

A Reassessment of the Roles of Technoscience Parks in Malaysia: Towards Developing A Sustainable Innovation Ecosystem

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Abstract

Technoscience parks, a policy tool in the 1970s and 1980s, have remained a popular policy tool today, particularly in response to the urgency of developing and strengthening knowledge-based economic growth. In general, this paper examines the historical evolution and potentials of technoscience parks as innovation support system in Malaysia. Specifically this study aims at exploring the motivating and hindering factors to successful development of technoscience parks in Malaysia. To achieve the stated objectives, this study employs a combination of case study, document-research, and interviews. Based on case studies conducted on several technoscience parks in Malaysia, it is found that the Malaysian technoscience parks are still lagging behind other technoscience parks in the world. Their roles are very much confined to low value-added activities with less emphasis on innovative performance. This article claims that a reassessment of the roles of technoscience parks should be given due consideration. This article highlights the great potentials of technoscience parks as the vital support systems of innovation in Malaysia in enhancing effective governance of sustainability in science and technology. This study also offers some policy and managerial recommendations which they can take to review their progress, their plans as well as their roles in the innovation ecosystem.

Keywords: Technoscience, science park, innovation, sustainable, knowledge-based economy

1. Introduction

The new millennium marked the beginning of a new era known as knowledge-based economy. A few studies highlight that technoscience parks have remained a popular public policy tool in response to the urgency of accelerating knowledge-based economic growth (Kirk & Catt, 2004; Van Geenhuizen & Soetanto, 2008; Chen, Stephen, & Choi, 2004; Chang, Lin, Hung, & Liu, 2009; Parry, 2009; Kakko, 2009). As a result of this new emerging knowledge ecosystem, technoscience parks have been widely regarded as among the key components of innovation of an ecosystem (Castells & Hall, 1994; Appold, 2004; Fukugawa, 2006).

Since technoscience parks are widely regarded as important economic tools to achieve the nation's innovation agenda, special attention should be rendered towards the assessment of their performance. Moreover, their presence and roles are no longer remote from the national agenda, but has become part and parcel of the national policy and plans.

This paper has been prepared to provide general understanding of the historical evolution and development of technoscience parks, particularly its development in Malaysia. This paper also reports the analysis of the factors that motivate or hinder the development of technoscience parks in Malaysia. It is hoped that this study may create awareness about the potential role that technoscience parks can play not only in accelerating Malaysia's industrialization programmes but also in transforming the country into a knowledge-based economy particularly in developing a sustainable innovation ecosystem.

2. Malaysian Technoscience Parks: An Overview

In order to succeed in today's knowledge economy and realize its vision of becoming a developed nation by the year 2020, it must develop the requisite infrastructure and infostructure indispensable to knowledge-based industries as well as activities related to such economy (Jomo & Wah, 1999; Yeoh, 2002; Abdulai, 2004). One of

the strategic tools for the successful transformation to knowledge economy is the development of technoscience parks (Castells & Hall, 1994; Kirk & Catts, 2004), the main subject of this study.

Significantly, the establishment of the Malaysian technoscience parks is indeed a recent phenomenon. It started just a few decades ago as an institutional support to empower the Malaysian industrial structure, particularly to accelerate the manufacturing sector as the main engine of growth through science, technology and innovation (Robani, 2008). This was initiated to ensure that the Malaysian industrial and technological competitiveness was able to meet the growing global challenges (Narayanan & Lai, 2000; Ramasamy, Chakrabarty, & Cheah, 2004; Lai & Yap, 2004; Malairaja & Zawdie, 2008)

Historically, the technoscience parks have evolved tremendously since 1960s from industrial estates to free trade zones with technoscience parks as the latest development. Apart from the great potential of attracting foreign investment, the government has immense expectations for the parks to generate employment and skilled workers for the country. It is only after the late 1990s, with Malaysia entering the era of K-economy, that the technoscience parks have been expected to focus not only on manufacturing operations but also on developing knowledge-intensive or value-added activities such as product development, entrepreneurship, technology transfer and patenting.

In terms of the nature of the set up, it is undeniable that the Malaysian technoscience park development is largely state-led initiatives. In this regard, they are 100% reliant or dependable on the government for their funding and support. The government's uncompromising commitment towards improving the productivity and competitiveness of the Malaysian industries has propelled it further to promote the establishment of technoscience parks. The grouping of industries in such parks is expected to facilitate the development of industrial innovation, upgrade industrial production techniques, and enhance public-private smart partnership.

3. Method

In addressing the challenges of limited data, this study employs a combination of case study, document-research, and interviews. This study focused on a multiple-case study of selected technoscience parks in Malaysia i.e. Technology Park Malaysia (TPM) and Kulim Hi-Tech Park (KHTP). In addition, semi-structured interviews and document research were the main research instruments employed in the case study for data collection purposes. The analysis of various official documents as well as the park's official reports and newsletters managed to shed light on the historical development of Malaysian technoscience parks.

The findings reported in this study regarding the current roles and management as well as the strengths and weaknesses of the parks are based on qualitative interviews with the park management personnel and tenants. The group of government representatives i.e. the top officers from each of the affiliated ministries in which the technoscience parks are located may also be beneficial to get vital inputs on the policy making aspect and to answer the questions on the strategies for future development of the respective parks. By using the multiple respondents (the management, the tenants and government representatives), this study managed to ensure that the external validity of the data gathered represented the overall views of the case study, particularly the views from the government.

4. The Motivating Factors for the Establishment of Technoscience Parks in Malaysia

This study finds that political and economic dimensions are the prime factors that motivate the establishment of the Malaysian technoscience parks. The two parks in the case study are largely state-led initiatives. The initial proposition was that the development of the Malaysian technoscience parks since the mid-1980s had been the result of the Malaysian government's efforts to emulate those mechanisms of the industrialized countries and Newly Industrializing Economies (NIEs) in promoting the development of industrial innovation and technological development (Robani, 2008). However, this study finds that some common types of technoscience park activities and mechanisms in those countries are absent in Malaysia. The traditional types of activities, such as real estate and property development remain the main types of technoscience park activities in this country. There has been some change in the scope of Malaysian technoscience parks since the beginning of the new millennium as a result of the programmes introduced by the government as well as the park management.

Significantly, technoscience parks are largely viewed by the Malaysian government as a strategic economic intervention mechanism to enhance the economic growth, particularly in attracting investment and generating employment. Among the most important political and economic factors that motivated the establishment of the Malaysian technoscience parks are shown in Figure 1.

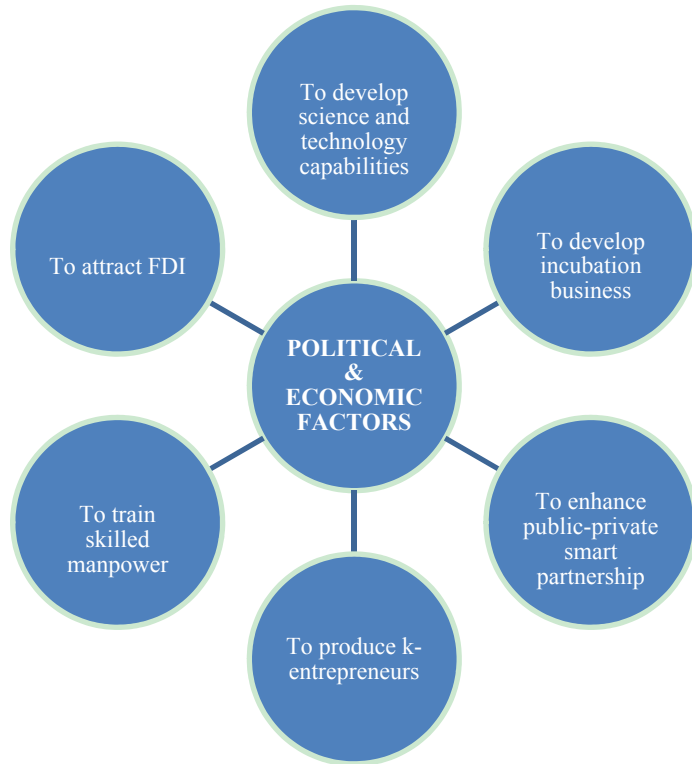


Figure 1. The political and economic factors that motivated the establishment of technoscience parks in Malaysia

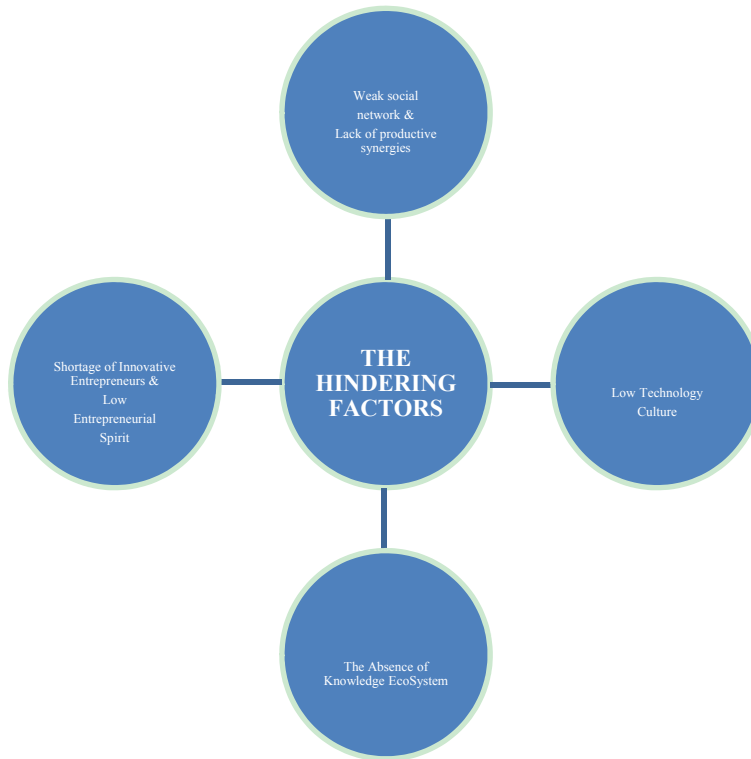


Figure 2. The hindering factors for the successful growth of the Malaysian technoscience parks

5. The Hindering Factors for Effective Roles of Technoscience Parks in Malaysia

The assessment of two parks in this case study suggests that the technoscience park development in Malaysia has several socio-cultural limitations that may hinder its successful development in promoting industrial innovation and competitiveness. The findings are summarized in the subsequent Figure 2.

Active interactions and interdependence among various technoscience actors are among the crucial elements for the successful growth of technoscience parks the future. All the individuals involved are embedded in social networks. Social networks are indeed essential to the success of the entrepreneurial process and are key environmental elements in which firms are created. In today's k-economy era, technoscience parks have been widely viewed as strategic tools to promote university–industry collaboration in Malaysia (Malairaja & Zawdie, 2008)

This study reveals that social networks have been developed moderately in both the parks. Both parks in this case study are facing not only a lack of “communities of practices” (as in the words of Bernasconi et al., 2006) in generating industrial innovation, but also a lack of the kind of communities of practices which might support and accompany company creation and development, particularly venture capitalists and merchant banks. This study also reveals that smart partnerships among existing socio-economic actors have been developed moderately in both parks, particularly among entrepreneurial firms. In other words, the development of inter-firm networks is minimal.

Undeniably, technoscience parks are the main source of knowledge spill over. In this regard, the Malaysian technoscience parks have failed to develop systematically the mechanisms for knowledge and innovation management in the parks. The management of the parks, for example, should think of the appropriate mechanisms to benefit from the presence of MNCs in the parks, particularly in the exchange of ideas and technology know-how. Moreover, the parks close proximity with the universities should be exploited to the fullest. At present, the nearby local universities (close to the parks in this case study) contributed mainly in terms of labour supply. The smart partnership between academia and firms on the parks, including the MNCs, is still minimal.

The study demonstrates that inter-firm synergies and linkages in the parks are also marginal, particularly in R&D and innovation activities. It is hoped that this study may trigger a review in the management's strategic planning as well as the Malaysian government's policies on how to improve the environment, and create a more productive ecosystem for knowledge sharing and innovation activities. It is believed that an adherence to focused and strategic planning could transform the two parks in this case study into “knowledge cities”.

The level of awareness of the technology culture among the local masses is still low. The main problem identified is that the Malaysian society is moderately inclined to accept change. Even though majority of the masses are already aware and interested in learning computers, they are still lagging behind in terms of IT application. They lack the will or encouragement to pursue greater technological heights.

This study also finds that the entrepreneurial culture is still lacking in the Malaysian society. The shortage of productive and innovative entrepreneurs is identified as one of the salient factors that could hinder the successful development of technoscience parks.

6. Implications for Policy Making

The government needs to intervene more, particularly through the educational systems and policies to spearhead the understanding and awareness about the culture of technology and innovation. The related ministries such as The Ministry of Science, Technology and Innovation (MOSTI) should help to spearhead the awareness among masses on the potential of technoscience parks in assisting the country, particularly in developing research capabilities and entrepreneurship. It is in this respect that the Malaysian technoscience parks could assist the government by participating actively in spearheading an awareness of a science and technology culture as well as bridging the digital gap.

Technoscience parks are social organizations. In this respect, the first step for intervention is clearly the human capital. The perfect technoscience park is one with a considerable asset of human resources, notably scientists, engineers, managers, business professionals and entrepreneurs. Since, this study identified the shortage of skilled manpower as the main limitation of technoscience park development, the government should intervene vigorously and consistently in solving this issue. With regard to this, the best medium to intervene is through the educational system and policies. To ensure the successful growth of technoscience parks, the policies should be instrumental in creating a dynamic and favourable ecosystem not only for attracting investors but also in developing a collaborative environment in promoting industrial innovation.

The policies should also place greater emphasis on the fostering of collaboration and smart partnership among various technoscience park actors or stakeholders. Another important and relevant issue in this respect is the systematic coordination, monitoring and assessment mechanisms to ensure the successful implementation of all the policies and programmes related to the growth technoscience parks.

In relation to the government intervention, it is argued that the best policy of the government is to render the least intervention in technoscience park management but provide maximum support in infrastructure development, education and training. The Malaysian government should make a bold investment consistently in terms of producing skilled and knowledgeable human resources.

This study also finds that at present, performance requirements do not matter in the context of the technoscience parks. Many project approvals were given to technoscience parks for their noble cause, such as attracting investment and producing k-entrepreneurs, commercialization of R&D. Since both technoscience parks under study are public-funded organizations, this study finds that it is urgent for the government to develop a systematic monitoring mechanisms, particularly the annual economic assessment to measure the impact of public-funded expenditures and monitor the contributions of technoscience parks towards the achievement of the national economic goals.

This study also finds the indicators to measure the performance and achievement of technoscience parks insignificant as the social obligations of public-funded organizations always come to the forefront. It is hoped that this finding may trigger the review of government policies and strategies of technoscience parks, especially those related to the governance of research and technology institutes. The enforcement of strict key performance indicators (KPIs) may be beneficial to the organizations in enhancing their contributions to the nation's innovation systems. This will explicitly motivate them not to misuse public funding.

As discussed earlier, most technoscience parks in the developed countries benefitted from their regional advantages, notably the abundance of a talent pool crucial for wealth creation. The regional strength is actually inside the society, such as social capital, human resources, attitude of the society, technology culture, and entrepreneurial culture. In this regard, the Malaysian government, together with the private sector, should consistently and proactively develop indigenous science and technological capabilities by using all the available channels and mechanisms, particularly to spearhead the awareness and importance of science and technology among the general masses.

More importantly, the policies should give greater emphasis on the fostering of collaborative networks, notably in producing academic spin-offs which could further promote industrial innovation between industry and academia (Van Geenhuizen, & Soetanto, 2009). Active interdependence and interactions between various technoscience park actors and elements, particularly among industry-government-academia are indeed crucial to the nation's innovation systems. This kind of collaboration may allow massive interchange of personnel and ideas for industrial innovation. In this respect, the government, together with the management of the parks should find an effective mechanism to achieve the above target. The government, be it federal, state or local should develop specific clustering programs which encourage the expansion of university-industry partnerships. For example, the park management should only lease the premises to companies which have research linkages with the universities.

Explicit policies should be developed to inculcate a culture of sharing among the technoscience parks and universities with regard to technology acquisition. Under the public research grant every research is allowed to purchase or acquire its own technology and equipment. It is worrisome that without proper mechanisms to monitor this activity, it could lead to the problem of underutilization. Furthermore, a mechanism should be developed to monitor the transfer of technology from the early stage to ensure that the institution has the required human capacity, such as the related engineers or technicians, to handle the particular technology or machine.

The data gathered from the interviews with government representatives reveal that the management of the parks is too dependent on the government for financial sources, particularly for developmental projects. It is important to highlight that the government's assistance and protection have created a complacent environment that may ultimately inhibit the competitive edge of an industry or organization. In this respect, it is advisable for the government to offer more autonomy to the parks' management to generate its own revenue by venturing into more business-oriented activities. Furthermore, the two parks in this case study have already been corporatized, thus, paving the way for running their organisations along business or profit-oriented lines.

Due to uncertainty in terms of funding from the government, most of the government respondents admitted that the Malaysian technoscience parks had to diversify their activities in order to generate revenue for the

organization. Despite its original mission to attract high technology industries to invest in the country, it is not surprising to find out that KHTP has now evolved into business incubators, particularly to help develop local entrepreneurs in the field of IT and biotechnology. On the other hand, TPM which originally functioned as research and incubator centres, have now ventured into the academic business with the setting up of the TPM College. It is perhaps timely for the government to help develop a more sustainable funding model which is based on one, or a mix of the following: parent company, equity holdings in incubated companies, rental payment, income from other services including training and events organization such as conferences and exhibitions. The system of venture capital in Malaysia should also be further enhanced for the successful implementation of technoscience park's main mission, that is to support the growth of k-entrepreneurs in the country.

7. Implications for Management on the Parks

This study also highlights the vitality of the park management as among the salient factors motivating the successful development of technoscience parks. The personal commitment of a leader with a vision for the park and a strong ability to realize that vision seems at least as important for a technoscience park as for a company. Successful technoscience parks should be advised by committees, but not run in a bureaucratic style. It is highly recommended that technoscience parks be led by credible managers with extensive industrial experience. In addition, around one-third of its staff should have substantial industrial experience. This strategy secures the park from any accusation of being overly academic and ensures a focus on industrially relevant work. The findings from the interviews also suggest that the skills of the chief executive and technical directors involving outside bodies, having a long-term view and developing an outward-looking, international and professional culture as salient factors for the success of technoscience park.

Both TPM and KHTP have benefitted from a stable environmental policy. Stability should be exploited further, particularly in fostering technological networks for developing industrial innovation and competitiveness. Perhaps less political interference would be beneficial to the management in leading the future direction of the technoscience park business venture. However, the probability of these parks becoming self-financing institutions in the near future is yet to be tenable, taking into account several national science and technology issues which still explicitly affect their performance, notably the shortage of skilled manpower and low technology culture.

Another challenge posed upon the park management is the SMEs management. Most of the small and newly formed firms do require advice and support on various business matters. Technoscience park managers should know their tenants well enough to sense their needs and problems before they do. This study finds that the most frequently cited supports needed by the tenants but unsatisfactorily fulfilled by the park management are: financial venture, technical services, and marketing competence. The managements of the parks in this case study justified these shortcomings to the shortage of expertise. To counteract this justification, perhaps it would be advisable for the management to be given more autonomy and allocation to hire more experts, such as academics and consultants, by offering them attractive incentives.

Many firms, especially small ones, have managerial and organizational weaknesses which prevent or delay innovation. The research finds that addressing technical problems alone is not enough to ensure success. Often a strategic business input combining hard technology with soft services, such as consultancy, coaching, quality assistance and standards advice, is needed to achieve innovation. These are among the important areas or skills that the park management should have to acquire to help develop industrial innovation entrepreneurship in the Malaysian technoscience parks.

Based on the interviews with seven managers, it can be concluded that the main concern of the management is to serve the needs of their tenants in terms of providing the needed infrastructure and facilities or managing their demands for leasing or selling land. Maybe it is timely for the management to come up with a program to strengthen the inter-firm networks, develop knowledge ecosystem as well as enhance the knowledge based activities to ensure that the park fulfils all the criteria needed to be acknowledged as a Third Generation Science Park.

8. Conclusion

This paper has brought to light the fact that technoscience parks have significant potentials in developing a sustainable innovation ecosystem but in Malaysia its potential has not been exploited to the fullest. As vital innovation support systems in today's k-economy, technoscience parks should focus more proactively and vigorously on the development of knowledge sharing and innovation network between local, national and global partners in the real sense in order to sustain their competitiveness. The technoscience parks must be increasingly

strengthened and empowered to play their roles in the ecosystems. Active technoscience park participation is urgently needed for a well-functioning and sustainable innovation ecosystem particularly in an innovation-driven economy

However, it should be borne in mind that there is actually no unique or correct model for technoscience park development. The right model for a given technoscience park depends on the needs of its users or customers, the state of development of the country in which it plays a part and the uniqueness of its contribution to the functioning of that system. In order to find their most effective roles in national innovation systems, technoscience parks need to be seen as an integral part of the economy's innovative potential rather than as a collection of activities which relate sporadically to innovation.

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