

Business Incubators: Creation of a Fit in Armenia

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In this paper, we evaluate the extent to which business incubation services meet tenant's needs. Additionally, we pose the question of whether the current business incubators actually cover the needs of a particular industry. Our empirical setting is a developing country in the Caucasian Region (Armenia) and we chose to research solely the IT industry. We employed a two stage procedure: first, we conducted interviews with pivotal people familiar with business incubation in Armenia; second, an electronic questionnaire survey was sent to the entire Armenian IT population. The results suggest a moderate need of IT companies for the typical business incubation services. Further, we show that incubated companies are generally satisfied with the services they enjoy albeit this satisfaction level decreases as the needs increase. Non-incubated companies, on the other hand, perceive incubation services to be valuable for their development and this value increases when their needs increase. Our study implies that a more extensive service provision is necessary to fully cover the needs of the Armenian IT industry for business incubation services.

1. Introduction

Business incubators (BI) are often seen as an important component of a local economic development strategy. Their intervention is based mostly on addressing market failures by enabling entrepreneurship where it previously was too costly or too risky (Hackett and Dilts 2004b). In the particular context of new high technology based firms, literature has shown that such market failures reduce the access of these companies to essential inputs such as finance (Storey and Tether 1998; Carpenter and Petersen 2002) or appropriate professional networks (Smilor 1987; von. Zedtwitz 2003; Peters. et al 2004).

BIs are perceived to be helpful in achieving these objectives. However, a flexible oversight with dynamic readjustment of incubation programs as dictated by local needs is important for maintaining the vitality and effectiveness of BIs in a cost-effective manner (Hackett and Dilts 2004b). This argument is often emphasized in theorizing about BIs highlighting the importance of a "fit" between what is offered by BIs and what is needed by their tenants. Consequently, in order to be effective BIs do not just have

to offer services, they also must offer the adequate services. Mismatches between BI's offer and the tenant's needs might lead to a failure of the incubators. An example is seen when BIs focus their offer entirely on infrastructure while entrepreneurs need high expertise and capital (Carayannis and von Zedtwitz 2005).

Our study set out to research the extent to which Business Incubation Services (BIS) meet tenant's needs. Additionally, we pose the question of whether the current BIs actually cover the needs of a particular industry. Our empirical setting is a developing country in the Caucasian Region (Armenia) and we chose to research solely the IT industry. More extensive insight in the ability of the business incubation system to meet the demand of companies will enable policy makers and other stakeholders in the process of fine-tuning of their business incubation efforts. This is important as a better developed business incubation system can contribute to the economic development of a country as a whole.

2. Literature Review

Previous work on BIS recognizes that incubation is most effective when a fit

exist between the offered services, the service provision approach of the BI and the needs of incubatees. We show that that three important elements need to be considered for evaluating such a fit: “*What*”, “*How*” and “*How Much*”.

2.1. What do BIs offer?

This element refers to the services that BIs offer and the support services needed by incubatees. To understand “*What*” better, it is important to consider the different dimensions along which BIs create value for their incubatees. Bergk and Norrman (2008) categorize the benefits of BIs for their incubatees along five dimensions and discern the main business incubation dimensions as: *Selection*, *Infrastructure*, *Business support*, *Mediation* and *Graduation*.

Selection refers to decisions of BIs concerning which ventures to accept for entry and which to reject. *Infrastructure* concerns localities such as office facilities and administrative services. Through this dimension, BIs generally offer a comparable set of administrative services, including office space and equipment as well as facility-related services and also office services such as reception and clerical services (Mian 1996a; Colombo and Delmastro 2002; Rice 2002; Lalkalka 2003; Lyons and Li 2003; Bollingtoft and Ulhoi 2005; Chan and Lau 2005). *Business Support* is associated with training and coaching activities that are undertaken by BIs to help incubatees develop. Business Support services typically include entrepreneurial training and business development advice, consultancy and other services concerned with general business and legal matters, marketing issues such as advertising and financial assistance (Mian 1996a; Lalkalka 2003; Lyons and Li 2003; Bollingtoft and Ulhoi 2005; Chan and Lau 2005). *Mediation* is concerned with the connection of incubatees to each other and to the outside world. A BI has a bridging function; consequently an important incubator role is to act as an intermediary or mediator between incubatees and

relevant external resources. The BI therefore is a network of individuals and organizations including the BI manager and staff, BI advisory board, incubatee companies and employees, local universities and university community members, industry contacts, and professional services providers such as lawyers, accountants, consultants, marketing specialists, venture capitalists, angel investors, and volunteers (Hackett and Dilts 2004b). Finally *Graduation* is related to the policies of BI’s regarding exit of incubatees from the incubator.

BIs however not always comprehend all these dimensions in their support provision. For understanding “*What*” it is therefore also important to consider that the actual service mix offered by BIs is affected by the BI taxonomies. Hackett and Dilts (2004b) identify different taxonomies employed in the literature for categorization of differences between BIs. These taxonomies classify BIs on the basis of several elements of differentiation such as the BI’s primary financial sponsorship, the nature of incubatees when founded, the business focus of the incubatees and the business focus of the BI. Publicly-sponsored BIs benefit from national and state-government funding sources, while nonprofit BIs benefit from local or community level funding. University-sponsored BIs are funded and operated directly or indirectly by a university. The main objective of universities when promoting a BI is the commercialization of university research and scientific knowledge. Privately-sponsored BIs on the other hand are typically self-funded and are operated in a fashion that resembles hands-on venture capitalists’ involvement in venture investments. They can be run by private investor groups, or by the new venture development units of corporations (Hackett and Dilts 2004b). The second element of differentiation is concerned with the nature of the incubatees when funded. More specifically, it refers to whether incubatees are spin-offs and have

been formed through a split from a larger (mother) company or are completely new companies with no such relation. The remaining elements of differentiation are concerned with the focus of both BIs and incubatees.

Carayannis and von Zedtwitz (2005) also strived to explain how BIs differentiate themselves from other startup facilitators (such as venture capitalists, business angels or consulting companies). They suggest that BIs can be classified based on their particular competitive scope, strategic objective and service package (Carayannis and von Zedtwitz 2005). Based on the work of Porter (Porter 1986), they discern four different elements of competitive scope namely; Vertical scope, Segment scope, Geographical scope and Industry focus.

Vertical scope is concerned with how BIs differentiate themselves from other startup facilitators in the business of providing financial and business support to companies in their initial development stages. They differentiate themselves along factors such as the development stage of the clients in their focus (pre-venture, existence or infancy, early growth) and the institutionalization of the coaching and other services they offer. The *Segment scope* is concerned with the actual source of the client companies in terms of any preferences regarding the actual entrepreneurs. University Incubators for instance typically prefer faculty students and staff entrepreneurs from their host university. The *Geographical scope* is concerned with the geographical focus of a Regional Incubator as a natural competitive factor. Network access as a crucial element of successful business incubations is usually bound to a certain region; this motivates BIs to establish a strong local presence. Exceptions do exist as for example Virtual Incubators which base their business models on a variety of startups rather than a certain geographical region. Finally the *Industry focus* is concerned with the focus of BIs on a

particular industry such as the IT industry. BIs can have different motivations for choosing such a specific focus such as the preferences of the BI manager or simply for the purpose of creating synergies.

Building on Porter's four elements of competitive scope (Porter 1986) and the distinctive strategic objective (for-profit or non-profit), Carayannis and von Zedtwitz (2005) proposed a classification of five different BI archetypes as the most frequently used BI taxonomies; *Regional Business Incubators*, *University Incubators*, *Independent Commercial Incubators*, *Company-Internal Incubators and Virtual Incubators*. Different authors (Hackett and Dilts 2004b; Bergek and Norrman 2008) recognize a shared office space as a necessary component of BIs. Von Zedtwitz however does not consider co-location as a necessary feature of BIs (von Zedtwitz 2003). This is also one of the underlying factors behind the recognition of Virtual Incubators by some authors (Nowak and Grantham 2000; Durão, Sarmento et al. 2005) and the rejection of these institutions as incubators by others (Bears 1998; Hackett and Dilts 2004b; Bergek and Norrman 2008).

Influenced by their competitive scope and strategic objectives, BIs provide their incubatees with certain services. They however can incorporate elements of different archetypes. In other words, "What" or the actual service mix depends on the focus of the BI as well as the needs and preferences of the incubatees (Nash-Hoff 1998). Regarding the latter, Carayannis and von Zedtwitz (2005) point that the actual mix of services should be developed through an agreement between the incubator and the incubatees.

2.2. How (Much) do BIs offer?

BI's service provision can also be differentiated based on their assistance approaches (Rice 2002; Hackett and Dilts 2004a). Bhabra-Remedios and Cornelious (2003) recognize the effectiveness of the services in relation to the success of the tenants is not only effected by the nature of

the services offered, but also by how services are provided. In line with this, Bergek and Norrman (2008) refer to two different categorizations of how services are provided. These categories describe the dimensions within the different approaches that a BI may have with regard to provision of assistance to incubatees. The first and more specific categorization is that of Hackett and Dilts (2004a). The authors recognize that the provision of services by BIs differ along three dimensions: Time intensity (percentage of working hours devoted to monitoring and assisting incubatees), comprehensiveness (the degree to which assistance includes strategic and operational assistance as well as administrative-related services) and degree of quality (the relative value of the assistance) (Hackett and Dilts 2004b).

The second more general categorization of service provision approaches is the one developed by Rice (2002). He distinguishes three different approaches to service provision: Reactive and episodic counseling takes place when the entrepreneur requests help for dealing with a crisis or problem and the assistance is focused on that specific problem and is generally of limited duration. Proactive and episodic counseling is mostly BI initiated; the BI manager engages entrepreneurs in informal, ad hoc counseling. Continual and proactive counseling is also BI initiated and is present when the venture is subjected to an ongoing review and intense-aggressive intervention by BI managers (Bergek and Norrman 2008).

Our study will attempt to evaluate the fit between BIS provision and the needs of the IT companies regarding BIS in the identified framework of “*What*”, “*How*” and “*How Much*”. In line with this, it is important to create a more extensive understanding of the specific needs of already incubated companies in comparison to non-incubated companies which never received such services.

3. Methods

3.1. Research Procedure

A two stage research procedure was employed for answering the research question. The first stage of the research comprehended interviews with pivotal people involved or related with the business incubation system in Armenia and the second stage was a self-administered questionnaire survey. Such a two stage approach enabled us to use the qualitative data gathered from the in-depth interviews for improving the quantitative data gathering through the survey of IT companies.

Interviews were aimed to help us develop a better understanding of the major issues concerning Armenian IT firms. These in-depth interviews were conducted with entrepreneurs, managers, consultants and other professionals operating within the IT industry. The acquired insight enabled us develop expectations regarding the needs of IT companies for BIS and also enabled us to create a questionnaire that better addressed key issues of concern to these companies.

During the second research stage, the survey questionnaires were administered to the complete population of IT companies in Armenia. The Enterprise Incubator Foundation (EIF) which is a non-profit publically sponsored BI is also the single main BI in Armenia. The study therefore involved companies which did or did not receive any services of EIF. Surveying both on and off-incubator companies allowed us to evaluate how the business incubation system covers the needs of different companies for BIS and make a comparison between these two groups. Such a comparison of non-incubated and incubated companies could provide us with valuable information on the needs of non-incubated companies for BIS and needs of incubated companies after receiving such services. Further, studying incubated firms would help us to analyze the match between the received services and the needs of incubated companies for

BIS. The existence of any gaps in demanded and offered BIS in the framework of the tree elements “*What*” “*How*” and “*How Much*” was set as a condition for negatively answering the research question.

3.2. Variables

What. To evaluate this element of fit, we categorized the most common BIS under the three main business incubation dimensions as; Infrastructure, Business Support and Network Mediation. The two remaining dimensions namely; Selection and Graduation were less relevant to the Armenian context as very limited selection procedures existed for receiving BIS by companies in Armenia.

The choice for including the selected lines of BIS was based on the most emphasized BIS in the literature, nevertheless, before inclusion; they were also evaluated by the expert panel. The panel evaluated the presented lines of support and provided us with their expert opinion on their relevancy and made suggestion for inclusion or exclusion of different lines of BIS.

Infrastructure was operationalized through three lines of support services namely; office space, R&D facilities and clerical services. Office space and clerical services are often mentioned as common Infrastructural services. In addition, we also studies R&D facilities as relevant Infrastructural services for IT companies as such facilities are assumed to help companies become/stay innovative. Business Support was operationalized through nine different lines of Business Support services namely; training and coaching regarding leadership, business plan development, innovative problem solving techniques, legal matters, project management, financial management, marketing management, HR management and strategic management. With regard to Mediation, BI’s mediation regarding seven different relevant external parties namely partners, customers, suppliers, employees, university researchers and financiers was

measured. Following the guidance of the expert panel, venture capital was added to the list of Mediation services as this type of investment is found to have specific importance for IT companies in general and more particularly for nascent companies.

Furthermore, variables which indirectly were expected to influence “*What*”, such as the entrepreneurial and managerial education level and experience and the quality of the available infrastructure were used as control variables for evaluating the need for BI services. Through education and work experience individuals develop key skills and enhanced knowledge which positively contributes to the survival of firms (Roberts 1991). The reason for using these variables as control variables was consequently based on the assumption that managers without lower educational levels and work experience would relatively have a higher need for BI support than managers with higher educational attainments.

How. The preferred BI’s approach to support provision was operationalized through the two divergent approaches a BI can have to services provision namely; an BI initiated (proactive) service provision approach and an incubatee initiated (reactive) approach. The preferences of companies in this regard were evaluated for service provision in general and the preferred support provision approach with regard to the different lines of Mediation services.

How Much. For measuring the usage of BIS we used “Man Hours per Month” (M.h.p.m) as a unit of measurement. M.h.p.m stands for the total hours that all employees together are using or in case of non-incubated companies expect to use services if offered. Further, square meters were used as a unit of measurement of the need for office space.

3.3. Data analysis

The Mann-Whitney U test was used for analyzing the statistical differences between the need for BIS of incubated and

non-incubated companies. The choice for this particular test was based on the fact that the computations concerned two independent groups and the collected data were ordinal. The Spearman's correlation coefficient was used for analyzing the interrelation between the need and perceived value of BIS. Here, the Spearman's coefficient was chosen as it is based on ranking of two variables and ordinal data.

Further, the needs of both incubated and non-incubated companies regarding different lines of BIS were evaluated on a five point Likert scale. The match between the offered BIS and the needs of the incubated companies was evaluated through a three point scale ranging from *Does not Match*, *Matches* and *Surpasses*. The gathered data was recoded for evaluating the interrelation between the five and three point scales used during data collection.

4. Results

4.1. First research stage

In addition to commenting on the validity and relevance of the questions in the questionnaire, the panel also evaluated "What" or the needs of the IT industry for the measured BIS. The panel was requested to rank the needs for BIS through the same scaling used in the survey questionnaire. The evaluations of the needs regarding the different BIS by the panel including the average ranks are illustrated in Annex Table 1.

Generally, the results of first research stage made us expect a large need for BIS by IT companies. Regarding Infrastructure, the results pointed towards a high need for services regarding R&D facilities and secretarial services as these were found to be the most needed lines of support services by the expert panel. The expert panel evaluated office space and bookkeeping services to be the de least needed support services in this regard. Based on the comments of the panel, our initial measurement approach regarding

bookkeeping and secretarial services was revised and these two lines of BIS were combined into clerical services as one variable. Such a change was also in line with the literature since the literature considers these services as parts of clerical services.

With regard to Business Support services, the panel found marketing management and project management the most needed lines of Business Support services followed by strategic management and consulting services. The panel also pointed towards certain lines of support services relevant to IT companies which initially were not operationalized. These were training and coaching regarding leadership, innovative problem solving techniques and legal matters. Consulting services and operational management were excluded as they to some degree already were covered by the other lines of BIS operationalized.

Furthermore, the panel found Mediation regarding suppliers and university researchers to be the highest needed line of Mediation by IT companies. Mediation regarding partners was the second most needed line of Mediation. In the questionnaire, direct supply of financing was replaced by mediation regarding venture capital which was considered to be vital and very relevant to IT companies.

4.2. Second research stage

4.2.1. Enterprise Characteristics

11 respondents (20 percent of all respondents) had received BIS of EIF. The remaining 44 respondents (80 percent) indicated not to have received any such services before (See Annex Table 2). Of the incubated companies 45.5 percent were branches of foreign companies when this was only 20.9 percent for non-incubated companies.

4.2.2. Entrepreneur Characteristics

Statistically significant differences were only found regarding IT related educational attainments of managers ($P=0.05$ percent), pointing towards higher

levels of technical IT related knowledge of the managers of incubated companies (See Annex Table 3). In contrary to IT related education, managers of non-incubated companies on average had slightly higher educational attainments regarding business management education.

With regard to working experience, as illustrated in Annex Table 4, 96 percent of all companies had managers with prior IT related work experience who on average also had 13 years of experience in this field. At the same time, 70 percent of companies had manager(s) with prior business management experience.

4.2.3. Need for Business Incubation Services

Regarding “*What*” the first element of fit, the need of IT companies for BIS was smaller than expected, considering the results of the first research stage which respectively pointed towards a large need (See Annex Table 5). Nevertheless, a considerable group of the non-incubated companies needed BIS. Statistically significant differences in the needs of incubated and non-incubated companies were only found regarding business plan development, marketing management support services and Mediation services regarding partners, costumers and financiers. These significant differences of the needs between incubated and non-incubated companies illustrated an interesting pattern of smaller needs by incubated companies. Regarding Infrastructure, 63.6 percent of the non-incubated companies had a need for office space. Further, the need for R&D facilities and clerical services were considerably low as 63.6 and 67.3 percent of all companies indicated not to need such services at all. Such a low need contrasted the expectations of the expert panel.

Furthermore, leadership training and coaching and marketing management were the most needed Business Support services followed by project management and strategic management. The need for these services was in line with the expert

evaluations. Regarding Mediation services however, again the expert panel evaluations varied from the actual need indicated by the companies. Here, mediation with regard to costumers was the most needed line of Mediation support followed by mediation regarding employees and financiers.

Concerning “*How Much*”, non-incubated companies clearly perceived a larger usage of Business Support services than incubated companies were receiving. With an average expected use of 22.5 M.h.p.m, non-incubated companies found innovative problem solving techniques to require the highest volume of assistance. Innovative problem solving techniques were followed by marketing management and financial management which on average were expected to require 20 M.h.p.m of support services. The lowest support volumes of Business Support services were needed for project management training and coaching regarding legal matters and strategic management.

4.2.4. Value of Business Incubation Services

During the data analysis we saw that in some cases when there was no need for a service, respondents omitted to indicate the value of such a service if provided. These (missing) responses were corrected with (no value at all) answers. The following correlation analysis showed a significant interrelation between respondents need for infrastructure, business support services and the expected value of these services for the future development of companies. Regarding Mediation services, there only was a significant positive relationship between the need for mediation regarding partners, costumers and financier and the respective value of these services. The positive significant interrelationship between the need for and the expected value of different services pointed towards a higher value perception for these services in case the need for such services increased. In other words, the larger the need for business support services became

the value of these services for the businesses also increased. Table 1 illustrates this interrelation by the

correlation coefficient (r_s) and the probability of an interrelation through the significance value.

Table 1 Percentage of Companies Categorized by their Perceived Value of Business incubation Services and the Interrelation of the Need for and the Expected Value of BIS.

<i>Lines of support services</i>	<i>No value at all</i>	<i>little value</i>	<i>Average value</i>	<i>Large value</i>	<i>Very large value</i>	(r_s)	<i>Sig (2-tailed)</i>
INFRASTRUCTURE							
Office space	31.8%	20.5%	2.3%	.0%	9.1%	0.806	0.000
R&D Facilities	59.5%	2.4%	9.5%	14.3%	14.3%	0.743	0.000
Clerical Services	60.5%	4.7%	18.6%	7.0%	9.3%	0.708	0.000
BUSINESS SUPPORT SERVICES							
Leadership Training and Coaching	37.2	20.9%	9.3%	18.6%	14.0%	0.884	0.000
Business-plan development	51.2%	11.6%	9.3%	16.3%	11.6%	0.979	0.000
Innovative problem solving techniques	48.0%	14.0%	4.7%	16.3%	16.3%	0.994	0.000
Project Management	46.5%	9.3%	11.6%	11.6%	20.9%	0.897	0.000
Financial Management	55.8%	7.0%	9.3%	11.6%	16.3%	0.857	0.000
Legal matters	46.5%	11.6%	11.6%	11.6%	18.6%	0.974	0.000
Marketing Management	31.8%	6.8%	9.1%	20.5%	29.5%	0.823	0.000
HR Management	46.5%	4.7%	23.3%	11.6%	14.0%	0.947	0.000
Strategic Management	48.9%	8.9%	8.9%	13.3%	20.0%	0.870	0.000
MEDIATION SERVICES							
Partners	30.2%	9.3%	18.6%	23.3%	18.6%	0.400	0.003
Costumers	21.4%	14.3%	19.0%	21.4%	23.8%	0.316	0.021
Suppliers	63.6%	27.3%	4.5%	4.5%	.0%	0.505	0.000
Employees	52.4%	9.5%	4.8%	19.0%	14.3%	0.620	0.000
University Researchers	66.7%	2.4%	11.9%	14.3%	4.8%	0.467	0.000
Financiers	37.2%	9.3%	11.6%	14.0%	27.9%	0.363	0.007
Equity investors	66.7%	11.9%	9.5%	4.8%	7.1%	0.401	0.003

The correlation coefficient is illustrated as the (r_s).

4.2.5. Match of the Needs and Received Services

In order to compute the interrelation between the need for BIS and the satisfaction level of incubated companies an equal number of ranks were required. We therefore, changed the ranking of the needs from a five point to a three point scale. This was done by recoding the ranks 1 and 2 into 1, rank 3 into 2 and the ranks 4 and 5 into 3. Furthermore, during the correlation analysis we disregarded responses indicating no need for support services as dissatisfaction in such cases

would be of no avail. Such an analysis allowed us to evaluate whether the high satisfaction level of incubated companies regarding the services they received was only based on a low need for such services or on the actual fit between the needs of these companies and the offered services. The results showed that the offered BIS were highly matching the needs of incubated companies. In case office space and R&D facilities, even all incubated companies found the offered services to be matching their needs. However, despite the high satisfaction level, there was a strong negative correlation between the need for services and the match of the offered

services. Significant negative interrelation was found between the need and satisfaction level of BIS concerning innovative problem solving techniques, financial management, legal matters, marketing management and strategic management, pointing towards a decrease

in the satisfaction level regarding the received services as the need for these services increased. The satisfaction level of incubated companies regarding the incubation services received is illustrated in Table 2.

Table 2 Match of the Offered Services with the needs

<i>Matching the needs</i>	<i>Is less</i>	<i>Matches</i>	<i>Surpasses</i>	<i>(r_s)</i>	<i>Sig (2-tailed)</i>
INFRASTRUCTURE					
Office space	0%	100%	0%	.	.
R&D Facilities	0%	100%	0%	.	.
Clerical Services	0%	81.8%	9.1%	-.143	0.736
BUSINESS SUPPORT SERVICES					
Leadership Training and Coaching	9.1%	72.7%	.0%	0.125	0.749
Business-plan development	9.1%	90.9%	.0%	0.100	0.770
Innovative Problem Solving Techniques	27.3%	72.7%	.0%	-0.908	0.000
Project Management	18.2%	81.8%	.0%	-.241	0.476
Financial Management	20.0%	80.0%	.0%	-1	.
Legal matters	18.2%	81.8%	.0%	-0.809	0.003
Marketing Management	18.2%	81.8%	.0%	-1	.
HR Management	18.2%	81.8%	.0%	-.333	0.317
Strategic Management	27.3%	72.7%	.0%	-.989	0.000
MEDIATION SERVICES					
Mediation regarding Partners	10%	90%	.0%	-.430	0.214
Mediation regarding Costumers	11.1%	88.9%	.0%	-.612	.0080
Mediation regarding Suppliers	20%	80%	.0%	.	.
Mediation regarding Employees	36.4%	63.6%	.0%	-.357	.345

4.2.6. Service Provision Approach

Regarding “How”, the third element of fit; the preferences of companies were quite diverse regardless whether they were incubated or non-incubated. Both reactive and proactive service provision approaches were favored regarding services provision in general. The differences between incubated and non-incubated companies were very small and there were no statistical significant differences in the preferences of these two groups of companies (See Annex Table 6).

With regard to the preferred BI approach to support provision for Mediation services, again the preferences varied very much among companies. As illustrated in Annex Table 7, for mediation regarding partners, costumers and financiers a proactive or BI initiated

service provision were more often favored. An incubatee initiated service provision approach was often favored for mediation regarding suppliers, employees, university researchers and equity investors.

4.2.7. Quality of the Available the Infrastructure

The results demonstrated no statistically significant differences between the quality of the available infrastructure for incubated and non-incubated companies (See Annex Table 8). The over majority of companies evaluated the quality of the currently available infrastructure as good and some even excellent. The relative high quality of the currently available infrastructure was therefore in line with the moderate identified need for infrastructural support services.

Moreover, incubated companies found the quality of the available infrastructure to be higher than non-incubated companies. Additionally, of the incubator tenant companies, 60 percent evaluated the overall quality of the infrastructure as excellent. This percentage was only 16 percent for companies residing outside the incubator premises, indicating a higher satisfaction of tenant companies on the quality of the available infrastructure compared to non-tenant companies.

5. Discussion

Regarding “*What*”, the needs of IT companies for BIS were weaker than initially thought, especially if we consider the moderate level of business management education and experience of managers and also the moderate developed national innovation system in Armenia. Managers with advanced education and business management experience are expected to perform better than those without such skills and consequently are assumed to need less support in this regard (Peña 2004). The moderate need also contradicts suggestions made in the literature regarding high-technology laggard countries where the presence of bridging institutions such as BIs may relatively be more beneficial than in countries where the national innovation system is more advanced (Colombo and Delmastro 2002).

Further, there was a moderate need for BIS regarding infrastructure. Companies found the quality of the currently available infrastructure to be quite high, which is an important factor influencing the need for BIS regarding infrastructure. Further, a large share of the non-incubated companies had a moderate need for office space; reasonably, this need was smaller for incubated companies as some of these companies were also tenants of EIF. The moderate need for Infrastructural BIS to some degree justifies the primary focus of the current BI system on the other dimensions of BIS as service mix the

should depend on both the focus of the BI as well as the needs and preferences of the incubatees (Nash-Hoff 1998). This also suggests that (future) BIs should also have a relative low focus on the provision of Infrastructural services than other BIS. Moreover, the need for R&D facilities was even smaller than the need for office space. We assume that the low need for such facilities is related to the main activities of the Armenian IT companies which do not need extensive R&D facilities as labs to function. The need for such facilities is therefore only likely to increase in case the industry will become more engaged in activities that require higher levels of innovational attainments. Once this is the case it may be better if BIs would base their business models on companies with high needs for such facilities in a certain geographical region which is typical for Regional Business Incubators (Carayannis and Zedtwitz 2005). As an exception, the need of incubated companies regarding clerical services was slightly larger than the indicated need by the non-incubated companies. The need for such services by the incubated companies may have been a reason for some of these companies to be located at the EIF premises.

Business Support was the highest needed dimension of Business Incubation dimensions identified by Bergk and Norrman (2008). Regarding Business Support and Mediation, non-incubated companies perceived marketing management training and coaching and mediation with regard to costumers as very valuable to the future development of their company. This can signify issues regarding the market and customer orientation of these companies. The small Armenian domestic IT market can be an underlying factor for such a high need for marketing training and coaching and mediation with regard to costumers (EIF 2008). As costumers must be found on the international market this increases the geographic and businesswise distance

between producer and customer. Therefore, the provision of these services by the Armenian business incubation system may have a crucial effect on the development of the Armenian IT industry.

Financial management involves three major types of decisions: (1) long-term investment decisions, (2) long-term financing decisions and (3) working capital management decisions. These decisions concern the acquisition and allocation of resources among the firms various activities (H K Baker and Powell 2005). The low revealed need for BIS regarding financial management can therefore point towards a low necessity of making financial decisions as for example investments are limited and no sales need to be funded on credit. The extreme low need for mediation regarding equity investments was also interesting in this regard. Logically, such a low need can be caused by two factors, one is that companies already have sufficient access to equity investors, or that companies are not ready to receive financing in exchange of company shares. If the second is causing such a low need, this might also tell us more about the willingness of businesses to invest. Consequently, for the development of the industry it may be interesting to explore what barriers businesses see for investing and developing their business before offering services such mediation regarding equity investors.

Bearing in mind that incubated companies had a significant lower need for BIS than non-incubated companies; it is probable that the currently offered BIS are effective in addressing the needs of the incubated companies. This would also imply that BI is an effective tool assisting the development of the Armenian IT industry. Nevertheless, needs of incubated companies might also have been affected by the nature of these companies as 45 percent of the incubated companies are subsidiaries of foreign companies compared to 20 percent of the non-

incubated ones. Being a subsidiary of a foreign company can affect the need for BIS as such a company usually is established for a very specific purpose such as R&D and has a very limited list of responsibilities next to this specific purpose. This is in line with the assumption that the role of such a subsidiary is "assigned" to it by the parent company according to such factors as the perceived capabilities of the subsidiary and the strategic importance of the local market (Bartlett and Ghoshal 1986). Companies that for example are solely occupied with performing in-sourcing tasks for their (foreign) mother company are assumed to have limited interest in assistance with regard to marketing management as all marketing activities are carried out by the mother company. This also could be an underlying reason for the large difference between the need for BIS among incubated and non incubated companies.

The results of the study also illustrated that the offering of BIS is perceived to be valuable by non-incubated companies. In other words, non-incubated companies believe that BIS in case offered will be valuable for their development. This implies that the non-incubated companies are likely to become part of the incubation system if the chance occurs. The value perception of these companies and their willingness to participate will have consequences for future incubation initiatives and should consequently be taken into account.

6. Conclusions and Recommendations for Further Research

Regarding "What", the study results suggest that there is a moderate need for BIS by the Armenian IT industry. Nevertheless the high value perception of non-incubated companies and the positive correlation of the perceived value with higher needs suggest that the non-incubated companies find the availability of BIS valuable for their development. There is consequently a considerable

group of non-incubated companies in need of BIS which currently is not served. Furthermore, despite the high satisfaction level of incubated companies, the negative correlation between the need for BIS and the match of the offered services points that the high satisfaction level of incubated companies' currently is a result of the moderate need of these companies for such services. Consequently, BIs fall short to cover the needs of companies if their needs increase. The study results therefore reveal a gap between the need for BIS and the BIS actually offered by the Armenian BIs.

Regarding "How", the second element of fit, the results suggest that both reactive and proactive service provision approaches were favored regarding service provision in general. Currently EIF often tailors its support services to the needs of individual companies. The incubator is therefore able to adjust its approach to the preferences of the incubatees in this regard and utilize this element for increasing the effectiveness of its support provision which is positive (Carayannis and Zedtwitz 2005). There however is a large group of companies which are in need of BIS. Consequently, if the Armenian business incubation system is to cover the complete IT industry such an individual approach may be impossible to maintain by the currently operating BI(s).

With regard to the third element "How Much", there was a large difference between the use of BIS by incubated companies and the expected usage by non-incubated companies. Non-incubated companies need many M.h.p.m of different Infrastructural and Business Support services; however, only limited support exists regarding these business incubation dimensions. Regarding Business Support services, the most M.h.p.m were needed for innovative problems solving techniques, followed by financial management and marketing management. Different components such as R&D facilities and services regarding innovative problem solving techniques are however

not offered at all, again pointing towards a gap between the demand for BIS and the offering of these services.

To this end, the findings suggest that the current business incubation efforts in Armenia do not cover the need for BIS of the Armenian IT industry as a considerable need exists which currently is not addressed. Tailored support provision is positive but may be hard to do if not impossible as EIF tries to cover the entire IT population with BIS. The current efforts with regard to business incubation in Armenia are therefore on the right track; however there is much to be done to cover the demand of the IT industry for BIS.

Contribution and Further Research

This work extends prior research on business incubation by targeting the specific needs of IT companies and shedding more light on the needs of such companies in a moderately developed industry with a relative low level of innovativeness. Such a study in this geographical context is an interesting addition to the literature that usually is focused on northern European and American countries where the national Business Incubation and innovation system is more advanced. Moreover, a study of an entire population is quite unique and is to our notice not done before.

In addition, despite the less advanced national business incubation system and the existence of considerable market failures in Armenia, the need for essential inputs and BIS appeared to be moderate. The results of the study, consequently contradict suggestions made in the literature regarding high-technology laggard countries where the presence of bridging institutions such as BIs may relatively be more beneficial than in countries where the national innovation system is more advanced (Colombo and Delmastro 2002).

As, the target group of this study was companies in a moderately developed industry. The extent to which the new

insights gained from this research are generalizable to other geographical contexts and industry development must be tested through follow-up studies. Comparative studies on the influence of industry development and innovativeness level on the need for BIS will also be a valuable addition to the existing literature. It would also be desirable to develop a clearer understanding on the needs of companies with different orientation than the ones studied here. The underlying factors influencing the preference of companies regarding the BI's involvement in support provision are also an interesting point for further research. Such an understanding will contribute to the fit between BIs offering and the needs of their (potential) target companies. BIs could therefore be able to adjust their involvement approach to their target companies before the start of the

incubation process. In line with this, further research is also required to assess the necessary measures that must be taken in order to meet the needs of these companies. Respective feasibility studies are needed to assess the most efficient and effective ways of providing the needed support services.

As discussed before, despite being declared a priority sector, the development of the Armenian IT sector has been less intensive as in some other developing countries. Similar research in such countries can shed more light on the needs of IT companies in other context. Hence, it would also be interesting to analyze the needs of the Armenian IT companies in later points in time when the business incubation system in the country has developed further. Such longitudinal studies will allow researchers to further develop the theory on business incubation.

Annexes

Annex Table 3 Evaluation of the Industry Needs by the Expert Panel

<i>Business Incubation Services</i>	<i>Mr. Kirakosyan</i>	<i>Mr. Vardanyan</i>	<i>Mr. Yengibaryan</i>	<i>Average Ranks</i>
INFRASTRUCTURE				
Office space	3	4	3	3.3
R&D Facilities	4	5	3	4.0
Secretarial Services	4	5	2	3.7
Bookkeeping Services	4	3	2	3.0
BUSINESS SUPPORT SERVICES				
Consulting Services	5	4	4	4.3
Business Plan Development	2	4	5	3.7
Project Management	5	4	5	4.7
Financial Management	4	4	4	4.0
Marketing Management	5	4	5	4.7
HR Management	4	4	3	3.7
Strategic Management	5	4	4	4.3
Operations Management	2	4	4	3.3
MEDIATION SERVICES				
Partners	5	4	4	4.3
Customers	2	4	5	3.7
Suppliers	5	4	5	4.7
Employees	4	4	4	4.0
University Researchers	5	4	5	4.7
Financiers	4	4	3	3.7
Direct supply of financing by incubator	5	4	4	4.3

Notes: 1 = no need at all, 2 = little need, 3 average need, 4 = Large need, 5 = Very large need

Annex Table 4 Company Origin of Responding Companies

<i>Company Groups</i>	<i>Foreign Branch</i>	<i>Local Company</i>
Percentage of Incubated	45.5%	54.5%
Percentage of Non-incubated	20.9%	79.1%

Annex Table 5 Percentage of Companies Categorized by Manager's Educational Attainments

<i>Lines of education</i>	<i>Non-of the managers (1)</i>	<i>At least one of the managers (2)</i>	<i>All of the managers (3)</i>	<i>Average Ranks</i>	<i>P-value</i>
IT related Education					0.050
% of incubated companies	10.0%	20.0%	70.0%	2.60	
% of non-incubated companies	18.2%	50.0%	31.8%	2.14	
Business Management Education					0.284
% of incubated companies	40.0%	60.0%	.0%	1.60	
% of non incubated companies	25.0%	70.5%	4.5%	1.80	

Annex Table 6 Prior Work Experience of Managers

<i>Field of Experience</i>				<i>Yes</i>	<i>No</i>
% of companies had managers with prior IT related work experience				96.0%	4.0%
% of companies had managers with prior Business Management experience				70.0 %	30.0%
Years of working experience (average 13 years)	0-5	6-10	11-20	21-30	31+
Years of experience	34.8%	21.7%	21.7%	13.0%	8.7%

Annex Table 7 Percentage of Companies Categorized by their Need for Incubation Services

<i>Lines of support services</i>	<i>No need at all</i>	<i>little need</i>	<i>Average need</i>	<i>Large need</i>	<i>Very large need</i>	<i>M.h. p.m</i>	<i>Average Ranks</i>	<i>P-value</i>
INFRASTRUCTURE								
Office space								0.148
Incubated	63.6%	9.1%	18.2%	9.1%	.0%	N.A	1.73	
Non-incubated	36.4%	22.7%	22.7%	6.8%	11.4%	N.A	2.34	
R&D Facilities								0.365
Incubated	72.7%	9.1%	9.1%	9.1%	.0%	N.A	1.55	
Non-incubated	61.4%	6.8%	9.1%	11.4%	11.4%	131	2.05	
Clerical Services								0.631
Incubated	63.6%	.0%	18.2%	.0%	18.2%	N.A	2.09	
Non-incubated	68.2%	11.4%	2.3%	11.4%	6.8%	40	1.77	
BUSINESS SUPPORT SERVICES								
Leadership Training and Coaching								0.244
Incubated	54.5%	27.3%	9.1%	9.1%	.0%	2.3	1.73	
Non-incubated	39.5%	25.6%	11.6%	14.0%	9.3%	16.5	2.28	
Business-plan development								0.035
Incubated	81.8%	9.1%	9.1%	.0%	.0%	1	1.27	
Non-incubated	48.8%	14.0%	9.3%	20.9%	7.0%	17	2.23	
Innovative problem solving techniques								0.457
Incubated	48.8%	14.0%	9.3%	14.0%	14.0%	1	2.00	
Non-incubated	63.6%	.0%	9.1%	27.3%	.0%	22.5	2.30	
Project Management								0.185
Incubated	63.6%	9.1%	27.3%	.0%	.0%	1.5	1.64	
Non-incubated	46.5%	16.3%	7.0%	16.3%	14.0%	15	2.35	
Financial Management								0.593
Incubated	72.7%	.0%	.0%	27.3%	.0%	0	1.82	
Non-incubated	60.5%	9.3%	9.3%	14.0%	7.0%	20	1.98	

Annex Table 8 Percentage of Companies Categorized by their Need for Incubation Services (continued)

<i>Lines of support services</i>	<i>No need at all</i>	<i>little need</i>	<i>Average need</i>	<i>Large need</i>	<i>Very large need</i>	<i>M.h. p.m</i>	<i>Average Ranks</i>	<i>P-value</i>
Legal matters								0.159
Incubated	72.7%	.0%	18.2%	9.1%	.0%	0.5	1.64	
Non-incubated	47.7%	11.4%	18.2%	11.4%	11.4%	15	2.27	
Marketing Management								0.043
Incubated	72.7%	9.1%	.0%	9.1%	9.1%	0	1.73	
Non-incubated	36.4%	6.8%	9.1%	29.5%	18.2%	20	2.86	
HR Management								0.352
Incubated	63.6%	9.1%	18.2%	9.1%	.0%	1	1.73	
Non-incubated	48.8%	14.0%	18.6%	9.3%	9.3%	17	2.16	
Strategic Management								0.070
Incubated	72.7%	.0%	18.2%	9.1%	.0%	0	1.64	
Non-incubated	43.2%	13.6%	6.8%	20.5%	15.9%	15	2.52	
MEDIATION SERVICES								
Mediation regarding Partners								0.040
Incubated	63.6%	9.1%	18.2%		.0%	N.A	1.73	
Non-incubated	34.9%	7.0%	20.9%		18.6%	N.A	2.79	
Mediation regarding Costumers								0.030
Incubated	54.5%	9.1%	27.3%		.0%	N.A	1.91	
Non-incubated	23.8%	14.3%	21.4%		16.7%	N.A	2.95	
Mediation regarding Suppliers								0.142
Incubated	90.9%	.0%	.0%		9.1%	N.A	1.36	
Non-incubated	64.3%	26.2%	4.8%		.0%	N.A	1.50	
Mediation regarding Employees								0.795
Incubated	45.5%	18.2%	18.2%		18.2%	N.A	2.27	
Non-incubated	52.4%	11.9%	9.5%		9.5%	N.A	2.19	
Mediation University Researchers								0.340
Incubated	81.8%	.0%	18.2%		.0%	N.A	1.79	
Non-incubated	69.0%	2.4%	14.3%		4.8%	N.A	1.36	
Mediation regarding Financiers								0.011
Incubated	72.7%	9.1%	18.2%		.0%	N.A	1.45	
Non-incubated	37.2%	7.0%	11.6%		20.9%	N.A	2.84	
Mediation Equity investments								0.161
Incubated	90.9%	.0%	9.1%		.0%	N.A	1.18	
Non-incubated	69.0%	11.9%	11.9%		2.4%	N.A	1.60	

Notes: the average need is based on the following ranks, no need at all =1, little need=2, average need =3, Large need= 4, Very large need =5. M.h.p.m stands for the total hours that all employees together are using or incase of non incubated companies expect to use such services if offered. The correlation coefficient is illustrated as the (rs).

Annex Table 6 Companies Categorized by the Preferred Service Provision Approach in General and the Statistical Differences between the Preferences of Incubated and Non-Incubated Companies.

<i>P-value = 0.871</i>	<i>Very Much Reactive</i>	<i>Somewhat reactive</i>	<i>Neither</i>	<i>Somewhat proactive</i>	<i>Very much proactive</i>	<i>Average Ranks</i>
Incubated	36.4%	9.0%	.0%	27.3%	27.3%	3.00
Non-incubated	25%	16%	14%	18%	27%	3.07

Annex Table 7 Percentage of Companies Categorized by the Preferred Services Provision Approach for Mediation Services

	<i>Partners</i>	<i>Costumers</i>	<i>Suppliers</i>	<i>Employees</i>	<i>University Researchers</i>	<i>Financiers</i>	<i>Equity Investments</i>
On-demand	48.1%	43.8%	84.6%	56.0%	57.1%	34.6%	58.3%
Pro-active	51.9%	56.2%	15.4%	44.0%	42.9%	65.4%	41.7%

Annex Table 8 Percentage of Companies Categorized by the Quality of the Available Infrastructure and the Statistical Differences between the between Incubated and Non-Incubated Companies.

<i>P-value = 0.094</i>	<i>Excellent</i> (1)	<i>Good</i> (2)	<i>Moderate</i> (3)	<i>Poor</i> (4)	<i>Not-useful</i> (5)	<i>Average</i> <i>Ranks</i>
Incubated	36.4%	36.4%	27.3%	.0%	.0%	1.91
tenant companies	60.0%	20.0%	20.0%	.0%	.0%	3.60
non-tenant companies	16.7%	50.0%	33.3%	.0%	.0%	2.17
Non-incubated	11.4%	45.5%	34.1%	9.1%	.0%	2.05

References

- Bartlett, C. A. and S. Ghoshal (1986). "Tap your subsidiaries for global reach." *Harvard Business Review* 64(6): 87-94.
- Bearse, P. (1998). "A Question of Evaluation: NBIA's Impact Assessment of Business Incubators." *Economic Development Quarterly* 12(4): 322-333.
- Bergek, A. and C. Norrman (2008). "Incubator best practice: A framework." *Technovation* 28(1-2): 20-28.
- Bhabra-Remidos, R. K. and B. Cornelius (2003). Cracks in the egg: improving performance measures in business incubator research. Small Enterprise Association of Australia and New Zealand 16th Annual Conference. Ballarat.
- Bollingtoft, A. and J. P. Ulhoi (2005). "The networked business incubator leveraging entrepreneurial agency? ." *Journal of Business Venturing* 20(2): 265–290.
- Carayannis, E. G. and M. von Zedtwitz (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* 25(2): 95-110.
- Carayannis, E. G. and M. v. Zedtwitz (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* 25(2): 95-110.
- Carpenter, R. E. and B. C. Petersen (2002). "Capital market imperfections, high-tech investment, and new equity financing." *Economic Journal of Business Venturing* 112: F54–F72.
- Chan, K. F. and T. Lau (2005). "Assessing technology incubator programs in the science park: the good, the bad and the ugly. ." *Technovation* 25(10): 1215–1228.
- Colombo, M. G. and M. Delmastro (2002). "How effective are technology incubators?: Evidence from Italy." *Research Policy* 31(7): 1103-1122.
- Durão, D., M. Sarmiento, et al. (2005). "Virtual and real-estate science and technology parks: a case study of Taguspark." *Technovation* 25(3): 237-244.
- EIF (2008). *Armenian Information Technology Sector State of Industry Report*. Yerevan, Enterprise Incubator Foundation: 20.
- H K Baker and G. E. Powell (2005). *Understanding financial management: A practical guide* Door Oxford, Blackwell Publishing Ltd.
- Hackett, S. M. and D. M. Dilts (2004a). "A real options-driven theory of business incubation. ." *Journal of Technology Transfer* 29 (1),(55–82).
- Hackett, S. M. and D. M. Dilts (2004b). "A Systematic Review of Business Incubation Research." *The Journal of Technology Transfer* 29(1): 55-82.
- Hackett, S. M. and D. M. Dilts (2004b). "A Systematic Review of Business Incubation Research." *Journal of Technology Transfer* 29(1): 55-82.
- Lalkalka, D. (2003). Current trends in business incubation. *The Africa Regional*

- Conference on Business Incubation. Bagamayo, Tanzania,.
- Lyons, T. S. and S. Li (2003). The state of the Wisconsin incubation industry in 2002: an analysis of the results of the survey of membership, Report prepared for The Wisconsin Business Incubator Association.
- Mian, S. A. (1996a). "Assessing value-added contributions of university technology business incubators to tenant firms." *Research Policy* 25(3): 325–335.
- Nash-Hoff, M. (1998). For-profit incubators—An industry survey report. N. Publications. Ohio.
- Nowak, M. J. and C. E. Grantham (2000). "The virtual incubator: managing human capital in the software industry." *Research Policy* 29(2): 125-134.
- Peña, I. (2004). "Business Incubation Centers and New Firm Growth in the Basque Country." *Small Business Economics*(22): 223–236.
- Peters. et al (2004). "The Role of Incubators in the Entrepreneurial Process." *Journal of Technology Transfer* 29: 83-91.
- Porter, M. (1986). *Competition in Global Industries: A Conceptual Framework*. Boston, Harvard Business School Press: pp. 15–60
- Rice, M. P. (2002). "Co-production of Business Assistance in Business Incubators: An Exploratory Study." *Journal of Business Venturing* 17: 163–187.
- Rice, M. P. (2002). "Co-production of Business Assistance in Business Incubators: An Exploratory Study." *Journal of Business Venturing* 17: 163–187.
- Rice, M. P. (2002). "Co-production of business assistance in business incubators: an exploratory study." *Journal of Business Venturing* 17(2): 163-187.
- Roberts, E. B. (1991). *Entrepreneurs in High Technology*. Oxford, Oxford University Press.
- Smilor, R. W. (1987). "Managing the Incubator System: Critical Success Factors to Accelerate New Company Development." *IEEE Transactions on Engineering Management* EM 34(4): 146–156.
- Storey, D. J. and B. S. Tether (1998). "Public policy measures to support new technology-based firms in the European Union. ." *Research Policy* 26(1037–1057).
- von Zedtwitz, M. (2003). "Classification and management of incubators: aligning strategic objectives and competitive scope for new business facilitation." *International Journal of Entrepreneurship and Innovation Management* 3(1/2): 176 –196.