S., U.K. and Japan?

I would like to addresses these questions by describing the recent innovation landscape of the major Asian countries, identifying the reasons and key factors that underpin their success and rapid emergence. I will also explore the areas for the Netherlands to benefit from the policies and actions of the Asian innovative tigers and point out the areas for collaboration.

Innovation –the key to economic growth and sustainable society

There has been increasing consensus about the importance of innovation in the world, despite the severe financial crisis and persistently high unemployment rate still prevailing in the world at the end of 2010. It is well recognized that innovation is becoming critical both for the advanced economies such as U.S., EU and Japan, but also for the emerging economies, in Asia and Africa. In the face of the explosive population growth in the poverty-stricken regions, together with the scarcity of resources such as water, foodstuff, and energy, innovation is perceived to be the key to resolving the global agenda of economic growth and sustainable society. Compared with the regions such as Europe and North America, which have reached advanced economic stage, Asia is faced with the double challenge of achieving the rapid economic growth so that the growing population can enjoy higher standard of living, while maintaining the clean environment and making sure the limited materials and resources to fuel the growth

are utilized efficiently. It is no wonder that the governments in the region have come to perceive 'innovation' as one of the effective alternatives to resolve these two, sometimes conflicting, agendas. For emerging economies in Asia, and for the region, innovation will be a key to achieving a higher standard of living for the growing population and sustainable environment.

In addition to the science-based innovation usually associated with high technology areas such as ICT, electric vehicles and solar panels, the innovation for providing goods and services to the BOP (Base of the Economic Pyramid) market segment in the developing economies in Asia has caught attention of many multinational companies. Innovation in product design – such as the small package size of consumer goods to make them affordable, or delivery of product and services via mobile phone to overcome lack of infrastructure for market information – has stimulated the companies in the advanced economies to think of innovation from a slightly different perspective (sometimes called frugal innovation) from the traditional science based one. The possibility of reverse innovation has also become the topic for discussion.

Thus Asia is now an exciting region not only for its role of the growth engine of the world economy, but also as the test bed for new types of innovation and the emerging source of knowledge resources.

Innovation Landscape in Asia

For major countries in Asia, how do they compare, across a range of aspects of innovation, with the innovative countries? *Facts and Figures on Innovation "Asian Challenge"* prepared by EIM show results of recent surveys conducted by several organizations, focusing on several countries in Asia, as compared with the Netherlands. Let us examine how Asian tigers are ranked now against U.S. and EU, in particular, the Netherlands and Nordic countries which are ranked high on competitiveness rankings. I also examine how they have achieved their current status.

Though there are some differences in measures of innovation used for different survey, they almost all point out the following; While the traditional innovation leaders, such as Japan (as well as the U.S., Finland, and the Netherlands) have maintained the leadership position, Asian countries (such as China, India, Korea, and Singapore) have shown dramatic rise in ranking/positioning, by many measures.

Why is there such rapid progress in Asia and what are the drivers behind their rapid rise?

Drivers for rapid rise in Asia

1. Clearly stated government policy which declares innovation as strategic goal for the country and gives priority to science & technology as the effective vehicle to be competitive in today's inter-connected world. The government vision for the future and the ambitious goal to become an innovative country is reflected in the growth in investment in R & D, plus various incentives to encourage Science & Technology.
2. Focus in certain areas for innovation in order to penetrate the niche and to allocate limited resources effectively. Asian countries tend to focus on certain areas for innovation. Singapore has taken this approach for some time, as in the case of biomedical following IT, Korea in the area of IT, and China in the area of clean technology. The collaboration in the Northeast Asia, of Japan, Korea, and China has been promoted for clean technology, as the three countries have invested considerable resources in clean technology and seen the synergy that emerges from cooperation between the three countries.
3. Focus on higher education; in particular of scientists and engineers, as the governments realize that people will be the key driver to innovation over the long term. The focus in Science & Technology is well timed with greater interest in higher education in general along with wide access to higher education increasingly being given to people in the emerging economies. The trend towards scientists and engineers in other advanced economies, such as the U.S., EU and Japan, has diminished in recent years. On the other hand, in Asian countries, the enthusiasm for and belief (almost faith) in S & T as effective solution to resolve their issues has supported a rise in numbers of students enrolled in a science & engineering major. There has also been a sharp increase in those who seek educational opportunities abroad, in the countries known for high standard of education for S & T, notably the U.S and the UK.
4. Enhanced corporate effort to use innovation as competitive advantage, in growing and capturing both the domestic market and the Asian region. It is based upon the understanding that low cost of labor and of resources will not remain effective competitive advantage in the global competition.
5. Strong manufacturing base in the country has helped supporting the efforts for innovation. As is well known, China is the manufacturing powerhouse for the world in various fields. Korea and Japan are also known for the excellent manufacturing capabilities. Together with the rapidly growing domestic (in the case of China and India) and/or the regional (Asian) market potential, having the major parts of the value chain have contributed to the rapid rise of Asia, as innovation requires experiment and trial and error.This manufacturing base helps

ensure that innovation is refined, diffused quickly and rapidly put to application.

6. Regional and global perspectives and not just a focus on the domestic, from the early stages of economic development are also evident. This may be the outcome by necessity rather than a clear choice. Asian countries and companies are aware of the reality of global competition, a power shift from advanced economies to emerging economies, from suppliers to consumers, etc. and the opening of a variety of borders. As they come into the global playing field when the drastic changes are taking place, they are in good position to take an advantage of late comer status and start from the regional (Asia now being the economic growth engine of the world) and the global perspective. This is very different from the development pattern experienced by some countries such as Japan. The latter have applied and succeeded with the model that overseas expansion follows domestic market growth. The emerging economies can start from zero-base with the latest technology in information, communication and transportation.
7. Attempt at quickly shifting from "catch up" stage through technology licensing and dependence on multinational companies to "independent, self-sustaining" stage solely through innovation. Though the intent to go from "catch-up" mode to "innovative" mode is clear, the results are still mixed. In some areas such as clean technology, the Asian tigers seem to have tried to acquire "first mover advantage" by focusing heavily on certain area, while others may be more rhetoric than reality.
8. Public and private collaboration is more apparent among the Asian tigers, in particular, Korea and China, in bringing the fruits of innovation to the society at large and to overseas.

Innovation in Korea, China and Japan

Initiatives for Clean technology

Clean technology is one of the "hot" areas for innovation, as climate change, energy, etc. has become such a significant issue on the global agenda in the past several years. The investment in renewable energy and energy efficient technologies, for example, is estimated to reach US$450 billion in 2012 and US$600 billion in 2020 on the global scale. Many venture capital funds in Silicon Valley have focused their effort in clean tech ventures.

Asia, as the region for highest growth potential with population growth and the rapid growth of industries with energy and resource requirement of considerable magnitude, is faced with the overwhelming challenge of attaining economic growth and clean environment.

In this context, Japan, Korea and China all plan to allocate heavy investment to clean technology (in terms of $ and %of GDP). The governments' policy initiatives to offer various incentives such as support for infrastructure, R & D, tax incentives for the private sector as well as government purchasing has been remarkable. Though the U.S. and EU, traditional innovator and investor, invest more now, the future plan by the three governments clearly surpasses that of the U.S. and EU. Three governments in Asia will invest a total of US$509 billion in clean technology (solar, wind, nuclear power, energy efficiency, advanced vehicles, high speed rail and carbon capture and sequestration) in 2009-2013 (vs. US$172 billion for the U.S.)

In the manufacturing capabilities of clean technologies, the three countries have gained quite a foothold in the global boom for the infrastructure build-up. In solar PV, wind, and nuclear power, three countries have built a solid base. For example, they all have their own domestic nuclear reactor designs. Plug-in hybrid and EVs and batteries which power them are also more advanced in Asia, as 80% of world's lithium-ion batteries are made by the three countries.

Three-way collaboration has begun since the tri-lateral summit held in Fukuoka, Japan in December 2008. The objective was to set up a mechanism for dialogue among the three governments for the regional stability and peace, as well as development of the world, and the region through the use of technology and innovation as part of foreign diplomacy. With the current tension in the Korean peninsula, the future prospect of the summit remains uncertain, as most attention has been given to the North Korea.

Korea

Korea's initiative in innovation is characterized by top-down approach with clear strategic direction by the government, and for its speed. The financial crisis the country underwent (and survived with the support of IMF several years ago) dealt a severe blow to the Korean economy. Many managers were laid off from the companies in the conglomerate groups in order for the companies to survive. The outcome was an unforeseen one: those who were laid off created a vibrant entrepreneurial community. As these people have considerable experience of working for the large conglomerates, understanding innovation and importance of creating marketable products, and of targeting the world market, thus the start-ups and ventures they created had commercial and global perspectives from the beginning. This phenomenon is found at various levels of company sizes.

Korea is very well known for the advanced state of its IT, as it is often called "the most

wired" country. In addition to IT, they have made low-carbon green-growth (LCGG) as a new national development paradigm as announced by the President Lee Myng-bak in 2008, followed by a "Green New Deal Project" announced in 2009 which combines green growth strategy with a job creation. Though some criticize the definition of "green", their initiatives in clean technologies have begun to bear fruit. With the dedicated effort by the President Lee Myung-bak, ex-business leader, and the government, they secured the nuclear power plant contract in UAE against powerful global competitors such as France and Japan. This example indicates their commitment to make Science & Technology their core national strategy and make the world aware of their technological capability.

As for the private sector, Korean companies are known for bold actions, as it is well reflected in the huge investment in semiconductor and in their concentrated effort to build their brand. Samsung, for example, is now one of the most profitable electronic companies in the world with the profit greater than all of the once-dominant Japanese electronics manufacturers combined. The company has also attained the leadership position in the global brand awareness. Their speedy action in developing "cool" tablet PC is just one example of their capability not only in technology development but also in design and concept creation.

Efforts by Korean companies to penetrate India have been well known.

China

China has been very active in recent years in its efforts to promote innovation, as Premier Wen Jiabao is committed to make China an innovation-driven economy. In terms of the input for innovation, the heavy investment in R & D and its rapid growth reflects their dedication to make innovation a strategic national priority. Push for patent by the government, and various policies including R & D tax deductions and other incentives, have made China the country with the biggest growth in innovative capacity and ability for knowledge creation over the past decade. Not only the government, but also the sustained level of investment for R & D by the companies such as Huawei and ZTE, shows the commitment to make innovation their first priority, even in 2008 financial crisis..

China's growth in human resources in Science & Technology as is reflected in the dramatic increase in the number of university graduates, doctoral degrees in both natural science and engineering indicates the scale of their ambition.

China has attracted a large amount of R & D investment by foreign companies. The number of European, Japanese and U.S. companies setting up R & D centers in China

has been increasing, making China as one of the most attractive locations for foreign corporate R & D activities. The recent years have seen some shift from local adaptive R & D to global R& D.

In terms of the output of innovation, the number of Chinese academic publications has increased from the 13th place in the mid 1990s to the second place – a pattern which is echoed also in the number of patent filings. Though there is some question of the quality of patents, the growth in sheer number of patent application is notable and there has been a shift from agriculture to high tech. China has become a large exporter of high technology products, accounting for 29% of its total exports in 2007.

China's strategy for science and technology for the period until 2020 presented in 2006, indicates its ambitious goal around "independent innovation"

-By increasing R & D expenditure as % of GDP to 2.5% by 2020, while GDP is set to grow fourfold.

-By reducing foreign technology

-By making companies as key players, in particular small and medium sized companies through the introduction of tax incentives and other policy measures.

China endorsed as a basis for its long-term sustainable development strategy, the concept of a "green and low carbon economy" in 2009. China's challenge is quite complex in that it needs to transform policy framework, economic and energy structure, while low carbon technology and low carbon industries are developed.

Various figures such as the investment in clean energy, patent owner of energy technologies(wind, solar PV, biomass, CSP, cleaner coal and carbon capture), patent filling locations, show China's determination to achieve both rapid economic growth (including poverty reduction) and low carbon development. For example, China led the world clean energy investment in 2009 for the first time and became the second after the U.S. in installed capacity for clean energy.

Some of the challenges facing China in innovation include:

R & D expenditure as a share of value added is low.

Business expenditure on R & D done in large SOEs.

Research still remains more for application research & development rather than for basic research.

Dramatic increase of students vs. stagnating public funding for education

Leading to inequality in terms of access, and quality of education

Academic corruption a problem

Mismatch between the education by Chinese universities and skills required
High unemployment with shortage of high skilled labor (employability)
Manufacturing base is still based on assembly

Japan

Japan has been known for strong innovative capacity for some time. The country is ranked high in terms of corporate R & D spending, firm-level technology adoption, capacity for innovation as well as innovation infrastructure such as availability of scientists and engineers and utility patents per million population. Japan has the largest number of Nobel Laureates (15 in total, 13 in science and technology) in Asia.

Without endowment of natural resources, Science & Technology has been recognized as the key to Japan's sustainable growth. Thus various policy initiatives have been in place by the government, including: the five-year Basic Science & Technology plan (1996-2001, 2001-2006,2006-2011) developed by the Council for Science & Technology Policy(established since 2001) at the Cabinet Office; and Innovation 25, a long-term strategic plan to make Japan one of the most innovative countries by 2025. Cluster policy initiatives have been underway since 2001. Some criticisms include that the innovation policies have focused too much on research without enough attention to development and commercialization; and also the lack of follow-up activities to evaluate the outcome.

The new administration by the Democratic Party of Japan has included green and life innovation as key elements of their New Growth Strategy in 2010. It is based upon the strength of energy/environment related technologies and robotics of the Japanese companies. These, together with the rapidly aging population, can serve as a "lead market" for innovation in the world. Despite its slogan of sustaining the leadership in science & technology and focusing on environment and life technologies, the policies have been fragmented and lack scale and speed found in other Asian tigers. The attempts to translate advanced technologies in solar, navigation, and water have not achieved the expected outcome. Many point out the absence of clear vision required to bring tangible value to the society and the lack of coordination capability.

The business investment of R & D has been high at some 80% of the total. Many Japanese companies such as Toyota, Honda, Sony and Nintendo were known in the past for great product and process innovations. However, low growth during the "Lost Decade" and global financial crisis in 2008 has hurt some companies as they cut R & D investment. It remains to be seen how innovative the well known companies continue to be. Some niche players with innovative strategy are identified, thought probably not

as well known globally as the companies mentioned above.

As is clearly seen in the case of mobile phone and car navigation system, the Japanese market which used to lead the world market has become "isolated" and has developed in a different way from the rest of the world. The companies, drawn by the large size of the market (though not growing) and demanding customers with technological savvy have focused too much on meeting the "specialized" needs of the Japanese market. The intense competition in the domestic market against other Japanese companies has exhausted their resources and the attempts at developing global de-facto standard have failed.

The desire for long term relationships and labor practices has made the innovation in private sector more "closed" than open. It has made collaborative effort within the industry, across national boundaries and with government and/or academic more difficult. One of the results has been the lack of effort and capability to set the open standard and to foster open innovation.

Japan has been known for low level of incoming investment at some 4% of GDP in 2008. Though the country used to attract many R & D centers of the multinational companies, there have been several cases in the last few years of well known companies closing their Japan-based R & D centers.(Merck in 2006, Glaxo SmithKline, Bauer, Pfizer, TI to name a few.)

Some Japanese companies such as Panasonic and Komatsu have begun efforts to penetrate BOP market in Asia, but their move has been much slower than that of others, for example the Koreans.

As for the future of innovation, the sharp decrease in number of young researchers spending time overseas, and of the number of exchange students in recent years, has become topic of debate. This is because it is recognized that human capital is the critical ingredient for innovation in the long term.

Compared with the scale and speed of the policies and initiatives placed by other Asian tigers, such as Korea and China, Japan seems not to feel the inter-connectedness of the world and the intensity of global competition for talent in science and engineering.

Despite these challenges, Japanese companies are still known for their energy and environment related technologies, which offers some potential for the collaboration.

Implications for the Netherlands

What are the implications of the Asian challenge for the Netherlands and what should the Netherlands do to capitalize on the surge of innovation in Asia?

1. Have a solid understanding the role Asian region will play in the world economy and

innovation. Keep up with the changing status of the innovation of the Asian tigers. Their pace of development and the ever changing nature of their political and institutional landscape, as well as complex relationship between the government and the private sector, warrant constant watch. It is critical to have the most up to date knowledge of the state of the region, both in public and private sectors, as it is changing so fast.

2. Develop a comprehensive, proactive and integrated strategy for the region to tap into the great potential for collaboration in science & technology and innovation, in particular the fields of energy, climate change and environment. In this field, Japan, Korea and China have become significant players and have collaborated as well as competed. The potential for collaboration between the Netherlands and the area outweighs the threat of competition. The fields of energy, climate and environment are expected to play a significant role for the global economic recovery and to provide growth opportunities. The Netherlands and the EU have extensive experience in clean energy innovation and are in a position to set up a win-win relationship with Asia. The lessons learned by the Netherlands and EU will help Asian tigers to better face the challenge of accommodating rapidly growing regional markets with accelerating need for energy etc. It will provide mutually beneficial opportunities for both regions.
3. Open innovation is the mandate of today. No countries or companies are able to continue innovation if they depend solely on the resources within. In order to make the best of open innovation, we need to be open to sources of new ideas, emergence of new technology, and above all, to people with brilliant minds. Asia may be far and distant for the Netherlands, but it is becoming the “hot” spot for innovation. Ensure that Asia is included as a part of your open innovation ecosystem.
4. Increase the talent mobility. People are the critical resource for innovation in the long run. There is a mismatch between the jobs and talent of high skills. Physical distance is still a hurdle, and yet, the growth of high tech clusters in China and India, combining the assets and market potential in the local network and global network with Silicon Valley, shows that people are the key to connect the clusters. The need for talent mobility as an effective means to resolve mismatch between the job and the talent of high skills will intensify in not only the advanced countries, but countries such as China and Korea due to fast aging population.

   Talent mobility can be accomplished by several ways. One is to attract Asian companies to locate their R & D center in the Netherlands and to encourage Dutch companies (particularly the SMEs) to locate R & D center in the region.

In the future, student exchange will play a significant role, and thus two-way flow between the Asian region and the Netherlands can be pursued.

5. Political commitment is necessary to ensure the foundation for collaboration is based upon trust. As there is a consensus that issue of environment and energy requires global and multidimensional collaboration, research and innovation can serve as a mechanism for dialogue and for diffusing and scaling up the technological solutions at the global level.
6. Another area for collaboration is the setting of global de facto standard. Partly because of the recent push for innovation by Asian tigers and of the absence of initiative from Japan, we see relatively few standards in key areas originating from the region. EU is well known for collaborative action to set standards in various high tech areas. Involving Asian tigers in the process of standard setting will ensure that the world becomes a positive-sum game and not a zero sum game.
7. Last, but not least, the timing and speed of innovation has become critical in today's world. Strategic window for opportunities will not be open for long. It is time for the Netherlands to take action. Analyzing data and understanding the trend from afar is important, and yet, in the inter-connected world where no country or sector is free from the impact of actions so far, you need to be there and find out yourself what is happening. You need to act sooner rather than later in the 21st century when information becomes available throughout the world in a matter of seconds rather than weeks.