

INVESTIGATING THE UNDERLYING COMPONENTS IN BUSINESS INCUBATION PROCESS IN MALAYSIAN ICT INCUBATORS

Fararishah Abdul Khalid, David Gilbert, Afreen Huq

School of Management, RMIT University, AUSTRALIA, &
Universiti Teknikal Malaysia Melaka, MALAYSIA.

fararishah.abdulkhalid@rmit.edu.au, david.gilbert@rmit.edu.au
afreen.huq@rmit.edu.au

ABSTRACT

The role of business incubators as an economic development tool has been reiterated in the entrepreneurship literature. Business incubators have been proven as effective in creating jobs, and accelerating the growth of new businesses. Both developed and developing countries have taken the business incubation route to encourage the spur of small to medium sized enterprises. Although the basic concept of business incubation remains until today, there have been several enhancements to the capability of business incubators as an economic driver. Malaysia is an example of a developing nation that has implemented its business incubation programmes in its effort to generate a critical mass of technology-based entrepreneurs. This paper examines the underlying components in the business incubation process in the Malaysian ICT incubators. A survey questionnaire method was used to solicit response from 118 incubatees from 15 ICT incubators in Malaysia. Exploratory factor analysis was performed to identify the underlying components. Results suggest that there are eleven components in the business incubation process.

Keywords: business incubators, incubates, ICTs

INTRODUCTION

A review of the literature revealed that there has been extensive research conducted on business incubation (Lalkaka, 1997; Hackett & Dilts, 2004b; Phan, Siegel & Wright, 2005). Autio and Klofsten (1998) stated that there exists a gap in the study of business incubators where empirical analysis is necessary to identify and analyse advantageous management practices in SME support arrangements. CSES (2002), in its benchmarking report conducted among European incubators, provided valuable conclusions that have formed the basis of much incubation research. Included among the findings are some significant outcomes of business incubators: job and wealth creation, acceleration and maximisation of start-up growth, and the adoption of best practices by business incubators.

Given the absence of any systematic review of the business incubation literature, Hackett and Dilts (2004b) analysed the literature in chronological order and recognised five primary research orientations in incubation—these are studies centred on incubator development, incubator

configurations, incubatee development, incubator-incubation impacts, and theorising about business incubation. Following an examination of Hackett and Dilts's (2004b) review of the incubation literature, this research is prompted to study the impacts of the business-incubation process on incubation performance. A problem lies in the dearth of knowledge and research surrounding the status and effectiveness of incubation in Malaysia, particularly in the ICT industry.

Extant literature with reference to the Malaysian incubation phenomenon reflects the immature status of the subject in the limited academic research conducted (Mohd Yunus, 2001). Much information regarding the status of Malaysian incubators and the incubation system has been found in professional literature appearing on websites, in annual incubator reports, consultancy surveys, benchmarking reports, magazines, and in various other publications (Mohd Saffar, 2009), however, there is a concerning lack of empirically-based research. For example, there has been no comprehensive study which specifically aims to investigate the underlying components in ICT incubation process in the Malaysian context. Extant literature that discusses the Malaysian system merely reports the status of the incubation system, focusing on non-specific types of incubators, and with no initiative to examine actual experience (Mahmud, 2003; Jusoh, 2006; MDeC, 2006).

This study fills that gap and explores the lack of clarity in the underlying components of business incubation process in Malaysia. This research unfolds the components in the incubation process that together meet the objective of incubators as a driver for the Malaysian economy.

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 & Ireland, 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 (2004a) and Peters *et al.* (2004). Another incubation model developed by Hackett and Dilts (2004a) 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, Matthyssens & Vandenbempt, 2007; Bergek & Norrman, 2008). The consensus amongst these researchers validates the importance of the selection process in the incubation model.

Monitoring and Business Assistance Intensity

The importance of monitoring new 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 (2004a) 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). Studies by Hackett and Dilts (2008) and Rice(2002) 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.

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, 2004a). 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 (Bollingtoft & Ulhoi, 2005; Carayannis & vonZedtwitz, 2005; Becker & Gassmann, 2006; McAdam & McAdam, 2008). Hackett and Dilts (2004a) 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).

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, 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 (2009) 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.

METHODOLOGY

A quantitative method was deployed in this study using survey questionnaire to solicit responses from incubatees of ICT incubators. The survey questionnaire was largely adapted from a study developed by Hackett and Dilts (2008). The questionnaire incorporates 251 items and comprises six sections consisting of:

- i) Profile of Incubatees
- ii) Selection Performance
- iii) Monitoring and Business Assistance Intensity
- iv) Resource Allocation
- v) Professional Management Services

Participants

Participants for the survey questionnaire were initially identified through the websites of their respective incubators. The participants were made up of incubatees of ICT incubators that were chosen for the qualitative part of the study. These companies are mostly ICT-based, with diverse business natures ranging from mobile and wireless communication to Internet-based business applications in the financial sector. A letter of invitation was first extended to incubatees by email to obtain their agreement to join the study. 180 incubatees, which is the entire population of the ICT incubatees were targeted to be participants of the survey questionnaire. Of the 180 questionnaires distributed to the entire population of ICT incubatees, 118 were returned yielding a response rate of 65.5%. Questionnaires were distributed in person as well as electronically to incubatees of ICT incubators via a website developed by the researcher.

Selection Performance

‘Selection Performance’ refers to “the degree to which the incubator behaves like an ‘ideal type’ venture capitalist when selecting emerging organisations (options) for admission to the incubator” (Hackett & Dilts, 2004a, p. 49). Relevant dimensions of Selection Performance include an inclination to select a promising organisation for admission based on their managerial, market, product, and financial characteristics. According to Hackett and Dilts (2004a), managerial characteristics refer to the prior employment experience and technical expertise of the applicant’s management team. Market characteristics denote the properties of the market which the applicant intends to enter. Product characteristics refer to “the properties of the product or service which the applicant intends to commercialise” and finally, financial

characteristics denote “the applicant’s profit potential” (Hackett & Dilts, 2004a, p. 49).

Monitoring and Business Assistance Intensity

‘Monitoring and Business Assistance Intensity’ refers to the degree to which the incubator monitors and helps incubatees with the development of their ventures, including helping them to learn about risks involving the resources invested in a business, and about containing the cost of potential (terminal) failure (Hackett & Dilts, 2004a; Hackett, 2006). Hackett and Dilts (2004a) state that the time intensity of assistance provided, comprehensiveness of assistance provided, and the quality of the assistance provided all characterised this component of business incubation process. ‘Time intensity of assistance provided’ refers to the percentage of working hours devoted to monitoring and assisting incubatees, while ‘comprehensiveness of assistance provided’ is a measure Hackett and Dilts (2008) adapted from Chrisman (1989), and it refers to the degree to which strategic, operational, and administrative-related assistance are provided by the incubator to the incubatees. Finally, ‘quality of assistance provided’ denotes the relative value of the assistance provided by the incubator to the incubatees (McGrath, 1999; Rice, 2002; Hackett & Dilts, 2004a).

Resource Allocation

‘Resource Allocation’ refers to “the relative abundance and distribution of incubator resources and is characterised by dimensions of resource availability, quality, and utilisation” (Hackett & Dilts, 2004a, p. 50). Hackett and Dilts (2004a) used Daft’s (1983) definition of business incubator resources in Barney (1991), which is “all assets, capabilities, organizational processes, attributes, information, knowledge, etc., controlled by the incubator that enable the incubator to conceive and implement strategies that improve its efficiency and effectiveness”, as they relate to facilitating new venture development. For this construct, the intention is to measure how important Resource Allocation is to the incubatees and is measured in three dimensions of resources; availability, quality, and utilisation. Resource availability refers to the ability of the incubators to provide incubatees with access to resources. Resource quality represents the relative value of the resources which the incubator provides to the incubatees, and lastly, the incubatees’ usage of the resources which they receive through the incubator is signified by resources utilisation (Hackett & Dilts, 2004a).

Professional Management Services

The final independent variable in the conceptual framework is ‘Professional Management Services’. This construct was not part of the original Hackett and Dilts (2004a) study and was added to the research framework here following identification of a gap in the incubation literature regarding the importance of management services in the incubation process. The dimensions included in this fourth construct were identified from various studies in business incubation (Hannon, 2003; Totterman & Sten, 2005; McAdam & Marlow, 2007; Khota & Pretorius, 2008), and from the pilot study, where a significant need for management services to be part of the services offered at the incubators was repeatedly identified. Four areas of professional management services are identified: marketing and promotion, financial, staff and personnel, and strategic management services.

RESULTS

Participants characteristics

The sample consists of 118 incubatees from various ICT incubators in Malaysia. Incubatees surveyed were representative of the Malaysian ICT incubatee population ($n = 180$). Of the 118 incubatees surveyed, 11% are still within their first year of establishment, 40% have been operating for 2-3 years, while the remaining has been established for more than three years. The sample represents a range of incubatees from government incubators (54.2%), private incubators (35.6%), and university-linked incubators (10.2%).

Of the 180 questionnaires distributed to the entire population of ICT incubatees, 118 were returned yielding a response rate of 65.5%. Questionnaires were distributed in person as well as electronically to incubatees of ICT incubators via a website developed by the researcher at www.incubatorstudy.com. The website provides a user-friendly interface for the ease of incubatees and the flexibility to return to their saved responses in the event that questionnaires could not be completed in one session.

Preliminary Analysis

In order to identify the underlying components of the business incubation process, the data set was prepared for analysis using SPSS Statistics 18.0. Prior to conducting exploratory factor analysis, preliminary data analysis was conducted including visual inspection of the data, identification of outliers, and an assessment of the central tendencies of the data (Hair, Black, Babin & Anderson, 2010). All items in the data set loaded higher than .32 and had Eigenvalues higher than 1.

Unidimensionality

Factor analysis was conducted to assess the unidimensionality of the four constructs: (i) Selection Performance, (ii) Monitoring and Business Assistance Intensity, (iii) Resource Allocation, and (iv) Professional Management Services. Specifically, PCA was used with Varimax Rotation as it is a good general approach that simplifies the interpretation of factors (Hair *et al.*, 2010). Factor loadings were generally aligned with previous research by Hackett and Dilts (2008) and conceptual understanding of the underlying structure of the data with a few items loading on multiple factors.

Unidimensionality testing – Selection Performance

The result of PCA revealed 3 components representing the Selection Performance construct, one less component than the theoretical framework, with loadings that were generally aligned with expectations. Collectively, the 3 components explained 69.54% of the total variance, which accords well with Hair *et al.*'s (2010) 60% benchmark. The results of the PCA are presented in Table 1.

**Table 1: Variables loading on Selection Performance construct
Rotated Factor Matrix^a**

Selection performance items	Component		
	1	2	3
10a[Long-term strategic orientation to market growth]	.787		
10d [Incubatees' potential in creating new markets]	.774		
10b [Size determination of target market]	.771		
10c [Accessibility of target market]	.766		
9a [Prior work experience]	.723		
9c [Technical expertise]	.633		
9b [Prior management experience]	.630		
9d [Entrepreneurial experience]	.534		
11f [Inimitability of product]		.881	
11e [Rareness of product]		.881	
11g [Substitutability of the product]		.852	
11a [Uniqueness of product]		.848	
11b [Patent protection for product]		.647	
11d [Having a relative advantage over competitor's product]		.552	
12e [Having a good cash flow]			.773
12b [The strong likelihood of achieving financial break-even in a short period of time]			.766
12d [Having multiple, harvestable exit options]			.723
12a [Profit potential of the company]			.696
12c [The potential to attract investment participation from venture capitalists]			.654

Component 1 appears to be measuring items that are a combination of what had been theorised as selection based on managerial or entrepreneurial and market characteristics. The reason managerial characteristics items merged with market characteristics items could be because products in the ICT industry are highly innovative where market variables can be largely unknown and the intersection between accumulated experience and entrepreneurial capabilities in combination with user-driven design dampen the influence of 'traditional' market factors such as supply and demand; market fragmentation and consolidation. This could also be interpreted as a result of the hyper competition in this volatile industry where entrepreneurs tend to develop products that customers or market do not even know they want. This component has been labeled '*market and managerial-based selection*' and item loadings ranged from .534 to .787.

Component 2 composed of items that measure selection based on product characteristics. Specifically, items addressed the inimitability, rareness, substitutability, uniqueness, and patent protection of the product. One theoretically derived item which has been previously shown to load on this component was found to cross-load with Component 3, which is intended to measure the selection based on financial characteristics. The item was 11c (having a technological edge to the product). The cross-load between items measuring selection based on product and selection based on financial characteristics also occurred in Hackett and Dilts' (2008) study. The reason for the cross-load could be explained by the association that a product with technological edge

has in terms of financial value and the similar financial impact that it may have on business incubation performance. Item 11c has been deleted due to the cross-load and this resulted in an improved total variance explained from 69.5% to 71.2%. Accordingly, Component 2 has been labeled as *'product-based selection'*. The items in this component received loadings from .552 to .881 indicating good measures.

Component 3 composed of items intended to measure the selection of incubatees based on the financial capabilities of the potential incubatees. Items that are grouped in this component reflect the incubators' tendency to choose incubatees based on their financial status. Measures include the company's cash flow, the likelihood of meeting break-even within a short period, having harvestable exit options, the profit potential of the company, and the potential to attract investment participation from venture capitalists. The items in this component received loadings from .528 to .773 and the component was labeled *'financial-based selection'*.

Unidimensionality testing – Monitoring and Business Assistance Intensity

The factor analysis results for Monitoring and Business Assistance Intensity items show two distinct components that were aligned as theorised as presented in Table 2. Collectively, the two components explained 76.6% of the variance.

Table 2: Variables loading on Monitoring and Business Assistance Intensity construct Rotated Factor Matrix

Monitoring and business assistance intensity items	Component	
	1	2
14h [The incubator manager actively seeks ways to continuously improve the level of customer service satisfaction inside the incubator]	.898	
14g [Our incubator ensures the quality of its services by regularly reviewing them]	.897	
14a [Our company receives business planning assistance from the incubator]	.893	
14f [The incubator regularly validates quality of potential new strategic service providers]	.893	
14c [Our company receives administrative assistance and services from the incubator]	.876	
14e [Our company receives operations-related advice from the incubator]	.873	
14i [The other incubatees teach alternate or new strategies for achieving business success]	.868	
14d [Our company receives production-related advice from the incubator]	.846	
14b [Our company receives business feasibility analysis assistance from the incubator]	.834	
13a [Company receives sufficient time working directly with incubator manager]		.865
13b [Company spends appropriate amount of time interacting with other incubatees]		.839
13c [Interactions with incubator manager reduce the likelihood of company making expensive business mistakes]		.778
13d [Company receives appropriate time in assistance]		.777

All items loaded on a single component, with no multiple loadings on any component, suggesting parsimonious results. The first component obtained loadings that measure the comprehensiveness and quality of the monitoring and business assistance. The loadings suggest that incubators ensure the quality of the business assistance rendered by actively seeking ways to improve the level of customer services, through regular review of the incubatees, and by regularly validating quality of potential new strategic service providers. Additionally, it also suggests the level of comprehensiveness of the services rendered include incubatees receiving business planning assistance, administrative assistance, operations-related advice, production-related advice, and business feasibility analysis. The high loadings obtained could possibly be due to the high correlation between the items in the component. The factor loadings for the first component in the Monitoring and Business Assistance Intensity construct ranged between .834 and .898 and the component has been labeled '*Comprehensiveness and Quality*'.

The second component's loadings suggest that items used for the time intensity measurement cover various aspects such as the time working directly with incubator managers, other incubatees, and the implication of interaction, including reducing the likelihood of the future incubatee making expensive business mistakes. The implication of this component could be used to explain the required amount of time that is needed to contribute to incubation success. The factor loadings for the items were from .777 to .865 and this component was labeled '*Time intensity*'.

Unidimensionality testing – Resource Allocation

The results of factor analysis performed on questions related to Resource Allocation showed two components as shown in Table 3, one less component compared to theoretical findings. For the first component, each item addresses some aspect of perceived quality of the incubator resources, and the utilisation of the resources by incubatees. Specifically, items address the following characteristics: incubatees' perception on the effects of the resources such as easy-to-understand information, maximising company's opportunity towards networking, utilisation of knowledge gained from other incubatees and the incubator itself, and enhanced reputation of companies because of the association with the incubators.

It appears that items from the Resources Quality component and Resources Utilisation component have emerged to form one single component. The reason for this could well be due to the correlations that exist among the items. For example, 16e and 17d both have the connotation of "receiving advice from incubator manager" which may explain why the two items load on the same component. Similarly, items 16d, 16c, and 17a could be loading on the same component because all three items are referring to characteristics of the incubator. The implication of the combination of items result in a composite component labeled as "*Resource Utilisation and Quality*." The items received significant loadings in the range of .602 to .825.

The second component exhibits items that would theoretically load on "Resource Availability" and are intended to measure the availability of resources at the incubators. The items received loadings between .584 and .824. Some cross-loadings emerged and possible reasons for this are that items in the second component may also have correlations to items in the first component. For example, items 15g and 15a refer to marketing specialists and administrative support services, both of which are resources at the incubator that could be assessed in terms of its

utilisation and quality. Ultimately, the EFA resulted in the reduction of the two items (15a and 15g) with remaining items loading unidimensionally on two factors that cumulatively explain 70.7% of the variance.

Table3: Variables loading on Resource Allocation construct
 Rotated Factor Matrixa

Resources allocation items	Component	
	1	2
16e [We receive business-related information from the incubator in a way that is easy to understand]	.825	
17d [Our company acts upon the advice we receive from the incubator manager]	.810	
17f [We maximize our opportunities from the introduction to the incubator's network contacts]	.789	
17b [Our company utilizes advice obtained from the incubator manager]	.768	
17c [Our company utilizes the knowledge obtained from other incubatees]	.740	
16d [Our incubator is nurturing]	.732	
16c [Our incubator is pleasant]	.732	
17e [Our company acts upon the advice we receive from fellow incubatees]	.709	
17a [Our company makes full use of the administrative services offered at the incubator]	.700	
16f [We receive information on sources of smart capital from our incubator]	.668	
15b [Access to managerial expertise]	.652	
16b [Our reputation is enhanced because of our association with the incubator]	.631	
16a [Our company is offered flexible lease agreements to meet our changing space needs]	.602	
15e [Access to accountants]		.824
15h [Access to funding]		.811
15d [Access to lawyers]		.809
15k [Access to technology labs]		.744
15j [Access to intellectual property advice]		.743
15i [Access to local university contacts]		.736
15c [Access to sources of capital]		.723
15f [Access to consultants]		.584

Unidimensionality testing – Professional Management Services

Finally, the factor analysis results of Professional Management Services construct showed four components as predicted in the conceptual model. All items loaded on a single component, with a few cross-loads as presented in Table 4. Collectively, the four components explained 74.1% of the variance.

**Table 4: Variables loading on Professional Management Services construct
Rotated Component Matrix (a)**

Professional management services items	Component			
	1	2	3	4
20e [Dealing with staff grievance issues and disciplinary action]	.794			
20c [Establishing staff appraisal and performance systems]	.782			
20g [Assigning work, duties and responsibilities]	.773			
20b [Managing the hiring and firing of staff (e.g. interviews and selection)]	.760			
20a [Preparing job descriptions and personnel specifications]	.736			
20f [Setting and reviewing salary structures]	.711			
20h [Developing staff training programmers]	.710			
20d [Supervising staff]	.698			
19d [Monitoring budgets]		.827		
19c [Evaluating and reporting on financial performance]		.810		
19e [Establishing a financial control system]		.806		
19f [Maintaining a financial control system]		.804		
19g [Making major purchasing decisions]		.601		
18c [Undertaking promotional activities]			.821	
18b [Preparing press releases]			.732	
18d [Preparing marketing materials (e.g. brochures, newsletters, ads, website)]			.645	
18e [Planning special events/media opportunities]			.632	
21d [Liaising with stakeholders, policy makers and other key players]				.733
21g [Identifying resource requirements and cost implications]				.669
21a [Writing and refining strategic plans for the incubator]				.656
21b [Defining/refining mission statement]				.642
21c [Acting as a staff liaison with the incubator board]				.572
21f [Undertaking feasibility studies]				.535

Component 1 is composed of items measuring the level of human resource services available at the incubators. Specifically, items in this component measured the incubators' role in preparing job description and personnel specifications, managing the hiring and firing of staff of the companies, establishing staff appraisal and performance systems, staff supervision, dealing with staff grievances and disciplinary issues, setting and reviewing salary structures, assigning work, duties and responsibilities and developing staff training programmers. This component obtained loadings of between 0.699 and 0.794. This component was labeled '*staff and personnel management*'.

The second component is characterised by loadings measuring the level of financial management services provided by the incubators. Items loading on this component measured incubator's involvement in issues such as monitoring incubatees' budget, evaluation and report on financial performance, establishing a financial control system, maintaining a financial control system, preparing annual operating and capital budgets, writing grant proposals, and making major

purchasing decisions. The factor loadings obtained by these items were from .584 to .827. The component has been labeled '*financial management*'.

The third component is composed of items measuring the level of incubators' involvement in marketing and promotion of incubatees' products. Specifically, the items addressed aspects pertaining to marketing of incubatee products such as incubator's involvement in devising and managing marketing strategies, preparing press releases, undertaking promotional activities, preparing marketing materials, planning special events/media opportunities, representing the incubator, developing media contacts and maintaining media contacts. The factor loadings obtained ranged between .558 and .821. This component has been labeled '*marketing and promotion management*'.

The fourth and final component is composed of items measuring the level of strategic management by the incubators. Generally, items in this factor addressed some aspect of incubators' involvement in the strategic development of the incubatees. Specifically, items address the following characteristics: incubator's role in assisting with writing and refining strategic plans for the incubator, defining, and refining mission statement, acting as staff liaison with incubator board, identification of income generation opportunities, and identification of resource requirements and cost implications. The component obtained factor loadings from .535 to .733. This component has been labeled '*strategic management*'.

Several cross-loads occurred for a number of reasons. Cross-loads between the second component and the third component occurred for two items, which are 18a and 18f. The two items were theoretically loading on the marketing related component, however, the EFA results showed that they also loaded on the component that measures financial management services of the incubators. The reason for the cross-load could be explained by the relationship that devising and managing marketing strategies has with financial management, especially in preparing marketing costs. Items 18a and 18f were deleted for loading on multiple factors.

Cross-loads involving Components 2 and 4 also occurred for items 19b, 19a, and 21e. As mentioned earlier, Component 2 appears to measure the level of incubator's involvement in financial management of the incubatees, while component 4 measures the level of incubator's involvement in strategic management. Item 19a and 19b, which theoretically should load on Component 2, have cross-loaded to component 4. The cross-load occurred due to the association of the word 'budget' with 'grant' and how they may be related to the strategic management of the incubators. Another item, 21e, which loaded on both Component 2 and 4, suggested that the cross-load occurred due to the association between the word 'opportunities' and items loading on strategic management. Due to the sizable cross-loadings, items 19a, 19b, and 21e were deleted.

Cross-loads between items in Component 3 and 4 occurred for two items; 18g and 18h. Both items were theoretically related to component 3, which measures the level of marketing management at the incubators. The cross-load with Component 4 could be explained by the use of the words 'developing' and 'maintaining' which both associate well with strategic management. Items 18g and 18h were deleted due to significant cross-loads and items deletions resulted in an improved total variance explained from 74.1% to 77.5%. Consistent with theory, the majority of items loaded on their corresponding constructs.

CONCLUSION

Findings from the study suggest that the components in business incubation process to some extent are aligned with the extant literature. Incubatee screening is a widely accepted element of the incubation model, and is postulated as a 'defining characteristic' of an incubator, as stated in the European Commission's benchmarking study (CSES, 2002). Researchers (Lumpkin & Ireland, 1988; Peters, Rice & Sundararajan, 2004) agree that careful selection of incubatees is an important management task. It is a significant component of the incubation process (Mian, 1997; Hackett & Dilts, 2004a; Aerts, Matthyssens & Vandenbempt, 2007), as it can increase the probability of incubatee and incubator success (Kuratko, LaFollette & William, 1987; Merrifield, 1987). This study revealed that product-based selection, market and managerial-based selection, and financial-based selection as the underlying components in the business incubation process.

Similarly, the significance of Monitoring and Business Assistance Intensity is also indicated by the results of the EFA where components such as 'time intensity' and 'comprehensiveness and quality' all point to the significance of this construct. This supports findings from Peters, Rice and Sundararajan (2004) who highlighted the significance of monitoring, or coaching in the business incubation process and associate it with increased incubatee graduation rates.

The incubation literature revealed many incubator studies that examined incubators' resources such as incubators' networks (Bollingtoft & Ulhoi, 2005; Studdard, 2006); the quality of the management team (Mian, 1997; Costa-David, Malan & Lalkaka, 2002); the type and the quality of the incubator's connection to a university (Tamasy, 2007); a professional service network and initial government funding (Lalkaka 1996); institutional support (Mian, 1997); and the incubators' image or prestige (Mian, 1997). The findings of this study confirm that resources are a big part of the business incubation process.

Finally, the Professional Management Services' underlying components suggest that services such as marketing and promotion management, strategic management, financial management, and staff and personnel management are all relevant services in the business incubation process.

REFERENCES

- Abetti, P. A. 2004, 'Government-supported incubators in the Helsinki Region, Finland: Infrastructure, results, and best practices', *Journal of Technology Transfer*, vol. 29, pp. 19-40.
- Aerts, K. *et al.* 2007, 'Critical role and screening practices of European business incubators', *Technovation*, vol. 27, no. 5, pp. 254-67.
- Autio, E. & Klofsten, M. 1998, 'A comparative study of two European business incubators', *Journal of Small Business Management*, vol. 36, no. 1, pp. 30-43.
- Barney, J. 1991, 'Firm resources and sustained competitive advantage', *Journal of Management*, vol. 17, no. 1, pp. 99-120.
- Becker, B. & Gassmann, O 2006, 'Corporate incubators: Industrial R&D and what universities can learn from them', *Journal of Technology Transfer*, vol. 31:, pp. 469-83.

- Bergek, A. & Norrman, C. 2008, 'Incubator best practice: A framework', *Technovation*, vol. 28, no. 1-2, pp. 20-8.
- Bollingtoft, A. & Ulhoi, J. P. 2005, 'The networked business incubator-leveraging entrepreneurial agency?', *Journal of Business Venturing*, vol. 20, no. 2, pp. 265-90.
- Carayannis, E. G. & vonZedtwitz, M. 2005, 'Architecting gloCal (global-local), real-virtual incubator networks (G-RVINS) as catalysts and accelerators of entrepreneurship in transitioning and developing economies: lessons learned and best practices from current development and business incubation practices', *Technovation*, vol. 25, pp. 95-110.
- Chrisman, J. J. 1989, 'Strategic, administrative, and operating assistance: The value of outside consulting to pre-venture entrepreneurs', *Journal of Business Venturing*, vol. 4, no. 6, pp. 401-18.
- Costa-David, J. *et al.* 2002, 'Improving business incubator performance through benchmarking and evaluation: lessons learned from Europe', paper presented to 16th International Conference on Business Incubation, Toronto, Canada, April 28-May, 1 2002.
- CSES 2002, *Benchmarking of Business Incubators*, European Commission Enterprise Directorate General.
- Daft, R. 1983, *Organization Theory and Design*, West, New York.
- Evald, M. R. & Bager, T. 2006, 'Managing venture team relationships in corporate incubators: a case study of network dynamics and political rivalry in a high-tech incubator', *International Entrepreneurship Managerial Journal*, vol. 4:, pp. 349-64.
- Gibb, A. 2005, 'Training the trainers for small business', *Journal of European Industrial Training*, vol. 14, no. 17-25.
- Hackett, S. M. & Dilts, D. M. 2004a, 'A real options-driven theory of business incubation', *Journal of Technology Transfer*, vol. 29, no. 1, pp. 41-54.
- Hackett, S. M. & Dilts, D. M. 2004b, 'A systematic review of business incubation research', *Journal of Technology Transfer*, vol. 29, no. 1, pp. 55-82.
- Hackett, S. M. & Dilts, D. M. 2008, 'Inside the black box of business incubation: Study B - scale assessment, model refinement, and incubation outcomes', *Journal of Technology Transfer*, vol. 33, no. 5, pp. 439-71.
- Hackett, S.M. 2006, 'Real options and the option to incubate: An exploratory study of the process of business incubation'.
- Hair, J. F. *et al.* 2010, *Multivariate Data Analysis*, 7th edn, Pearson, London.
- Hancock, G. & Llewellyn, M. 2008, 'Best Practice Business Incubator Management: Toward a Conceptual Research Framework', University of Adelaide, Australia.
- Hannon, P. D. 2003, 'A conceptual development framework for management and leadership learning in the UK incubator sector', *Education & Training*, vol. 45, no. 8/9, pp. 449-60.
- Jusoh, S. 2006, 'Incubators as catalysts in developing high technology businesses: Malaysia's experience', *African Technology Development Forum*, vol. 3, no. 1, pp. 25-9.
- Khota, I.A. & Pretorius, L. 2008, 'Embedded innovation-Strategic management incubators for knowledge hegemony', *South African Journal of Industrial Engineering*, vol.19, no.1, pp. 105-18.

- Kuratko, D. F. *et al.* 1987, 'Small Business Incubators for Local Economic Development', *Economic Development Review*, vol. 5, no. 2, pp. 49-55.
- Lalkaka, R. 1997 *BaTD Strategies, Lessons from international experience for the promotion of business incubation systems in emerging economies*, UNIDO Small medium enterprises programme.
- Lumpkin, J. R. & Ireland 1988, 'Screening practices of new business incubators: The evaluation of critical success factors', *American Journal of Small Business*, vol. 12, no. 4, pp. 59-81.
- Mahmud, A. 2003, *Seed stage venture capitalists & incubators in Malaysia: a win-win collaboration*.
- McAdam, M. & Marlow, S. 2007, 'Building futures or stealing secrets? Entrepreneurial cooperation and conflict within business incubators', *International Small Business Journal*, vol. 25, no. 4, pp. 361-82.
- McAdam, M. & McAdam, R. 2008, 'High tech start-ups in University Science Park incubators: The relationship between the start-up's lifecycle progression and use of the incubator's resources', *Technovation*, vol. 28, no. 5, pp. 277-90.
- McGrath, R. G. 1999, 'Falling forward: real options reasoning and entrepreneurial failure', *Academy of Management Review*, vol. 24, no. 1, pp. 13-30.
- MDeC 2006, *Growing a Vibrant ICT Incubator Industry In Malaysia*.
- Merrifield, B. 1987, 'New business incubators', *Journal of Business Venturing*, vol. 2:, pp. 277-84.
- Mian, S. 1997, 'Assessing the value-added contributions of university technology business incubators to tenant firms', *Journal of Business Venturing*, vol. 12, no. 4, pp. 251-85.
- Mohd Saffar, A. 2009, *Malaysian Incubation Country Case Study*.
- Mohd Yunos, M. G. 2001, 'Building an innovation-based economy: The Malaysian technology business incubator experience', *Journal of Change Management*, vol. 3, no. 2, pp. 177-88.
- Peters, L. *et al.* 2004, 'The role of incubators in the entrepreneurial process', *Journal of Technology Transfer*, vol. 29, no. 1, pp. 83-91.
- Phan, P. H. *et al.* 2005, 'Science parks and incubators: observations, synthesis and future research', *Journal of Business Venturing*, vol. 20, no. 1, pp. 165-82.
- Rice, M. P. 2002, 'Co-production of business assistance in business incubators: An exploratory study', *Journal of Business Venturing*, vol. 17, no. 1, pp. 163-87.
- Studdard, N. L. 2006, 'The effectiveness of entrepreneurial firm's knowledge acquisition from a business incubator', *International Entrepreneurship Management Journal*, vol. 2:, pp. 211-25.
- Totterman, H & Sten, J. 2005, 'Start-ups - Business incubation and social capital', *International Small Business Journal*, vol. 23, no. 5, pp. 487-511.