The Impact of Technology Parks Services on The High Technology Industry: A Case Study On Kulim Hi-Tech Park

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Abstract
The emergence of technology parks in Malaysia typically generates the expectations that they will contribute significantly to the industrialization. Accordingly, there is increasing number of research conducted on technology parks performance. However, there is still uncertainty about whether technology parks are achieving their goals or not and exactly what their impact is on their tenants. This paper attempts to contribute in understanding this issue by focusing specifically on the impact of technology park services on high technology industries. A case study on one of well established technology parks in Malaysia that is Kulim Hi-Tech Park (KHTP) has been conducted. After a series of interviews with the administrator and review on literature, nine evaluation criteria were identified and used to observe the impact of technology park services on the industrial tenants of the technology park. From a survey on the industrial tenants in KHTP it is found that the technology park has all the nine evaluated criteria. However, these criteria have different categories of impact on the tenants. It can be concluded that there are still more room to improve in ensuring the competitiveness of the technology park. The results have significant implications for the administrator of the KHTP.

Keywords: Technology parks, high-tech firms, technology park services

Introduction
It is widely believed that technology parks have unique potentials in accelerating the growth of nation’s economy and competitiveness. Its distinct characteristics of clustering the high technology firms and synergies able 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 (Hu, 2007). Hence, the Malaysian technology parks have been established as a part of the government’s initiatives to maximize the utilization of science and technology and realize the achievement towards being a knowledge-economy country.

Generally, the development of Malaysia technology parks are closely related to the five-yearly programs of Malaysia Plan. In the Eight Malaysia Plan (2001-2005), the Malaysian Government was looking at the knowledge-economy as the basis of every spectrum of the nation’s development. This is continued further in the Ninth Malaysia Plan (2006-2010) and Malaysia’s Outline Perspective Plan (OPP 3, 2000-2010). Based on these plans, the government is continuing its effort to develop competitive and resilient SMEs that are equipped with strong technical and innovation capacity as well as managerial and business skills. In the recent Tenth Malaysia Plan (2011-2015), the government sets the stage for a major structural transformation that a high-income economy requires. The plan details strategies towards a more focused role for the government as a regulator and catalyst and programmes that enable the country to emerge as a high income nation, as envisioned in Vision 2020. The foundation of any productive high income
The increasing importance of high-technology industries in Malaysia, particularly in electrical and electronics industry led to the establishment of the first comprehensive high-technology park known as Kulim High-Technology Park (KHTP) in Kedah (Hasnan et. al, 2012). In the second half of the 1990’s, KHTP is expected to fulfil one of the strategies of the Seventh Plan that is to develop local electronic parts and components as well as the promotion of backward integration of the semiconductor industry through the establishment of wafer fabrication plants in order to minimize the dependence on imported components (Seventh Malaysia Plan, p.289).

Nevertheless, despite the significant role to the county development, there is still limited study focusing on the technology parks performance. In other words, there is still uncertainty about the tenants’ perception on the services that have been offered by the technology park. This paper, therefore, attempts to explore the impact technology park services on high technology industries. A case study on one of well established technology parks in Malaysia that is Kulim Hi-Tech Park (KHTP) has been conducted.

Kulim Hi-Tech Park

KHTP situated in south Kedah, 40 kilometres from the island of Penang, Malaysia, offers 4,200 acres of development with a strategic location, support facilities, and human resources for high-tech manufacturing and research and development (R&D) activities. As the first comprehensive high-technology park, Kulim Hi-Technology Park (KHTP) has created its own unique environment. If other high technology parks merely want to be a ‘technology free trade zone,’ but at the Kulim Hi-Tech Park, the companies aims to go beyond that and always trying hard to ‘infuse’ technology into the day-to-day lives of the tenants and residents.

The technology park is attracting the attention of diverse tech industries, including biotech, aerospace, alternative energy, and optoelectronics with its city-within-a-park paradigm that includes a fire department, police station, mosque, restaurants, and hospitals. One of its important tenant companies, First Solar has already begun exporting its thin film solar modules and is further expanding its plants in Kulim High-Tech Park. The company is investing $680 million in the manufacturing plant and expected to achieve cost reductions through economies of scale in a high-quality manufacturing environment. Apparently the openness and business practice of KHTP had yielded positive results in foreign direct investments to this country (Hasnan et. al, 2012).

The increasing globalization, strategic alliances with overseas companies in capital intensive and high technology industries are vigorously promoted by the government. This significantly increases the role of KHTP in the Malaysian economy. Wafer fabrication is actually the main activity of KHTP. It is of strategic importance in the country’s industrialization drive as it is a core technology of the semiconductor industry. The establishment of wafer fabrication plants is expected to promote the development of high technology in Malaysia. The 1,700 hectare park targets technology-related industries, primarily in the fields of advanced electronics, telecommunications, biotechnology, advanced materials, research and development and emerging technologies.

Technology Park Services

It is widely believed that technology parks can provide a nurturing environment for new business start-up and therefore, leading to later development of growth-oriented firms (Robani, 2008). 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 (Maillat, 1995; Phillimore, 1999). Generally, these services divided into basic structural support and technology-specific structural support. Common examples of basic structural support include shared office services, business assistance, rental breaks, business networking, access to capital, legal and accounting aid, and advice on management practices (Mian, 1997; Smilor, 1987; Harwit, 2002). Technology-related structural support features the following services: laboratory and workshop facilities (Mian, 1997), mainframe computers (Chan & Lau, 2005), research and development activities (Doutriaux, 1987), technology transfer programs (Smilor, 1987) and advice on intellectual property (OECD, 1999).

Although the increasing number of technology parks and the research conducted on their performance, there is still uncertainty about whether technology parks are achieving their goals and exactly what their impact is on their tenants. The impact of differing institutional backers is still unknown. There is a gap in our knowledge about how an organization develops in the protected environment of a technology park (Hasnan et al., 2010).

Strategy researchers have integrated the three organizational perspectives and developed performance measures in terms of multiple hierarchical constructs (Venkatraman and Ramanujam, 1986). The first is financial performance in terms of organizational effectiveness (Chakravarty, 1986). The second is organizational effectiveness measured by product quality and market share. Financial performance measures allow for competitive analysis where firms compare financial data regarding market share, sales, production costs or the budgets of competitors (Yasin, 2002).

Performance evaluation provides responses to questions such as whether, how and why an organization succeeds. These approaches work well when applied to the corporate environment where long terms data can be analyze and compare with other organizations. However, the problems inherent in small firm research confront those attempting to apply these theoretical perspectives to research into incubators and their tenants (Remedios and Cornelius, 2003). On the other hand, non-financial operational performance measures have been use in small firm research (Murphy et al., 1996). Given that it is problematic to collect financial data from new ventures or small businesses, operational measures form a suitable base for building a framework for measuring the performance of start-ups located in incubators.

Mian (1997) proposed an integrated framework for the assessment of the performance of university technology incubator after reviewing and summarizing the salient features of four selected approaches to the incubator, i.e. goal approach, system resource approach, stakeholder approach and internal process approach. In this model, three sets of variables identified based on the related literature: (a) performance outcomes, (b) management policies and their effectiveness, and (c) services and their value-added. Lau and Chan (2005) modified the comparative evaluation approach to capture the effects on technology firms throughout the venture development path.

Based on the literature review, which discussed on the purpose of the establishment of technology parks and the function of these incubation areas, it was found that several evaluation criteria can be utilized to determine the technology park performance from tenants’ perspective. They can be categorized as follows:

a. Provide pooling resources (staff training, marketing event and exhibition)
b. Provide consulting/counselling services
c. Assist in reducing cost
d. Assist in funding.
e. Provide sharing resources (laboratory, testing equipment, meeting rooms, etc.)
f. Facilitate in creating good image
g. Facilitate in creating networking
h. Present advantages of clustering
Methodology

A series of interviews have been conducted with representatives of Kulim Hi-Tech Park Corporation (KTPC) who act as the administrator of the plant. The interviews are very meaningful in order to understand the nature of operations, the involvement of stakeholders, technology park’s strategies, achievement and approaches defined via taking these competitive advantages. Based on literature review and the conducted interviews, a set of close ended questionnaire was developed to gather data on the nine evaluation criteria. The questionnaire contains a total of 44 questions that are divided into three sections. The three sections asked questions on the background details of the respondent and the firm, the nine criteria of technology park performance, and the challenges or barriers faced by their organization operating in this technology park.

The Sample and Data

The survey on the performance criteria involved a sample of industrial tenants operating in the technology park. The unit of analysis chosen is the company whereby the data was collected using survey method from the target respondents at the managerial level. These people were chosen because they are close to the decision- making involving the transfer of technology and they were involved in employee development. The sample size for this study was determined by using Krejcie and Morgan Table (1970).

There are a total of 53 companies operating in Kulim Hi-Tech Park. Therefore, a sample of 44 companies is needed in order to get result that reflects the target population with 95 percent of confidence level and confidence interval of 5. By the use of simple random sampling procedure the questionnaires were distributed to the selected companies. However, only 19 completed questionnaires were received and give in 43 percent response rate. This response rate was quite reasonable compare to previous studies on the tenants of technology parks, for example 35 percent (21 companies out of 60 companies) in Vedovello (1997). The data from the survey of this study can be analyzed with 95 percent of confidence level and with a wider confidence interval that is 18.

Results and Finding

The respondents involved in this study are managers and directors or CEOs of the companies. 57.9 percent of the respondents have less than five years in their designations, 26.3 percent have between five to ten years, and three respondents have more than five years experience. Table 1 shows the breakdown of this demographic.

<table>
<thead>
<tr>
<th>Number of Years</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 years</td>
<td>11</td>
<td>57.9</td>
</tr>
<tr>
<td>Between 5 to 10 years</td>
<td>5</td>
<td>26.3</td>
</tr>
<tr>
<td>More than 10 years</td>
<td>3</td>
<td>15.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

In terms of company size base on turnover, that 42.1 percent of the companies have less than 10 RM millions, followed by 31.6 percent have 31-100 RM millions per year.
Figure 1 Turnover (RM Millions)

These companies are from various fields of high technology industries. The types of industries are listed in Table 2.

<table>
<thead>
<tr>
<th>No.</th>
<th>Industries</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>advanced electronics</td>
</tr>
<tr>
<td>2</td>
<td>biotechnology</td>
</tr>
<tr>
<td>3</td>
<td>chemical</td>
</tr>
<tr>
<td>4</td>
<td>hard mask blanks</td>
</tr>
<tr>
<td>5</td>
<td>industrial gases and services</td>
</tr>
<tr>
<td>6</td>
<td>mechanical electronics</td>
</tr>
<tr>
<td>7</td>
<td>medical and scientific instruments</td>
</tr>
<tr>
<td>8</td>
<td>medical device manufacturing</td>
</tr>
<tr>
<td>9</td>
<td>microelectronics</td>
</tr>
<tr>
<td>10</td>
<td>photo-electronics</td>
</tr>
<tr>
<td>11</td>
<td>semiconductors</td>
</tr>
<tr>
<td>12</td>
<td>wafer fabrication</td>
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</tbody>
</table>

The respondent were asked to rate the impact of the criteria on their companies with a scale ranged from zero to hundred. The mean score of each criterion is categorized into five groups as shown in Table 3.

<table>
<thead>
<tr>
<th>Mean Score</th>
<th>Actual Rate (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 1.9</td>
<td>0 – 19</td>
<td>Poor</td>
</tr>
<tr>
<td>2.0 – 3.9</td>
<td>20 – 39</td>
<td>Low</td>
</tr>
<tr>
<td>4.0 – 5.9</td>
<td>40 – 59</td>
<td>Moderate</td>
</tr>
<tr>
<td>6.0 – 7.9</td>
<td>60 – 79</td>
<td>Good</td>
</tr>
<tr>
<td>8.0 – 10</td>
<td>80 – 100</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

From the survey, it was identified that KHTP has all the evaluation criteria. However, the impacts of these criteria on the incubating companies are different. Figure 2 shows the illustration of the model for existing impact of evaluation criteria on the incubating companies. This model shows that most influencing criterion is clustering. The overall mean score of this criterion is 6.0 or 60 percent actual rate. It can be considered as in good category. There are five criteria in that can be categorised as moderate.
These criteria are graphical proximity (56% actual rate), public image (53% actual rate), sharing resources (40% actual rate), networking (49% actual rate) and consulting services (42% actual rate). While another three criteria those are pooling resources (38% actual rate), cost subsidies (38% actual rate) and funding support (36% actual rate) are in low category.

Figure 2 Model of Existing Impact of Kulim Hi-Tech Park Evaluation Criteria on the Incubating Companies

Discussion

In general KHTP has all the evaluation criteria. It appears that the services provided by the technology park are able to contribute in business development of the incubating companies. However, the results presented indicate that the impacts of technology park services in terms of the evaluation criteria are different. Among the criteria that obtain high score are clustering and geographic proximity. Apparently the being located at KHTP provides the tenants the advantage of obtaining services and supplies from well-established companies in this area. KHTP is well-connected, in terms of its road network as there is an expressway that provides easy access between KHTP to the North Butterworth Container Terminal (NBCT) seaport, North-South Expressway and to the Penang International Airport on the Penang Island, via the Penang Bridge. Being located at the high-tech park provides the companies with proximity to a good pool of readily available skilled and semi-skilled human resources 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.
On the other hand, in terms of pooling resources, funding supports and cost subsidies the technology park services have low impact on the tenant. This results obtained might be because of the services provided are depending on the size of the companies. Although one of the main criteria driving the decision to establish company in KHTP is the low cost of doing business with high technology facilities, certain services only available for companies with certain criteria.

Conclusion

Kulim High Technology Park (KHTP) developed to incorporate the most desirable characteristics of comprehensive and complete high-tech park. It is moving forward to be one of the best high-tech parks in the region. Nevertheless, to offer more value added to the tenant companies and to the nation as a whole, KHTP should always monitor its position and clearly understand the direction. Appropriate strategies and mechanism needed to overcome the obstacles faced. A continuous program for assessment the dimensions of KHTP could be very important in order to identify the reasons and their challenges faced within the technology parks that led to increase the competitive capabilities. It can be concluded that there are still more room to improve in ensuring the competitiveness of the technology park.

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