

TECHNOLOGY PARKS OF INDONESIA, MALAYSIA, AND SINGAPORE: A CRITICAL DISCOURSE

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Graphical Abstract



Abstract

The emergence of global scale competition is leading towards the development of new mechanisms to help countries to become more competitive and technology parks are the vehicle of choice to achieve that. Technology Parks offer modern infrastructure and integrated info-structure to promote research and technology development and commercialization for wealth creation and sustainable economic growth and Global Competitiveness. This paper discusses the position of technology parks in East Asia; elaborates on their role in today's nation development, analytically examines three selected technology parks in Indonesia, Malaysia, and Singapore using GCI Index 2015 and concludes that Technology parks have contributed to gross domestic product (GDP) growth, infrastructure development, knowledge community expansion, capacity building, and export production and distribution. However, optimum benefits of Technology Parks accrue when they are established and managed professionally in line with the best practices and all transactions are equitable, just, and transparent; the whole process must culminate trust nationally and internationally.

Keywords: Economic growth, industrial clusters, knowledge economy, technology parks.

Abstrak

Kemunculan persaingan berskala global ke arah pembentukan satu mekanisma baru untuk membantu negara menjadi lebih kompetitif, maka Taman teknologi akan menjadi satu wadah bagi mencapai maksud tersebut. Taman teknologi menyediakan infrastruktur moden dan struktur-maklumat berintegrasi bagi menggalakkan penyelidikan dan pembangunan teknologi serta penjana kekayaan melalui perkomersialan dan pertumbuhan ekonomi lestari, dan Daya Saing Global. Kertas ini membincangkan tentang kedudukan taman teknologi di Asia Timur; menerangkan peranannya dalam pembangunan negara. Selanjutnya kertas ini melaksanakan analisis secara kritikal tiga Taman teknologi terpilih di Indonesia, Malaysia dan Singapura dengan menggunakan indeks GCI 2015. Satu rumusan dibuat bahawa Taman teknologi telah menyumbang kepada pertumbuhan KDNK, pembangunan infrastruktur, pengembangan komuniti berpengetahuan, pembangunan kapasiti, dan pengagihan serta pengeluaran eksport. Walaubagaimanapun, manfaat optimum dari Taman teknologi diraih apabila ianya diwujudkan dengan diurus secara profesional selari dengan amalan terbaik dan segala transaksi dilaksanakan secara saksama, adil dan telus; secara keseluruhannya proses tersebut perlu berpaksikan timbal balik kepercayaan ditahap kebangsaan dan antarabangsa.

Katakunci: Pertumbuhan ekonomi, klaster industri, ekonomi pengetahuan, taman teknologi

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1.0 INTRODUCTION

Technology Parks are physical foundations which are designed and built for the development of knowledge-based institutions. They concentrate research and information capabilities of government, private institutions and universities in one location. Technology parks also gather some of the facilities with high values work-place and high standards for corporations interested in participation at Technology Parks. Most literature on technology parks agree that science and technological parks are originally derived from the ideas of Stanford University which later on grew as successful Silicon Valley which was established in USA during 1950s. They also agree that Silicon Valley is the first successful model for science and technological parks [1].

The idea that geographical concentration generates externalities through localization and agglomeration dates back to Marshall [2]; he was one of the first economists to deal with the concept of cluster. In giving the definition of industrial cluster, Huggins [3] includes: The geographic or spatial clustering of economic activity; Horizontal and vertical relationship between industry sector; Use of common technology; Presence of a central anchor large firm or research Centre; and The quality of the firm network, or firm network cooperation.

The clustering of high-technology firms and the synergies it creates among various institutions in the cluster is a defining characteristic of Silicon Valley and Route 128 in the U.S. Observers have noted that such concentration of innovative firms and individuals in a region helps to create an entrepreneurial and innovative culture that breeds a continuous stream of innovations in an environment of information sharing and knowledge spillover, both across firms and between firms and academic institutions, often via informal channels [4].

Technology parks from the three countries, Indonesia, Malaysia and Singapore, were selected on account of their disproportionate performance. Despite the countries, the parks are located in, are close neighbours, share cultural similarities, common frames of reference in history, and started their journey after independence almost in the similar circumstances [5].

2.0 TECHNOLOGY PARKS DEFINED

The definition of technology parks differs almost as widely as the individual parks themselves. The United Kingdom Science Park Association (UKSPA) defines the park as a business support and technology transfer initiative that encourages and supports the start-up and incubation of innovation-led, high-growth, knowledge-based institutions. It provides an environment where larger and international businesses can develop specific and close interactions with a particular centre of knowledge

creation for their mutual benefit. Also, it has formal and operational links with centres of knowledge creation such as universities, higher education institutes and research organizations.

The Department of Town and Country Planning, Peninsular Malaysia defines the technology park [6] as an exclusive real estate development which encourages the formation and growth of the commercial and industry sectors based on knowledge, encourages the transfer of high technologies and skills to the organisations while having formal and close links to universities, institutes of higher learning and research institutes. They have formal and operational links with a university or other higher education institution or major center of research; are designed to encourage the formation and growth of knowledge-based businesses and other organizations normally resident on site; and have a management function that is actively engaged in the transfer of technology and business skills to the organizations on site.

3.0 THE INFRASTRUCTURE IN TECHNOLOGY PARKS

Technology Parks offer modern infrastructure and integrated info-structure to promote research and technology development and commercialization for wealth creation and sustainable economic growth. The synergy between and among high tech firms can be generated through the structural elements provided by the incubator such as infrastructure and supporting facilities. Generally, these services are divided into basic structural support and technology-specific structural support.

The role of the parks is to create and fuse the necessary links amongst persons getting together for the purpose of exploiting idea's potential. There are three functional components in the technology parks which are; park, incubator, and higher education institute. 'Park' refers to development of the property that enables new technology based firms to engage in R&D that enables R&D-related facilities to be located in the vicinity and 'Incubator' refers to the provision of business services for those who aim to start or have established new technology based firms; however, it does not refer to physical arrangements such as shared offices. High education institute refers to the site location of research facilities or liaison offices of high education institutes or the presence of a partnership with higher education institutes [6].

A 2013 study on technology parks in Malaysia by Abdullah *et al.*, [6] highlighted nine criteria that appeal to invite the companies to operate in the technology parks. Those are: Provide pooling resources (staff training, marketing event and exhibition); Provide consulting/counselling services; Assist in reducing cost; Assist in funding; Provide sharing resources (laboratory, testing equipment,

meeting rooms, etc.); Facilitate in creating good image; Facilitate in creating networking; Present advantages of clustering; and Present advantages of geographical proximity.

Abdullah *et al.* [6] found that from the perspective of the industrial tenants, clustering and geographic proximity is highly important because being located at the high-tech park provides the companies with proximity to a good pool of readily available skilled and semi-skilled human resource for their operations. This really means that the work force around this location is accustomed to working in, as well as having sufficient knowledge and skills in, the technology industry. Besides, a study by Abidin *et al.* [7] found that the services provided by the technology park are essential in supporting and enhancing the development of the companies' social capital which is an important resource gained by social relationships with other human beings and organizations. The central intention of social capital is network of relationships which are valuable resource for the individual or organization. Technology parks in Indonesia, Malaysia, and Singapore are discussed in the following section.

4.0 TECHNOLOGY PARKS IN INDONESIA, MALAYSIA, AND SINGAPORE

4.1 Indonesia

Bandung High Tech Valley (BHTV) is an initiative to foster technology-based business and industries in Bandung region; it aims to be the Silicon Valley of Indonesia. The BHTV initiative originated from Ministry of Industry and Trade of Indonesia as a mean to increase electronics export. It started in 1986, but was abandoned when Indonesia faced economy crisis in 1997. Later, it was restarted by some people in Institut Teknologi Bandung. In 2004, there was a BHTV expo, in which 70 companies, mostly IT, participated. On February 10, 2006, BHTV Foundation was legally laid by four ITB faculty members to further oversee the development of BHTV as shown in Figure 1.



Figure 1 Bandung Techno Park Indonesia

Bandung is chosen for the project because it has been known to have research and education centers in technology and science through Institut Teknologi Bandung, founded during the Dutch East Indies period in 1920. In the course of time, graduated students and researchers from the university have contributed into the development in several technology-based companies located in Bandung. That includes PT Telkom (telecommunication company; the headquarters and research centre), PT Inti (electronics and telecommunication manufacturer), LEN (National Electronic Institute), Omedata (IC bonding and packaging), PT Dirgantara Indonesia (formerly IPTN, the only aircraft industry in Indonesia), PT Kereta Api Indonesia (state-owned railroad and train production company) and several small local companies. In the early 1980's Indonesia decaded four of universities to be "centre of excellence" and gave them particular financial support. The results were not convincing. Only isolated competence centres were established and they were not adequately networked with other knowledge and production hubs. Knowledge clusters were not created [8].

4.2 Malaysia

Technology Park Malaysia (TPM) was incorporated in 1996, and since has achieved a turnover of RM 6.3 billion to date; created employment opportunities for over 9,000 professionals and has helped increase the Malaysia's economy GDP by a healthy 1.2% [9]. Figure 2 shows the Cyberjaya Technology Park of Malaysia.



Figure 2 Cyberjaya Technology Park of Malaysia

Cyberjaya is the first and the biggest ICT based city in Malaysia and is part of the Multimedia Super Corridor Malaysia. It was conceptualised as a model intelligent city and designed to attract world class multimedia and ICT companies. In addition to attracting the best and the biggest ICT companies in the world, the city was expected to create an atmosphere conducive to the promotion of creativity and innovation, similar to Silicon Valley in the USA

[10]. Administratively, the city is located in the State of Selangor; the most populated and developed state in Malaysia. Cyberjaya is located next to Putrajaya and linked to Kuala Lumpur International Airport (KLIA) and Shah Alam, the State capital. The city is also connected to major highways which allow accessibility to key economic centres in the Kelang Valley. It covers an area of 7,000 acres and is expected to cater to 210,000 people once it is fully developed [11]. Currently, there are three higher learning institutions located in the city, the largest being the Multimedia University (MMU), followed by Limkokwing University of Creative Technology (LUCT) and Cyberjaya University College of Medical Sciences (CUCMS). At present, several multinational companies in the ICT business are present in Cyberjaya, such as Dell, IBM, AT&T, NTT, Ericsson, Fujitsu and Satyam as well as local brand names such as Telekom Malaysia and MEASAT.

4.3 Singapore

The Singapore Science Park is shown in Figure 3, it is the definitive address for R&D. Home to more than 350 MNCs, local companies and national institutions; its lushly landscaped grounds create the ideal ambience and working environment for an exclusive community of over 9,000 researchers, engineers and support staff. The outstanding building quality is complemented by excellent lifestyle amenities, business support facilities and vibrant activities that offer optimal networking opportunities for the top names in technology. Strategically located along Singapore's "Technology Corridor", the park is in close proximity to research and tertiary institutions such as the National University of Singapore (NUS), National University Hospital (NUH) and one-north, Singapore's biomedical R&D hub. Many leading corporations across a wide range of industries have chosen the Science Park as their home for R&D activities. The Singapore Science Park offers research and IT space, catering to disciplines such as: Biomedical sciences; Information technology; Software development; Telecommunications; Electronics; Food technology; Flavours and fragrances; Materials and chemical and many more.



Figure 3 Capricorn Building Science Park Singapore

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Singapore Science Park was set up by the Government to provide a focal point for research, development and innovation as an integrated complex and the various types of services which are necessary for the development and operation of enterprises and their employees. These science parks have two objectives which aim to attract foreign corporations and also to provide an environment in which R&D-intensive national firms can grow. The mission of the Singapore Science Park is to create total business environment that inspires people to excel.

Science Park I was set up in 1980. Then, the nearby Science Park II followed. These parks were used to help in establishing Singapore's ICT sector. A lot of tenants are attracted to Science Parks I and II including; Sony, Silicon Graphics, Det Norske Veritas, Fuji Xerox Asia Pacific, Lucent Technologies, as well as Singapore's Productivity Standards Board and the IDA. About half of the tenants are foreign corporations. The Singapore Science Park is professionally run by 'Ascendas' and is the definitive address for R&D in Asia.

5.0 DISCUSSION

It has been obvious for a long time that knowledge has become an essential development factor, if not the most important one of all. In a knowledge economy, the creation of wealth from immaterial production (services, computer assisted production, etc.) exceeds that from material production (manufacturing). Since late 1990s, it has been debated how to bridge the digital divide, both at national and the international levels. It mostly boils down to development strategies that supposedly

allow countries to “catch up”: developing countries should emulate the developed knowledge societies, ensure computer literacy, technical infrastructures and facilities, and increase the number of higher education graduates in each age group. What is needed, as a step forward, is a strategy that is directed at several things, namely: Knowledge hubs, computer centres and centres of excellence; Knowledge clusters, “Learning Regions” that bolster innovation driven economic activities; Transfer of knowledge through global production networks; and the use of competitive advantages of local knowledge. Technology Parks play a key role in implementing the aforesaid strategies. Economic research emphasizes the close inter-connectedness of Innovation, local economic growth and Cluster formation. “Clusters” are regional concentrations of companies, manufacturing subsidiaries, research institutions, universities and other institutions which are connected with knowledge utilization and production. What is important is the diversity of the players involved. They may complement one another, be in competition, or cooperate. Research on Asian knowledge cities such as Singapore has demonstrated the relevance of these structures. Geographical clustering without knowledge sharing tends to reduce the effectiveness of knowledge production and knowledge output [12, 13]. One of the crucial elements of a knowledge city or cluster is the existence of knowledge-based organisation and the knowledge flow in the city [8, 14]. However, although knowledge flow is fundamental to the growth of knowledge cities, they must avoid the ‘knowledge trap’ in which they merely become users or copiers rather than creators [10]. Worst, the long-term consequence will be the country becoming a victim of the middle-income trap [15].

5.1 Innovation-Driven Economies

Characteristic of innovation-driven economies is their resilience to external shocks and the ability of their businesses to produce new and unique products and services. Such economies can produce innovative products and services at the cutting-edge technology which represents the dominant source of their competitive advantage. Those countries with cutting edge technological capabilities, such as USA, Germany, Japan, UK, Finland and Denmark, are regarded as leaders at the edge of the global technological frontier and are often the wealthiest nations. Within the Asian region, Korea, Taiwan, and Singapore are countries recognised as being at the innovation-driven stage at par with advanced industrialised countries of the world.

The impact of innovation results in quantum leaps of value creation. Developed countries tend to leverage on the strategic role of innovation as a means of generating new business ideas that will enhance their competitiveness in the long term and ultimately lead to increase in standard of living. Evidence shows that countries at the innovation-

driven stage record higher GDP per capita: USA (\$47,572), Switzerland (\$46,739) and Singapore (\$36,898) - three times higher than Malaysia at \$ 15,168. These countries possess high innovative capacities for generating new products and services, and thus are ranked among the top 5 most progressive countries. Malaysia is currently placing emphasis on innovation so as to further strengthen the competitiveness of its economy as it moves forward on its journey towards becoming an innovation-driven economy; for this Malaysia could benchmark Singapore’s performance.

5.2 Competitiveness Continuum

Global Competitive Index (GCI) has been used for critical analysis of the three technology parks. GCI is an acceptable criterion on the performance of countries in which technology parks play a crucial role. GCI report assesses the competitiveness landscape of 144 economies, providing insight into the drivers of their productivity and prosperity. The report remains the most comprehensive assessment of national competitiveness worldwide, providing a platform for dialogue between government, business and civil society about the actions required to improve economic prosperity. Competitiveness is defined as the set of institutions, policies and factors that determine the level of productivity of a country. The level of productivity, in turn, sets the level of prosperity that can be earned by an economy. The different aspects of competitiveness are captured in 12 pillars, which compose the Global Competitiveness Index; 35th edition (2014-2015) emphasizes innovation and skills as the key drivers of economic growth [15].

Innovation, the final pillar of competitiveness focuses on technological innovation. Although substantial gains can be obtained by improving institutions, building infrastructure, reducing macroeconomic instability, or improving human capital, all these factors eventually run into diminishing returns. The same is true for the efficiency of the labor, financial, and goods markets. In the long run, standards of living can be largely enhanced by technological innovation. Technological breakthroughs have been at the basis of many of the productivity gains that our economies have historically experienced. Innovation is particularly important for economies as they approach the frontiers of knowledge, and the possibility of generating more value by merely integrating and adapting exogenous technologies tends to disappear.

Firms in the countries, at the innovation stage, must design and develop cutting-edge products and processes to maintain a competitive edge and move toward even higher value-added activities. This progression requires an environment that is conducive to innovative activity and supported by both the public and the private sectors. In particular, it means sufficient investment in research and

development (R&D), especially by the private sector; the presence of high-quality scientific research institutions that can generate the basic knowledge needed to build the new technologies housed in 'Technology Parks'. Technology parks spur innovation and job creation; a catalyst for economic growth. They facilitate extensive collaboration in research and technological developments between universities and industry; and the protection of intellectual property, in addition to high levels of competition and access to venture capital and financing that are analysed in other pillars of the Index. In light of the recent sluggish recovery and rising fiscal pressures faced by advanced economies, it is important that public and private sectors resist pressures to cut back on the R&D spending that will be so critical for sustainable growth into the future [15].

5.3 Professional Tech Park Management

Considering the disproportionate performance of the three countries' technology parks by comparing the GCI 2015 index and the GDP difference one is impelled to surmise that the performance of the technology parks is playing a key role in the economic growth of the respective countries. The common thread that runs through the outstanding performance of the technology parks of the leading south Asian economies is the professional management of these entities. Some of the best performing technology parks in East Asia are managed by Ascendas including: The International Tech Park, Bangalore, India; Singapore Science Park, Singapore; and Dalian IT Park, China. Ascendas provides a complete real estate needs, from planning, development, management to ownership. Based in Singapore, Ascendas is Asia's leading provider of business space solutions; it serves a global clientele of over 2,400 customers in 26 cities across 10 countries including Singapore, China, and India. Malaysian Technology parks are not managed by professional park management companies and, consequently, the dismal performance of Malaysian technology parks is evident. Three of the selected countries are discussed in the next paragraphs.

5.4 Singapore

According to 'The Global Competitiveness Index 2014–2015' Singapore ranks 2nd overall for the fourth consecutive year (Figure: 4), owing to an outstanding and stable performance across all the dimensions of the GCI. Again this year, Singapore is the only economy to feature in the top 3 in seven out of the 12 pillars; it also appears in the top 10 of two other pillars.

The top 10 most competitive global economies



Country	Global rank*
Switzerland	1
Singapore	2
United States	3
Germany	4
Netherlands	5
Japan	6
Hong Kong SAR	7
Finland	8
Sweden	9
United Kingdom	10

Source: The Global Competitiveness Report 2015-2016
* 2015-2016 rank out of 140 economies

Figure 4 The Global Competitiveness Index 2016

Singapore tops the goods market efficiency pillar and places 2nd in the labor market efficiency and financial market development pillars. Furthermore, the city-state boasts one of the world's best institutional frameworks (3rd), even though it loses the top spot to New Zealand in that category of the Index. Singapore possesses world-class infrastructure (2nd), with excellent roads, ports, and air transport facilities and state of the art technology parks (Figure: 5).

Infrastructure Top 10	
The Global Competitiveness Index 2014-2015	Global rank*
Hong Kong SAR	1
Singapore	2
United Arab Emirates	3
Netherlands	4
Switzerland	5
Japan	6
Germany	7
France	8
Spain	9
United Kingdom	10

Source: The Global Competitiveness Report 2014-2015
Note: * 2014-2015 rank out of 144 economies

Figure 5 Infrastructure GCI 2015

Its economy can also rely on a sound macroeconomic environment and fiscal management (15th)—its budget surplus amounted to 6.9 percent of GDP in 2013. Singapore's competitiveness is further enhanced by its strong focus on education, which has translated into a steady improvement of its ranking in the higher education and training pillar, where it comes in 2nd, behind Finland (Figure: 6).

Higher Education & Training Top 10	
The Global Competitiveness Index 2014-2015	Global rank*
Finland	1
Singapore	2
Netherlands	3
Switzerland	4
Belgium	5
United Arab Emirates	6
United States	7
Norway	8
New Zealand	9
Denmark	10

Source: The Global Competitiveness Report 2014-2015
Note: * 2014-2015 rank out of 144 economies

Figure 6 Higher Education & Training GCI 2015

Singapore's private sector is also fairly sophisticated (19th) and becoming more innovative (9th), although room for improvement exists in both areas, especially as these are the keys to Singapore's future prosperity. Singapore technology parks are operated by Ascendas that have contributed tremendously in Seaport's growth over the years and, consequently, added to the growth of Singapore's economy.

However, challenges faced by individual countries vary distinctively; for clarity case of two countries, Indonesia and Malaysia are elaborated on [15].

5.5 Indonesia

Up four notches to 34th place, Indonesia, Southeast Asia's largest country, continues its progression in the overall rankings. This improvement in competitiveness will probably contribute to sustaining the country's impressive momentum—its GDP grew by 5.8 percent annually since 2004—under the new leadership. However, Indonesia's overall performance remains uneven. Infrastructure and connectivity continue to improve: up five places from last year and 20 places since 2011, Indonesia now ranks 56th in the related GCI pillar. The quality of public and private governance is strengthening; Indonesia is up 14 places to 53rd as a result of improvement in 18 of the 21 indicators composing this pillar. In particular, Indonesia ranks a remarkable 36th place for government efficiency [15]. Corruption remains prevalent (87th) but has been receding for several years. The macroeconomic situation deteriorated between 2012 and 2013 on the back of a higher deficit, but remains satisfactory (34th, down eight). The situation of its labor market (110th, down seven) remains by far the weakest aspect, owing to rigidities in terms of wage setting and hiring and firing procedures—for instance, the World Bank estimates that, on average, the cost associated with making a worker redundant is equivalent to 58 weeks of salary (139th). Furthermore, the participation of women in

the workforce remains low (112th). Another area of concern is public health (99th). The incidence of communicable diseases and the infant mortality rate are among the highest outside sub-Saharan Africa. Turning to the more sophisticated drivers of competitiveness, Indonesia's technological readiness is lagging (77th). In particular, the use of ICTs by the population at large remains comparatively low (94th, down 10).

According to the Global Competitive Index report 2014-2015, Indonesia is part of group countries that are in the efficiency-driven stage, countries whose economies are based on the efficient production processes. In the report, it is also stated that Indonesian position is moving up from rank 38 in 2013-2014 to 34 in 2014-2015 (Table: 1).

Table 1 Global Competitiveness Index (GCI) of three ASEAN Countries

Country	GCI 2013-2014	GCI 2014-2015
	Rank	Rank
Singapore	2	2
Malaysia	24	20
Indonesia	38	34

Source: World Economic Forum.
www.weforum.org/GCR (2015)

Moving to pillar of innovation, Indonesia ranked quite high and improved from the 33rd position in 2013-2014 to 31st position in 2014-2015 (Table: 2).

Table 2 Innovation Pillar of three ASEAN Countries

Country	GCI 2013-2014	GCI 2014-2015
	Rank	Rank
Singapore	9	9
Malaysia	25	21
Indonesia	33	31

Source: World Economic Forum.
www.weforum.org/GCR (2015)

Innovation Pillar is an indicator that shows the ability of a nation to innovate technology in order to improve the living standards of the people. Considering these figures, Indonesia is a country with great innovation ability; however its utility is still weak. Hence, its challenge is about how to bridge the high innovation capacity on one hand with the efforts of utilization on the other hand. Collaboration and synergy among researchers, engineers and academics as a technology provider with businesses sector as users of technology in developing competitive products, is becoming the key in improving the competitiveness of the national economy. To build the collaboration, interaction between the two sides - providers/technology developers and users of technology should be strengthened [15].

Apart from the weak aspect in utilizing R&D results, there are also some critical problems that need to be addressed soon by the government. Though the share of manufacturing industries in Indonesia reached 47 % of GDP in 2013, issue of relatively low contribution of S&T to the national economy (only 7 % of export contributed by high tech products in 2013) needs to be resolved. R&D Expenditure as percentage of GDP, last measured in 2009 was 0.08 %; R&D Investment from public compared to private is 70:30; Indonesia has 2638 universities, but mostly are "teaching" universities instead of "research" or "entrepreneur" university; Relatively low innovation collaboration; Government's R & D Institution and university are not being source of innovation for industries; and Industrial innovation is still limited, especially in food and beverages industry [8]. The improvement of human capital mastering science and technology is highly needed when Indonesia enters into the innovation-driven economies stage. To achieve that goal, Indonesia's National Innovation Committee (KIN) formulated the concept "1-747 innovation initiative" to increase productivities: 1 % of GDP for R&D, 7 steps of innovation system improvement, 4 models of economic growth acceleration, and 7 objectives of Indonesia's vision 2025. This innovation initiative as a key driver in the transformation to innovation-based economic (IBE) system by strengthening the education system (human capital) and technological readiness; one of seven steps is to improve innovation system and to develop regional innovation cluster, which is STP. Solo Techno Park, Bandung Techno Park, and Batam Techno Park, are the main clusters that are supported by The Indonesian Research Centre for Science and Technology (Puspipstek) in Serpong.

5.6 Malaysia

Continuing its upward trend, Malaysia makes its way into the top 20 (#18) for the first time since the current GCI methodology was introduced in 2006 (Figure: 7).

The 10 most competitive Asia-Pacific economies



Country	Global rank*
Singapore	2
Japan	6
Hong Kong	7
Taiwan, China	15
New Zealand	16
Malaysia	18
Australia	21
Korea, Rep.	26
China	28
Thailand	32

Source: The Global Competitiveness Report 2015-2016
*Asia-Pacific 2015-2016 rank out of 140 economies

Figure 7 Asia-Pacific Top 10 GCI 2015-2016

The country remains the highest ranked among the developing Asian economies. Malaysia advances nine positions in the institutions pillar, which largely drives this year's progress. It ranks no lower than 60th in any of the 12 pillars of the GCI. It ranks an outstanding 4th in the financial market development pillar, which reflects its efforts to position itself as the leading centre of global Islamic finance. And it ranks 7th in the efficiency of its goods and services markets and a business-friendly institutional framework (29th). In a region plagued by corruption and red tape, Malaysia stands out as one of the very few countries that have been relatively successful at tackling these two issues, as part of its economic and government transformation programs. The country, for instance, ranks an impressive 4th for the burden of government regulation, although its score differential with the leader in this area, Singapore, remains large. Malaysia ranks a satisfactory 26th in the ethics and corruption component of the Index, but room for improvement remains; recent 1Malaysia Development Bhd., or 1MDB scandal has significantly tarnished country's reputation, globally. Furthermore, Malaysia ranks 11th for the quality of its transport infrastructure, a remarkable feat in this part of the world, where insufficient infrastructure and poor connectivity are major obstacles to development for many countries. Finally, Malaysia's private sector is highly sophisticated (15th) and already innovative (21st). All this bodes well for a country that aims to become a high-income, knowledge-based economy by the end of the decade. Amid this largely positive assessment, the government budget deficit, which represented 4.6 percent of GDP in 2013 (102nd); the low level of female participation in the workforce (119th); and the still comparatively low technological readiness (60th) stand out as some of Malaysia's major competitive challenges [15].

Since its establishment in 1996, Technology Park Malaysia Corporation Sdn. Bhd. (TPM) continues to manifest its objective of creating conducive environment for innovation, and that TPM will transform itself with a five prong strategy which involves the maximizing of its land assets, enhancing its commercialization and support services, increasing the efficacy of its advanced infrastructure and networking capabilities, elevating its 4th generation technology incubation programmes and developing start-up friendly policies to generate a proliferation of technology based quality start-up companies with global potential. However, till date, the performance of the technology parks has been, dismal, at best. Due to space constraint only Cyberjaya city is discussed below.

5.6.1 Incompetent Management at TPM

Aside from Multimedia Development Corporation (MDeC), the main actors in Cyberjaya include, the main landowner, Cyberview Sdn Bhd, a subsidiary company controlled by the Ministry of Finance (MOF); the local authority, Majlis Perbandaran

Sepang (Sepang Municipal Council); and the master developer, Setia Haruman Sdn Bhd. Nearly all the main organisational actors in Cyberjaya development are members of or are owned by the Malay elite, from the landowner, the local authority, and two of the higher learning institutions to the residents' association and the master developer. The city is an attempt to reconstruct the meaning of 'developed' based on the interpretation of the Malay political elite. This is done in the form of the planning guidelines, which clearly prescribe the architectural forms and the land use that should be applied in the city and therefore regulate the usage of space [16].

5.6.2 Skimpy Innovation at TPM

Though at present, several multinational companies in the ICT business are present in Cyberjaya, such as Dell and IBM, yet, almost all the foreign-owned companies are involved only in support services or call centres that serve the Asia-Pacific region. Their participation in R&D activities is minimal where it exists at all. Most of the R&D activities take place in their parent companies' home countries, such as the USA. Malaysia introduced a cluster-based policy since 1996 through the Second Industrial Master Plan [17] that has yet to produce tangible results as the plan is weak in terms of cross industry links and has failed to highlight the social aspect of the cluster development [18]. Cyberjaya is an example of how the political elites construct a physical location to create an imagined city with ICT as the backbone that did not materialize into reality. Although Cyberjaya was developed and highlighted as a knowledge-based city, it does not seem to provide even the basic facilities required for its residents, such as affordable housing and religious and medical needs. Furthermore, ethnically based cluster development has created dissatisfaction among different ethnic groups. Cyberjaya's infrastructure development shows that the capitalists chosen to lead the project used the opportunity to make profits. Infrastructure projects are built once the market value and demand increases to gain the highest profit and intentional delay in providing the housing facilities could also be attributed to drive the housing real-estate prices higher and make the maximum profit [19].

6.0 CONCLUSION

Technology parks of East Asia are the result of investments and partnerships among national stake holders, transnational corporations, and international institutions. Technology parks have contributed to gross domestic product (GDP) growth, infrastructure development, knowledge community expansion, capacity building, and export production and distribution. Technology parks have contributed to

national inclusion in global information society, while some have become resource centers for development of ICT applications to further national goals of ICT education and distribution. Considering the disproportionate performance of the three countries' technology parks by comparing the GCI 2015 index and the GDP difference one is impelled to surmise that the performance of the technology parks is playing a key role in the economic growth of the respective countries. Optimum benefits of Technology Parks accrue when they are established and managed professionally in line with the best practices and all transactions are equitable, just, and transparent; the whole process should culminate trust nationally and internationally.

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