

THE WAY FORWARD FOR BUSINESS INCUBATION PROCESS IN ICT INCUBATORS IN MALAYSIA

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ABSTRACT

The development of ICT SMEs has been the top priority for Malaysia, in trying to achieve its aspirations to become a fully developed nation by the year 2020. The government has launched several initiatives to expedite the launch and growth of ICT SMEs including the establishing science parks, technology parks, and business incubators. This paper examines the critical components that are essential in a business incubation ecosystem. Six ICT incubator managers in Malaysia were interviewed and findings from the interviews revealed that although process of business incubation is evident in all incubators, there is a lack in consistency and implementation. This paper provides a managerial perspective of business incubation process in ICT incubators and the way forward for these incubators to become world-class ICT incubators.

Keywords: Business Incubation; ICT Incubators; ICT Start-Ups.

1. BACKGROUND OF THE RESEARCH

The important role of business incubation as a useful strategy to accelerate growth and development of small and medium sized enterprises (SMEs) has been widely acknowledged in the economic and entrepreneurship literature (OECD, 1996; Lee & Yang, 2000; Aernoudt, 2004; Phan, Siegel & Wright, 2005). This role is evidenced by the growing number of incubators worldwide and testimonials from both developed and developing countries (OECD, 1999; Tamasy, 2007; Ndabeni, 2008). The faith in the incubation system is likely due to its ability in establishing SMEs at a faster rate and at a lower cost (Costa-David, Malan & Lalkaka, 2002). SMEs in most countries form the backbone of the economy contributing to national wealth creation via GDP, employment and exports (Huang, 1999; Doyle & Hammond, 2008).

Despite this, the role of ICT incubators in promoting new ventures in Malaysia remains unclear. To date, there has been little study done on the business incubation process in Malaysia, in

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particular regarding the effectiveness of business incubation process in respect of selection performance, monitoring and business incubation process in respect of selection performance, monitoring and business assistance intensity, resource allocation and professional management services (Rothaermel & Thursby, 2005; Hackett & Dilts, 2008). This paper begins with an overview of business incubation, followed by an explanation of the four elements in relation to the business incubation process, the research methodology, preliminary findings from the research, discussion, and concludes with recommendations and limitations.

1.1. Business Incubation in Malaysia: A Brief Overview

In Malaysia, business incubation was first introduced in 1996 under MSC Malaysia or the Multimedia Super Corridor project. The project was developed primarily to spearhead the growth of the ICT industry in the country by providing a test-bed for the global ICT industry. Physically, it covers an area of more than 750 square kilometres extending south from Malaysia's capital city and business hub, Kuala Lumpur. MSC Malaysia provides an ideal environment for companies to harness the full potential of ICT and multimedia technologies. In promoting the development of MSC Malaysia as a key growth driver of the economy, Multimedia Development Corporation (MDeC) has been tasked to advise the Malaysian government on ICT legislation and policies as well as setting benchmark standards for ICT and multimedia operations (MSC, 1996; MDeC, 2007; Mohan, 2007).

MDeC is the governing body that collaborates with various parties and government agencies to ensure an enabling environment for both local and global ICT companies is developed. To date, MSC Malaysia has attracted participation from more than 2,000 local and multinational technology companies involved in various ICT sectors which represent major activities within the Malaysian ICT industry (MDeC, 2009). MSC Malaysia's value add contribution to Malaysia's economy was recorded at 1.2% of Gross Domestic Output of Malaysia in 2007. MSC Malaysia's contribution to the country's economy in terms of revenue to Gross Domestic Output in 2007 was recorded at 2.66% (MDeC, 2009). These contributions indicate the positive effects of MSC Malaysia toward the economic growth of the country.

The findings of the MDeC 2008 impact survey suggest that MSC Malaysia has progressed and achieved favourable impacts on Malaysia's economy especially in employment creation, GDP contribution and exports. However, the role of ICT incubators in promoting the growth of ICT SMEs has been scarcely acknowledged. Particularly, a closer look at the status of ICT incubators indicate that the majority of the incubators in Malaysia are observed to provide essentially basic incubator facilities and services (Mohd Saffar, 2007). According to Lalkaka (2001a), incubators in most developing countries are still trapped in the first-generation type of incubators which are the early versions of incubator models introduced in the 1980s. This situation is indicative of the Malaysian business incubation scenario where 94% of the incubators are still entrenched in the real-estate model with minimal business services as indicated in Table 1. Ironically, the number of incubators in the third-generation model which offers technology labs and more sophisticated type of business services is still somewhat low.

Table 1: Types of Organizational Forms of Incubators in Malaysia

| Number of Incubators | 72 |
|---|-----------|
| 1st Generation Incubators Real Estate, Landlord, Shared facilities, Reactive Support | 52 |
| 2nd Generation Incubators Real Estate, Landlord, Shared facilities, Reactive Support + Consulting/Advisory | 16 |
| 3rd Generation Incubators Facilities + business advisory services + Acceleration Technology Labs | 4 |

Source: (Saffar, 2007)

This paper gauges the validity of such claims by examining the business incubation process ICT incubators in Malaysia. The study sought to understand the extent of the four key elements being practiced in the ICT incubators.

2. LITERATURE REVIEW

As evident in the extant literature, ‘business incubator’ has been defined in various ways by many researchers (Phan, Siegel & Wright, 2005; Voisey, Gornall, Jones & Thomas, 2006). The reason for the variation in defining business incubator could likely be due to the diverse nature of the incubator sponsors, goals, and areas of development. This is supported by Bruneel, Ratinho, Clarysse and Cock (2010) who added that the continuous growth in business incubation and the ongoing diversification of configurations has led to increased difficulty in defining business incubators precisely.

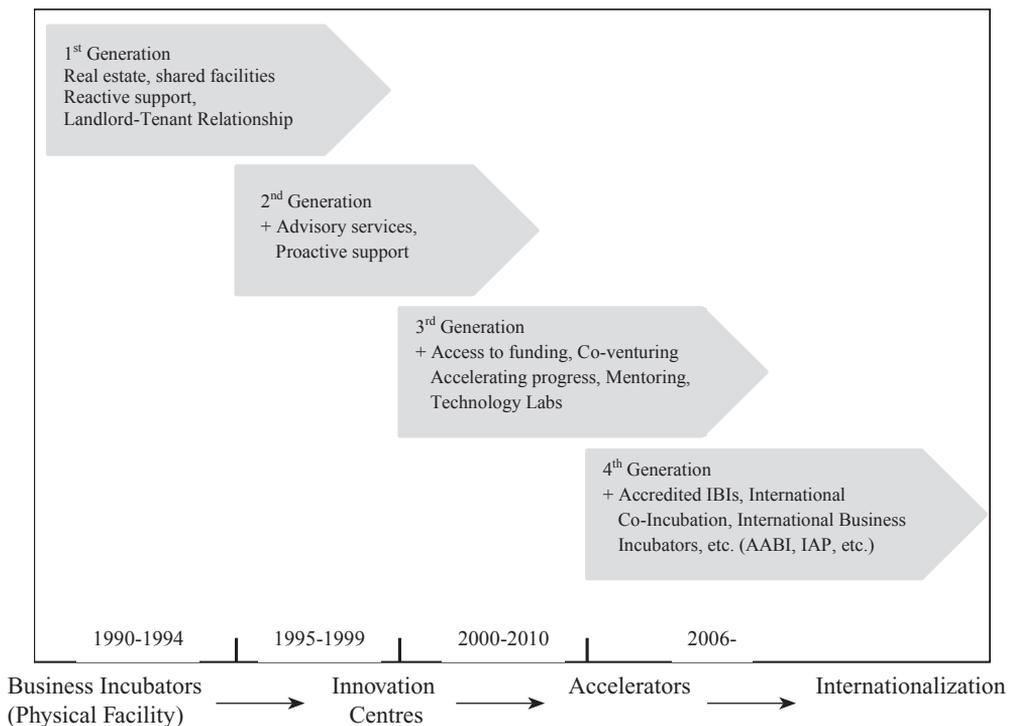
Nonetheless, the National Business Incubation Association or NBIA defines business incubator as a business assistance program targeted to start-ups and early stage firms with the goal of improving their chances to grow into healthy, sustainable companies (NBIA, 2006). Similarly, Business Innovation and Incubation Australia or BIIA (2008) defines business incubator as ‘a new hybrid type of economic development facility that combines features of entrepreneurship, business facilitation and real estate development’. For the purpose of developing this paper, both definitions are deemed adequate.

2.1. Incubation in Malaysia

As has been discussed previously, SMEs have been noted to contribute to Malaysia’s GDP, employment and export. In recognition of this, the government has deemed the creation and development of more SMEs a national priority, particularly SMEs in the ICT industry. As a result, the Malaysian government has taken the step to establish incubation centres under the supervision of MDeC to develop a pool of ICT SMEs. The ICT incubators are specifically aimed to capture and cluster technopreneurs from both local and foreign countries to create and nurture a critical mass of technopreneurs, SMEs, and start-up companies involved in ICT and biotechnology industries (SMIDEC, 2006).

There has been a number of incubator generations since they were first introduced in the late 1980s. Grimaldi and Grandi (2005) observed that the existence of different types of incubators and the evolution of business incubator models over time were necessary to accommodate the requirements and needs of businesses, which in turn was the impetus that drove the diversity in services at incubators. Generally, the evolution of incubators can be viewed in four phases (Saffar, 2008): first-generation incubators, second-generation incubators, third-generation incubators and fourth-generation incubators as illustrated in Figure 1. Each of these incubator generations will be explained in the next section.

Figure 1: Evolution of Business Incubators in Malaysia



2.2. First-generation incubators

In the early 1990s, Malaysia launched its first batch of incubators and initially focused on only providing shared office space for new entrepreneurs. This batch of incubators is otherwise known as the first-generation incubators which are characterised by a tenant-landlord relationship model. The basic function of a business incubator in this model was to provide office space for the entrepreneur to initiate their business activities (Saffar, 2008). Rental rates for office space at incubators were comparatively lower than that of normal business premises, making it an attractive reason to try and “win” a spot in incubators.

Services offered at first-generation incubators were fundamental and aimed to accommodate the basic needs of new businesses (Lalkaka, 2001b). Aerts, Matthyssens and Vandembemt (2007) added that besides office space, incubatees were also provided with shared facilities such as meeting rooms, access to telephone and fax machines as well as management support. These additional facilities however, are provided upon enquiry from incubatees. Hence, this type of support is also known as reactive support (Bergek & Norrman, 2008; Saffar, 2008). Lalkaka also described these first-generation incubators as a place that offer “affordable space and shared facilities to carefully selected entrepreneurial groups” (2001a, p. 4). He later added that counselling, skills enhancement, and networking services became part of the services.

2.3. *Second-generation incubators*

The first-generation incubators initially provided sufficient support for the incubatees who only sought for office space and basic office facilities. However, the need for consultancy and business advice became significant which altered the model of the first-generation incubators to second-generation incubators. The characteristics of second-generation incubators included the typical office space rental, shared facilities, proactive support and business advisory services (Lalkaka, 2001a). This type of incubator model predominantly existed in Malaysia between 1995 and 1998, an era when the ICT industry was booming, although many of the incubators today still epitomize similar attributes. These incubators were aimed to grow and develop the ICT industry and provide a “convergence of support, towards creating growth-potential, tech-based ventures” (Lalkaka, 2001a, p. 4). Alternatively, business incubators in this generation were also known as “innovation centres” as described by Ramasamy, Chakrabarty and Cheah (2003).

2.4. *Third-generation incubators*

The need to develop a third-generation incubator that focuses on the importance of business support was pivotal according to Peters, Rice and Sundararajan (2004) who observed that business support services are far more important than facilities and administrative services. Within 5 years after the second-generation incubators were modelled, the third-generation incubators were then introduced. The cause for this development was perhaps analogous with the boom of the ICT industry in 1998-1999 where businesses required more IT-savvy assistance such as technology labs, technopreneur development-focused programmes, technology development consulting and industry development consulting. All of these services were available in the third-generation incubators, in addition to the basic first and second-generation incubator services (Hackett & Dilts, 2004). This is consistent with the European Commissions’ (2002) claim that incubators mushrooming in the late 1990s focused more on establishing promising start-ups in the ICT and high-tech sector, which, understandably would require such technical assistance. Lalkaka supports this regarding the third-generation incubators describing them as able to “de-emphasise low rentals and focus on enhanced business services, both for tenants and affiliates on an out-reach basis” (2001b, p. 170). According to Scaramuzzi (2002), third-generation incubators provide a full range of support services for the development of knowledge-based businesses. The third-generation type is already present in countries including China, Korea, and Malaysia, although in fewer numbers in the latter.

Scaramuzzi (2002) also added that the strength of these incubators lie in their capacity to disseminate knowledge and resources providing linkages and synergies to incubatees.

2.5. *Fourth-generation incubators*

The most recent development of business incubator sees a move to fourth-generation incubators. These incubators have departed from the traditional facilities of an incubator and provide more than just business support services. Characteristics of fourth-generation incubators as asserted by Saffar (2008) include being accredited international business incubators (IBIs) and co-incubation. An example of this would be the International Business Incubator in Silicon Valley which offers services to SMEs from other countries to establish their businesses in the US market. Similarly, IBIs are also present in San Jose, California and Ben Craig Centre at the University of North Carolina (Lalkaka, 2001a). Services that fourth-generation type incubator offer include market assessment, market strategy consulting, partner and sales development, and establishment of an office in the respective countries. A contrasting view by Scaramuzzi (2002) associates fourth-generation incubators with higher levels of risk and mortality rates however at this juncture he also notes there has been insufficient assessment conducted on fourth-generation incubators. The next section provides a literature review of the elements currently proposed by researchers in the field as significant in the business incubation process.

2.6. *Elements of the Business Incubation Process*

(a) *Selection performance*

Various studies on the incubation process have been undertaken and suggest that selection performance is an important part of the business incubation process (Merrifield, 1987; Lumpkin, 1988; Bergek & Norrman, 2008). Aerts et al. (2007) posit that a severe screening process would enable incubators to evaluate the presence of characteristics deemed essential to develop sound enterprises, which also agrees with Merrifield (1987), Lumpkin (1988), Hackett and Dilts (2004) and Peters *et al.* (2004). Another incubation model developed by Hackett and Dilts (2004) also included selection practices as part of the incubation process. Screening for future incubatees is a process that would be guided by the following attributes: managerial characteristics, market characteristics, product characteristics and financial characteristics. Incubators that follow these guidelines are deemed as following 'best practice' in the business incubation realm (Aerts *et al.*, 2007; Bergek & Norrman, 2008). The consensus amongst these researchers validates the importance of the selection process in the incubation model.

(b) *Monitoring and business assistance intensity*

The importance of monitoring businesses and assistance intensity in business incubators has also been acknowledged as an important component in the business incubation process. According to Abetti (2004), intensive monitoring of companies by managers and staff of incubators is one of the best practices amongst the five incubators which he studied. Campbell *et al.* (1985) and Hackett and Dilts (2004) share this view and maintained that monitoring and intensity of business assistance are principal elements of the incubation process. Similarly,

Campbell *et al.* (1985), Smilor and Gill (1986), and Autio and Klofsten (1998) confirmed in their studies that monitoring of businesses is a source of value that incubators could offer to their incubatees. Additionally, Merrifield (1987) asserted monitoring of businesses as a critical success factor for incubators. According to Hackett and Dilts (2004) monitoring and the intensity of assistance provided to incubatees could be gauged at different levels: time spent providing assistance to the incubatees, time spent by incubatees interacting with other incubatees, time spent working directly with the incubatees, and the reduced likelihood of business failure. In addition, the comprehensiveness and quality of the services provided are also criteria that have been used to measure the intensity of monitoring and business assistance (Hackett & Dilts, 2008). As far as impacts of business assistance intensity on incubator performance is concerned, there have been studies that showed significant relationship between the two as investigated by Hackett and Dilts (2008) and Rice (2002). Both studies imply that time intensity of business assistance provided by the managers must be strategically allocated and in return incubatees must be prepared to utilise the assistance provided.

(c) Resource Allocation

Resource allocation refers to the “relative abundance of incubator resources and is characterized by dimensions of resource availability, quality and utilization” (Hackett & Dilts, 2004). These resources, as put forward by Daft (1983), are defined as all assets, capabilities, organizational processes, attributes, information, knowledge, etc., controlled by [the incubator] that enable the [incubator] to conceive of and implement strategies that improve its efficiency and effectiveness. Studies have shown that other resources such as administrative support services, sources of capital, access to lawyer, accountants, consultants, marketing specialists, funding and local university contacts are useful resources provided by incubators (Carayannis & von Zedtwitz, 2003; Bollingtoft & Ulhoi, 2005; Becker & Gassmann, 2006; McAdam & McAdam, 2008). Hackett and Dilts (2004) also suggest that incubators need to maintain the quality of the resources provided to ensure a continuously rewarding incubation process. As such, it is likely that good incubation practice would include measures to maintain high standards of resources at incubators. Subsequently, the utilization of resources by incubatees would reflect on the quality of the resources provided (McAdam & McAdam, 2008).

(d) Professional Management Services

The fourth critical element in the business incubation process is identified as professional management services in various incubation studies (Gibb, 2005; Evald & Bager, 2006; Hancock & Llewellyn, 2008). The professional management services component is included in the proposed theoretical framework because of the growing level of significance in incubation management. Various studies have reiterated the importance of managerial competency in incubators (Kirby, 1990; Read & Rowe, 2002; Hannon, 2003; Studdard, 2006). Hannon (2003) also details the importance of management and leadership in the incubator sector. For example, a growing demand in dealing with commercialization of ideas requires knowledge and capability across a range of core process areas including intellectual property rights (IPR) protection, prototyping activities, market research, product development, company formation, business plan writing and licensing and royalty agreements (Hannon, 2003).

Hence, diverse management capabilities are expected of the incubator managers and staff to ensure that incubatees are provided with appropriate professional management services. These capabilities include managers' financial capability, analytical capability, business function capability, interpersonal capability, entrepreneurial capability, networking capability, and commercialization capability including IPR.

In sum, these elements have been noted as important to the business incubation process but the extent of each element being practiced is questionable. Specifically, there has not been any study deliberating on the existence and use of these elements in the Malaysian ICT incubators. This study aims to provide insight on the business incubation process amongst Malaysian ICT incubators with regards to the four detailed elements. This is important, as Saffar (2008) has noted further research into the underlying elements significant in the business incubation process is critical. Additionally, the fact that the majority of the incubators in Malaysia have been observed to be operating in the first and second-generation domain provides a compelling reason to undertake this research.

3. RESEARCH QUESTIONS

Based on the elements identified and discussed in the earlier section, the following research question was developed:

RQ:

How do ICT incubators in Malaysia advance toward offering third and fourth-generation incubator services?

4. METHODOLOGY

This research adopted the mixed-methods approach consisting of quantitative survey and semi-structured qualitative interview guided by an interview protocol. However, for the purpose of developing this paper, only results from the qualitative study will be discussed. The interview protocol was developed around key themes which emerged from the literature review as well as the quantitative survey instrument development and pilot testing. Major themes included in the protocol were selection practices of incubator managers, monitoring and business assistance intensity by incubator managers, resource allocation for the incubatees and professional management services provided by the incubator managers. The respondents for this study consist of six ICT incubator managers of ICT incubators in Malaysia. The population of ICT incubators in Malaysia totals 12 but due to access limitations, six of the incubators located in the MSC region were chosen.

The incubators were first identified from the list in the MDeC's website, which is the governing body that spearheads the ICT development in Malaysia. Initial contacts with the incubator managers were first established through emails to gain their consent on conducting the interviews. Some incubator managers requested preliminary information regarding the interview in order to get them prepared for the interview. Each interview was recorded and lasted for about 50 minutes. At the end of the session, incubator managers expressed their support for the study and provided information regarding their incubatees required for the quantitative part of this study.

5. RESULTS

The results of the interviews are reported as follows. First, Table 2 provides a descriptive overview of the incubator managers (IM). Four of the six incubator managers interviewed were male, and most of them, except for one have had tertiary education at the undergraduate degree level. Five out of six cases were government-funded incubators.

Table 2: Profile of Incubator Managers

| Respondent | Position | Length in office | Age group (years) | Gender | Highest Academic Qualification | Incubator operation (years) | Incubator type |
|------------|------------------|-------------------|-------------------|--------|--------------------------------|-----------------------------|-------------------|
| IM 1 | Manager | More than 3 years | 30-39 | M | Masters | More than 5 years | Private |
| IM 2 | Senior Executive | More than 3 years | 30-39 | M | Undergraduate | 3-5 years | Government-linked |
| IM 3 | Head | Less than 1 year | 40-49 | M | Masters | More than 5 years | Government |
| IM 4 | Executive | 1-3 years | 18-29 | F | Undergraduate | More than 5 years | Government |
| IM 5 | Executive | More than 3 years | 30-39 | F | High School | 3-5 years | Government |
| IM 6 | Manager | More than 3 years | 30-39 | M | Undergraduate | 3-5 years | Government |

Table 3 illustrates the implementation (or lack of) of the four elements in the business incubation process by the six ICT incubators.

Table 3: Matrix of Business Incubation Process in six ICT Incubators in Malaysia

| Incubators | IM 1 | | | IM 2 | | | IM 3 | | | IM 4 | | | IM 5 | | | IM 6 | | |
|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | 1 st | 2 nd | 3 rd | 1 st | 2 nd | 3 rd | 1 st | 2 nd | 3 rd | 1 st | 2 nd | 3 rd | 1 st | 2 nd | 3 rd | 1 st | 2 nd | 3 rd |
| Selection Performance | x | x | | x | x | | x | x | x | x | x | | x | x | | x | x | x |
| Monitoring and Business Assistance Intensity | x | x | | x | | | x | x | | x | | | x | x | x | x | x | x |
| Resource Allocation | x | x | | x | | | x | x | x | x | | | x | x | | x | x | x |
| Professional Management Services | x | x | | x | | | x | x | | x | | | x | x | | x | x | |

As can be gathered from the matrix, a majority of the incubators characterize the first and second-generation incubator models in terms of selection performance, monitoring and business assistance intensity, resource allocation, and professional management services. The extent of adoption for each aspect is detailed as follows.

5.1. Selection performance

All six incubators replied they adopt selection performance practice as a guideline to select incubatees. However, the criteria used amongst these incubators vary in terms of formalization and procedure. IM 1, IM 2, IM 4 and IM 5 can be characterized as mirroring the first and second-generation model incubators where the absence of clear selection criteria is detected. Potential incubatees only need to present their business plans to be considered a place at the incubators. There appears to be no standard method or assessment practice to evaluate the quality of the business plans. In addition, Rather, IM 1 replied that two main things that they look for in future incubatees were idea and passion. The ideas should be something worth investing, coupled with a 'good' business model. IM 3 and IM 6 however, demonstrate a clear focus of selecting potential incubatees by having a proper selection process flow chart which includes strict criteria pertaining to financial status, experience status and potential of the business idea. This flow chart comprises detailed selection process beginning from a survey questionnaire to gauge the status of potential incubatees, to a psychometric test to analyse their entrepreneurial orientation and finally an interview.

5.2. Monitoring and business assistance intensity

With regards to monitoring and business assistance intensity, all six incubator managers stated that their incubators provide business assistance and monitoring albeit with varying degrees. IM 1 claims that the incubator provides services to the incubatees on a constant basis. IM 2 stated that they provide technical consultancy and support, management support and IP management through workshops and training. IM 3 provides a more comprehensive range of business support. The incubator coaches them to develop viability of their business idea and provides incubates with consultancy services. This includes consultancy on IP related matters ranging from IP mining, IP drafting and filing, IP management and IP strategies.

IM 2 and IM 4 both stated business support is provided although with less intensity where only monthly meetings are conducted with tenants. The reason for the lack in frequency is because most tenants are virtual, therefore only a small number of tenants are physically in the incubators. Despite the infrequent interactions with the incubatees, the incubator managers claim that enquiries from the incubatees are always welcomed. Both IM5 and IM6 offer state-of-the-art business services and support ranging from access to market to access to finance and as well as daily interaction with incubatees. This somewhat epitomises the third-generation incubators.

5.3. Resource allocations

In terms of resource allocations, IM 1 stated that besides office space, they also provide other facilities such as meeting rooms, entrepreneurial support, market network, market access, and access to funding. Monthly rental rates range between RM 90 and RM 300 per room/per month. However, IM 1 suggests that the rooms are quite underutilised and incubatees are not there because of the facilities. IM 1 added that other training facilities are also conducted at the incubator through the engagement of a partner in areas of technical training and entrepreneurial training.

IM2's resources are mostly in terms of use of equipment and technical advice to the incubatees. The incubator lacks in facilities such as a cafeteria, or a resource centre and to some extent, the incubator looks more like a workshop than a business incubator.

IM3 states that they have a range of resources provided for the incubatees ranging from office space, meeting rooms, presentation facilities, 24-hour access and an extended resource centre. Being the more experienced incubator of the sample, IM3 seems to have a wider range and more sophisticated types of resources. The resources such as rooms and facilities are well utilised. In contrast, underutilised resources include the resource centre as entrepreneurs tend to rely more on the technical staff assistance rather than making use of the technical books and references. IM3 noted their resources include meeting rooms, cafes, and presentation facilities. However, IM4 and IM5 both stated that they do not offer any other services besides the physical facilities. IM6 however, shared that the resources at their incubator are providing proactive support and technology labs that are moving toward the premium end of services offered by ICT.

5.4. Professional management services

In regards to professional management services, none of the incubators interviewed offered in-house professional management services. Most of the incubator managers said that they try not to intervene with the incubatees' operations. They prefer not to get involved in their affairs and rather play the role of a councillor whenever the need arises. Most of the professional management services are outsourced to other companies. The advice that incubator managers provide are normally informal and IM1 stated that informality is important as it enables incubatees to open up and trust the incubator managers. IM1 also claims that there needs to be a personal touch for each entrepreneur. For example, should they need specific advice on legal or accounts advice, the incubator staff would engage experts to talk to them. IM1 maintains daily interaction as necessary to keep abreast with their needs and requirements. IM2 and IM4 stated that they e.g. provide technical training and conduct marketing for the products at road shows. Similarly, IM3 stated that he provides marketing services by setting up kiosks. In terms of financial management, IM3 stated that they only go as far as providing information to obtain the funds.

The findings suggest that there is some validity to the claim of Malaysian incubators being largely characterised as first and second-generation types of incubators. The following section discusses how the situation can be improved progressing current incubator processes to a more sophisticated type of incubators as characterised by third and fourth-generation incubators.

6. DISCUSSION AND CONCLUSIONS

The findings confirm that business incubation process in ICT incubators in Malaysia is to some extent, eclectic in practice, with some incubators having more sophisticated practices, while others are still mirroring the first- and second-generation incubator models. This confirms Saffar's (2008) assertion that Malaysia's incubators are lagging behind incubators in other developing countries such as Korea and China. China's incubators in Shanghai have advanced

to internationalisation networking, which mirrors the fourth-generation incubators (Qian, 2007). Qian (2007) also adds that this movement is witnessed through the international exchange platform with incubators and relevant organisations all over the world such as in Russia, USA, France, England, Korea and Japan. Korea's incubators have also gained prominence in the incubation literature (Chung, 2004; Kim, Lee & Ames, 2005; Sung, 2007; Cho & Son, 2009) and perhaps the relevance of the business services and sophistication of business incubation practices in general in Korean incubators could explain their success. For example, Korean incubators would first identify key success factors that affect the success rate of start-ups and use them to activate and increase efficiency of incubation activities (Cho & Son, 2009).

With regards to selection criteria, interview replies suggest that for the most part no formal criteria are being used as a guideline. Rather, selection is made rather arbitrarily based on the presence of a business plan and the perceived innovativeness of the business idea. With the exception of IM3, other incubator managers indicate a rather loose procedure of selection performance. While this may be acceptable in the first and second-generation models, third and fourth-generation incubators practice more stringent selection performance which provides long-term benefits for the incubators and incubatees. In order to bridge the gap and for Malaysian ICT incubators to achieve third and fourth-generation status, it is suggested that Malaysian ICT incubators benchmark and adopt world's best practices regarding implementation and execution of the selection process. Business plans alone cannot be used as a measure to select incubatees. Rather, a more comprehensive set of criteria would ensure sustainability of the business and their outcomes. As suggested by Aerts *et al.* (2007) incubators should look at incubatees from these angles: experience of the management team, financial strength and market and personal factors. Aerts *et al.* (2007) agree with Hackett and Dilts (2004) on the importance of an effective selection performance and the complexity it bears. Hackett and Dilts (2004) also concluded that this critical element of the incubation process requires an advisory board for both economic (i.e. to understand the market and new venture creation) and political (i.e. funding-related issues) reasons. This approach should be adopted in Malaysia to improve both managerial performance and incubator governance.

With regards to monitoring and business assistance intensity, the findings indicate that most incubator managers provide reactive support to the incubatees, which reflects the nature of first and second-generation incubator models. Reactive support is usually initiated by the incubatees rather than the incubator. Third and fourth-generation incubators promote proactive support to their incubatees and this can be achieved through regular interactions between incubator managers and incubatees. Coaching and mentoring in third and fourth-generation incubators such as the one in the Silicon Valley are provided by a network of external coaches with varying backgrounds such as management, marketing, finance, accounting, commercial and business consulting experience (Lalkaka, 2001a). Based on findings, it is suggested the level of interaction between incubator managers and incubatees be heightened to foster a relationship that would result in better understanding of incubatee needs and in return, more relevant services and assistance provided to the incubatees. Likewise development of diverse, formalized networks of experts would add considerable professionalism to Malaysian incubators.

In terms of resource allocation, interview replies generally suggest that incubators provide services that characterize the first and second-generation incubators with only one of them providing technology labs and focused technopreneur development programme to incubatees. Most professional management services such as access to market, access to funding, marketing, accounting, and legal services are evidently not present in these incubators. Further, the findings also suggest that incubatees make little use of the resources indicating poor utilisation of resources at the incubators. In order for the incubators to advance toward third and fourth-generation incubators, it is recommended that better quality and not quantity of resources be provided. These resources should aim towards better access to funding, technology sophistication via technology labs as well as development and provision of international linkages. It is also useful to note that resources allocated at incubators should be tailored and flexible in relation to incubatee needs which would result from better relationships between incubator manager and incubatees as advocated earlier.

In regards to professional management services, it is evident that, ICT incubators in Malaysia are outsourcing in an ad-hoc fashion most of the vital management services. In other words, incubatees have patchwork access to advice in terms of marketing, human resources, financial, legal and account directly from the incubators or from any developed network of experts as evidenced in the Silicon Valley incubator. The lack of expertise provided in these areas suggests that the incubatees in these ICT incubators may be subject to considerable constraints within their operations. Third and fourth-generation incubators, as indicated in Figure 1 have moved past the real-estate model advancing to becoming business accelerators. Since there is evidently a lack of third-generation services present in the ICT incubators, incubatees may not be progressing as they should. Hence, these ICT incubators should look to revising the professional management services to include elements that are relevant to the specific needs of the incubatees.

In sum, the extent of the four elements being practiced at the six incubators still demonstrates first and second-generation type of models. The ICT incubators have undoubtedly fulfilled the requirements of basic incubation process. However, due to rapid global competition and turbulences in the business environment, more sophisticated incubation processes need to be developed and delivered.

7. LIMITATIONS AND FUTURE RESEARCH

This research focuses on the components that directly influence the performance of business incubation in ICT incubators in Malaysia. Hence findings of this research may not be generalizable to all types of incubators. However, looking at it from a broader perspective, future research may use significant components identified in this study to form the basis of a newer and more customised incubation process that would suit any incubation industry. Additionally, the causal relationship between the four factors and the performance of incubator firms was not examined in this paper; this will be addressed in the quantitative study currently being conducted as part of this research.

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