Chapter 2.1

Enabling Innovative Entrepreneurship through Business Incubation

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Introduction

A country's primary socioeconomic goal is to improve the quality of life of its citizens. The competitiveness of the economy must be raised, opportunities that empower people to earn sustainable incomes must be created, and problems affecting the population, such as disease and environmental degradation must be alleviated. In pursuing this mission, a country's ability to reformulate the traditional model of economic growth is essential, so that knowledge, technology, entrepreneurship, and innovation are positioned at the center of its development agenda. Innovation, in particular, triggers a virtuous development circle that unleashes human ingenuity to develop and deliver products and services that are needed by the population and increase enterprise competitiveness, while simultaneously creating sustainable incomes and tax revenues that can be reinvested for social and economic gains.

In the development context, innovation should be viewed as changes in thinking, products, processes, organizations, or new ideas which are successfully applied. Innovation in business is thus defined by assessing the novelty of products, services, and processes relative to customers' current perception of value and their experience of alternative offerings. It is linked to performance and growth, through improvements in efficiency, productivity, quality, competitive positioning, and market share.

Inventions with potentially high social and economic value can be found in numerous sources, including the grassroots, academia, small and large enterprises, R&D centers, and government agencies. In today's global knowledge economy, people and institutions also have immediate access to inventions that have already been introduced in other countries and settings. However, the environment often discourages entrepreneurs from bringing inventions to market, regardless of the source. Many are not utilized because they are not adequately tailored to local needs. Thus, countries are faced with the challenge not only of spurring invention domestically or identifying existing inventions abroad that can be adapted to the local environment, but also of *creating the conditions that allow the invention to be coupled with entrepreneurship*, so that the economic and social wealth creation potential of the invention can be realized.

Globally, policymakers and their development partners have invested in a range of initiatives to create these favorable conditions, including policy and regulatory incentives, mechanisms to expand access to capital, and education reform. Within this landscape of interventions that link innovation and entrepreneurship is the process of business incubation, characterized by a focus on strengthening dynamic, growth-oriented, early-stage enterprises.

This chapter focuses on the use of business incubation as a tool to help developing countries bring new ideas to the market, and thereby create social and economic wealth. As shown in Box 1, the paper draws on infoDev's extensive experience with supporting business incubation across 80 developing countries, including a comprehensive monitoring and evaluation impact assessment (MEIA), concluded in 2007, which surveyed 49 business incubators in 49 developing countries.

Business incubators within the innovation and entrepreneurship ecosystem

Business incubation is a process aimed at supporting the development and scaling of growth-oriented, early-stage enterprises.[1] The process provides entrepreneurs with an enabling environment at the start-up stage of enterprise development, to help reduce the cost of launching the enterprise, increase the confidence and capacity of the entrepreneur, and link the entrepreneur to the resources required to start and scale a competitive enterprise. Entrepreneurs accepted into the business incubator stay until an agreed upon milestone is reached, often measured in terms of sales revenue or profitability.

Business incubation is one of many tools aimed at fostering innovative enterprise creation and growth. There can be other complementary vehicles, such as business development centers and technology parks. Table 1 illustrates how business incubation is positioned vis-à-vis these two complementary vehicles.[2]

What infoDev refers to as the "innovation and entrepreneurship ecosystem" is an expansion of the so-called "triple helix" framework, also known as the "innovation system." While the innovation system framework is evolving, it emphasizes that there must be sufficient linkages between universities, industry, and government in order to spur innovation and to bring innovation to market (Lundvall, 1992; Nelson, 1993, Fagerberg and Nelson, 2004). Expanding upon this school of thought, infoDev's experience indicates that effective coupling of innovation and entrepreneurship requires what can be described as an ecosystem with active linkages between financiers, academia, policymakers, and the business community (Figure 1). If any one of these linkages is weak or non-existent, the entire system suffers and the ecosystem is not as effective at enabling innovative entrepreneurship as it could be.

Business incubators have a unique position in this ecosystem. They interact with all the actors in the ecosystem, either directly or indirectly, through the enterprises they serve, and feel first-hand the challenges that their clients face when seeking to set up and grow their enterprises, whether the difficulties have to do with regulations, finance, labor, or infrastructure. If these challenges are effectively communicated to the relevant actors in the ecosystem, a valuable feedback loop can be established which benefits not only the incubated enterprises, but innovative entrepreneurs across the economy.

Business incubators offer not only important feedback on

Box 1. infoDev's business incubation experience

infoDev's Business Incubation Network

This Network now spans 189 business incubators in 80 developing countries, 66 of which received direct support from infoDev in the form of technical assistance and grant funding used as co-financing in the start-up phase of the business incubator. The other 123 business incubators have joined infoDev's Business Incubator Network to benefit from the peer-to-peer networking and knowledge-sharing opportunities that the Network offers. More information about infoDev's work in business incubation and about the network can be found at: http://www.idisc.net/en/index.html

infoDev's Monitoring and Evaluation Impact Assessment (MEIA)

The MEIA was completed by an independent consulting company (OTF GROUP), with the aim of assessing the impact of business incubators that had received grant financing from infoDev. Business incubators in 49 developing countries participated in the survey, for which the assessment team carried out on-site observation and interviews. Most of the business incubators included in the assessment were less than five years old. The MEIA findings can be seen at: http://www.infodev.org/en/Project.77.html

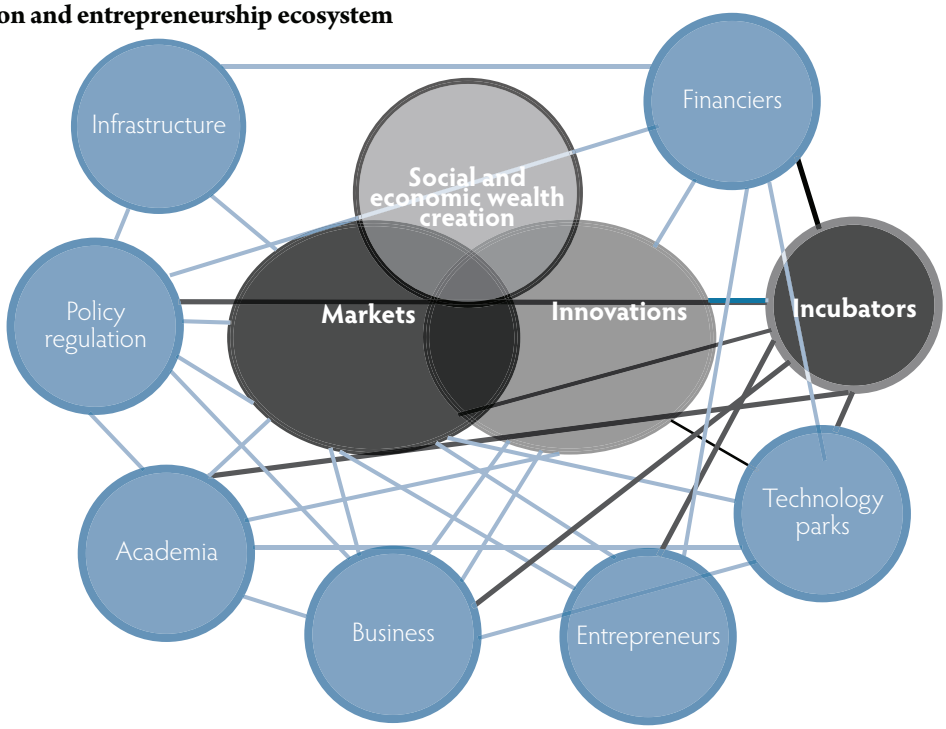
[1] Although the tool can be used specifically to foster innovative enterprise development, it can also be successfully focused on creating competitive enterprises with high job-creation potential, regardless of whether or not the business concept is innovative.

[2] It should be noted that, in many instances, the distinction between these different tools is blurred; for example, a business incubator may offer business development services to non-incubatees to supplement its revenues; a technology park may include a business incubator to test new ideas, etc.

Table 1. Intermediary vehicles for innovative enterprise development

	Business development centers	Business incubators	Technology parks
Target enterprises	Any small and medium enterprise (SME)	Early-stage enterprises with high growth potential	Emerging and established technology businesses
Key features	• Ad hoc, demand-driven assistance • Focused on a particular issue for which the entrepreneur asks for assistance • Usually broad business support, including training and advisory services	• Emphasis on co-location and "cluster" effect between enterprises • Ongoing , supply and demand-driven assistance until an agreed upon performance milestone has been reached • Integrated mix of intensive strategic and operational support focused on the enterprise in its entirety	• Emphasis on co-location and "cluster" effect between enterprises • Demand-driven assistance • Emphasis on provision of state-of-the-art real estate, office space, and research facilities
Revenue sources	Government /donor subsidies, fee-for-service	Government/donor subsidies, fee-for-service, rent, royalties, equity	Government/donor subsidies, fee-for-service, rent, royalties, equity
Business model	Nonprofit or profit-making		

Figure 1. Innovation and entrepreneurship ecosystem



Source: infoDev.

challenges and needs, but also *opportunities* for other actors in the system. For instance, they can offer financiers a pool of high-growth potential investment and lending prospects at reduced risk, given the ongoing assistance that these entrepreneurs continue to receive in dealing with business challenges and opportunities. They can offer academic institutions a vehicle to commercialize research and/or assist graduates with setting up a new business venture, and also provide corporations access to innovative ideas that could potentially strengthen their supply chain, delivery mechanisms, or operations.

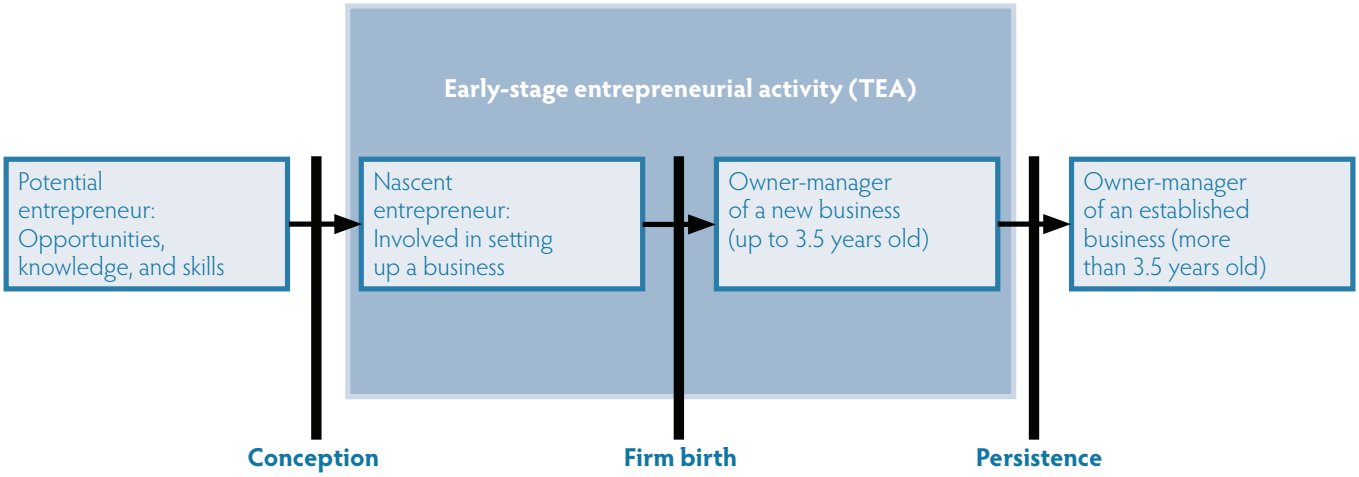
In this context, business incubators that manage to create effective relationships with the other actors in the ecosystem can serve as important levers to forge positive change that creates a more enabling environment for innovative entrepreneurs across the economy.

Understanding business incubation

Figure 2 from the Global Entrepreneurship Monitor (GEM) illustrates the stage of enterprise development at which business incubation is targeted. Business incubation is used at the "early-stage entrepreneurial activity" stage in the figure. At this stage, the new venture is more than an idea. The enterprise may already have made its first sales, and the innovator is ready to invest substantial time and resources in pursuing the new venture.[3]

Identifying an early-stage enterprise that will grow significantly if provided with a nurturing environment is not easy. In this respect, the role of the business incubation team is similar to that of a venture capitalist. It "invests" in management, not just in ideas. Good practice business incubators assess both the entrepreneur and the market potential of the business venture in order to determine the potential of the business. A variety of tools and methods are used to assess entrepreneurs and the market potential of business ideas. The process generally involves the engagement of experienced business development professionals, financiers, and industry experts.[5]

Figure 2. Enterprise development stages



Business incubation is selective. The business incubation process is aimed at assisting growth-oriented entrepreneurs in their quest to grow and become more competitive.[4] Only a subset of entrepreneurs are growth-oriented and pursuing an innovative venture. The GEM index across 38 surveyed countries shows that only 5 to 35 percent of the early-stage entrepreneurs had novel product-market combinations. A critical mass of potential business incubation applicants is, therefore, necessary for business incubation to be an efficient tool for fostering innovative entrepreneurship.

Where are innovators and entrepreneurs found?

The human capacity to innovate and become an entrepreneur is everywhere in the world. It is the environment that unleashes human ingenuity or quells it. The GEM measures the percentage of early-stage entrepreneurs with novel product-market combinations. The GEM index shows that there is no specific geographic trend in the location of innovative entrepreneurs.

[3] Assistance provided at the "idea" stage is commonly referred to as "pre-incubation," and involves less intensive assistance to allow the entrepreneur to investigate his/her idea further before starting the enterprise.

[4] For the business owner, growth is defined in terms of revenue. Depending on the objectives of the business incubator, job creation potential may be the most important measure of growth, although business incubators and their sponsors should keep in mind that the most innovative firms are not necessarily the biggest creators of jobs; a textile mill is not innovative, but can create a large number of jobs immediately. The production and sale of a technology that enables doctors and nurses to do their jobs more effectively can save lives, but it does not necessarily create a large number of jobs. A business incubator can be an effective tool to promote both types of enterprises, but the incubator stakeholders must be careful about the criteria they set for business incubator applicants, and how the success of the business incubator is measured, so that the set objectives for the incubator can be reached.

[5] For tools used by infoDev's business incubation community, see: http://www.idisc.net/en/index.html

Apart from the lack of a geographic pattern, infoDev's business incubation network does not show a pattern of successful entrepreneurs coming from a specific professional background. Successful entrepreneurs and viable business ideas have come from all sources: from corporations, universities, and the grassroots. There are also excellent examples in the network of individuals who have gone abroad to study or pursue a career, and who then returned to their home country to set up a business venture, thus leveraging their experience and exposure abroad.

Defining the assistance given to entrepreneurs

Once entrepreneurs are accepted into the business incubator, the business incubator analyzes their needs and designs a program to strengthen and accelerate the business. The business incubator is proactive in assisting the clients, and will offer assistance in areas that the entrepreneurs may not be prepared to deal with on their own. The business incubators may also require the incubatees to take training courses to ensure a certain level of management knowledge.

While the exact mix of services depends on what is needed in the local market, business incubators usually provide the following four types of service:

- Shared infrastructure (thus reducing start-up costs), such as office space, meeting rooms, telecommunications, reliable electricity, and in some environments, security services;[6]
- Business advisory services to assist the entrepreneurs with management issues, such as business planning, financial management, marketing, and regulatory compliance on formal matters, such as applications for registration and licensing;
- Financial services, ranging from brokering services to providing seed loans, or taking equity in the enterprise;
- "People connectivity," including mentoring by experienced business professionals, knowledge-sharing with like-minded entrepreneurs, and links to business relationships and opportunities.

The value of a psychologically supportive environment cannot be overemphasized. Most of infoDev's business incubators identified the contrast between entrepreneurship and local values as a key challenge for their clients, and many cited culture as their clients' most significant barrier. Therefore, it is not surprising that entrepreneurs cite the psychological support provided by incubation staff and fellow entrepreneurs in the incubator, who "believe in you and your ideas" as having especially high value. One grateful entrepreneur referred to his incubator as an "oasis of cultural safety."

Business models and sustainability of business incubators

There are four main types of incubator business models: university-based, government owned, non-governmental/not-for-profit entities, or private sector companies. Table 2 shows the high proportion of NGO and non-profit organizations in infoDev's network.

Table 2. Distribution of business incubator models in infoDev's network

University	21%
Government	20%
NGO and non-profit	42%
Private company	17%

Source: http://www.idisc.net

Regardless of ownership structure, one of the most significant challenges of business incubators is to achieve financial sustainability. Financial sustainability, defined narrowly as "earned revenue covering all business incubation expenses," is very rare in both the developed and developing world. Most often, business incubators rely on a mix of revenue sources, including earned revenues based on rents, fees-for-service, and, less commonly, royalties and equity payments, as well as non-reimbursable funding from government and the private sector. For example, according to the MEIA, where the mean age of the incubators surveyed was five years old, 27 percent of incubators indicated that more than 75 percent of their revenue is earned, while over 15 percent indicated that their earned revenue amounted to less than 10 percent. This variability can be explained, in part, by the range of the organizational maturity of the incubators.

[6] Some business incubators, particularly those targeting a specific industry, provide shared production equipment, often the most expensive part of starting a manufacturing business. Providing entrepreneurs with access to such shared equipment can substantially reduce the start-up costs for entrepreneurs, until they reach a production scale at which investment in equipment carries a lower risk, and until they are able to secure capital from potential investors.

Strategic partnerships and alliances complement earned and non-earned revenues, and are key to the effectiveness and sustainability of business incubators around the world. These partnerships are based on win-win opportunities between institutions, and include a variety of forms of cooperative provision of infrastructure, administration, or services. For example, a bank or business angel may provide non-reimbursable funding to a business incubator, knowing that it in essence is building up future lower-risk, high-growth potential clients. Other examples of such partnerships found across infoDev's network include local companies providing funding, expertise and links to markets—in some cases, through corporate social responsibility programs, but also with an interest in strengthening their own supply chain; others are universities providing brand (and therefore credibility), expertise and space, while benefiting from a vehicle to provide self-employment opportunities for its graduating students and research commercialization opportunities for its professors.

The question of whether or not business incubators should be pushed towards financial sustainability—narrowly defined—is controversial. Relying upon earned revenue as an income source forces a certain discipline on the business incubator, ensuring that it stays market-oriented and provides services that are truly needed by its client companies. At the same time, the very purpose of business incubators is to assist entrepreneurs at the stage in their business life-cycle when they are most volatile and cash-strapped. Most business incubator managers have heard their clients ask for deferred rent payment schedules. Many experience the difficulty their clients have when they are required to pay the full price for assistance with aspects of business, when the incubator can clearly see that the enterprise is cash-strapped and struggling and unable to allocate resources for that purpose.

Another issue often raised has to do with the trust that must be established between the incubator staff and the entrepreneur. If the business incubator becomes overly driven by the need to meet revenue targets, its client entrepreneurs may develop mistrust in the incubator staff, and be uncertain whether the service suggested is actually critical, or whether it has been proposed so that the business incubator can meet its revenue targets.

For these reasons, many business incubators provide their clients with subsidized rents and fee-for-service plans, in which the subsidies decrease over time, as the enterprise gets on its feet. Royalty schemes—where the incubatee pays an agreed percentage of the additional income earned while under incubation, or possibly for a few years after graduation—can also help to overcome this problem. However, in both cases, the business incubator bears the risk that the enterprise may fail before the cost of incubating the client can be recuperated. Over time, successful enterprises may compensate for those that are not successful, but, in the mean time, incubators struggle with having insufficient cash flow to cover their operating costs.

In order to deliver services and lower operating costs, some incubators are experimenting with providing "virtual services," defined as off-site business incubation, including the use of information and communication services. However, it is not clear whether or not virtual incubation is as effective as the traditional form of incubation, or whether it actually saves money.

The flip side of the sustainability argument is that business incubators who push hard to cover their costs by earned revenues must then change their objectives and work as accelerators of more advanced enterprises, which are less risky and less cash-strapped. This defeats the primary objective of business incubators, viz. to support early-stage entrepreneurs, who have fewer resources and capabilities.

There is a plethora of revenue models among business incubators around the world, and the right revenue model for any given environment can only be arrived at by means of a thorough understanding of the business environment, along with experimentation with various revenue models and prices. As a result of the challenges and opportunities described above, infoDev's experience appears to indicate that the most realistic—and perhaps the most effective—model is one that combines both earned and non-earned revenues. This perspective is echoed by a report requested by the European Commission which assessed the performance of business incubators across Europe (Centre for Strategy and Evaluation Services, 2002).

From a policy perspective, public investment to co-finance the start-up phase of business incubators is justified for at least two reasons: first, as we outline below, because effective business incubation yields economic development returns; second, because from a government budgetary perspective, sev-

eral assessments have found that government contributions towards business incubation quickly pay for themselves, by generating tax revenues through the enterprises and jobs they generate. For example, over the last 20 years, the government of Brazil has invested 150 million reals in business incubators and technology parks. It is now estimated that graduated enterprises generate 400 million reals annually in tax revenues.[7]

Notwithstanding the challenges of reaching sustainability, long-term sustainability—defined to include strategic alliances and partnerships that offset costs—should be viewed as a success measure. In this respect, as in any viable partnership, there should be various risk-sharing schemes so that all stakeholders share in both costs and revenues, in a way that enhances the success of an incubated entrepreneur, while also supporting the long-term sustainability of the incubator.

Effectiveness of business incubation: infoDev's experience

Appropriate indicators for measuring the *effectiveness* of business incubation as a tool for stimulating the creation and growth of innovative enterprises, include:

- The number of innovative enterprises created
- The viability,[8] revenue size, and growth rate of those enterprises
- The investment size attracted (as a proxy for perceived market value of the enterprise)

Ideally, one would measure these indicators for entrepreneurs that received business incubation assistance, in contrast to a control group in the same industry which did not receive any incubation.

In addition to directly affecting the success of the early-stage enterprises they incubate, business incubators have a broader positive influence on society by helping to commercialize innovations with potentially high impact on human welfare and/or business productivity and competitiveness, and which affect the broader enabling environment for innovative entrepreneurs, and creating new jobs. When assessing the impact of business incubation, it is also important to take into account this broader impact.

Challenges in measuring the effectiveness of business incubation

Limited systematic data are available to measure the effectiveness of business incubation. The lack of data is explained by a number of factors. First, it takes time to see the true results of successful incubation. On average it takes about three to four years to incubate a promising enterprise, and if one would like to measure the viability and growth rate of the incubated firms, one would have to wait at least another three to four years. Empirical evidence in New Zealand suggests that the real growth in revenue (and jobs) often does not occur until between four and seven years after graduation. Among developing countries, apart from a few veterans such as India and Brazil, business incubation is a relatively new concept. In infoDev's network of 189 business incubators in 80 developing countries the mean age of the incubators is only six years. Only now are we starting to see the results of incubation as a tool in developing countries.

A second complicating issue in the assessment of business incubation is that the term "business incubation" is being used loosely to describe a variety of different initiatives that aim to support the development of small and medium enterprises (SMEs), ranging from office parks and business development services to incubation, each with varying objectives, such as, empowerment of disadvantaged groups, job creation, innovation commercialization, and the generation of high-growth enterprises. If one aggregates the results of these so-called "business incubators," one risks trying to evaluate the results of different remedies.

Third, as with other social science interventions, it is difficult to identify a control group against which one can test how the incubated entrepreneurs fared, in comparison with those that did not receive incubation assistance. No entrepreneurs are the same. Moreover, when the business ideas accepted by the incubator are by definition innovative, there are not many other cases against which to compare the outcomes. Finally, it is surprising that many business incubators do not track their results, beyond the simple count of how many enterprises they graduate.

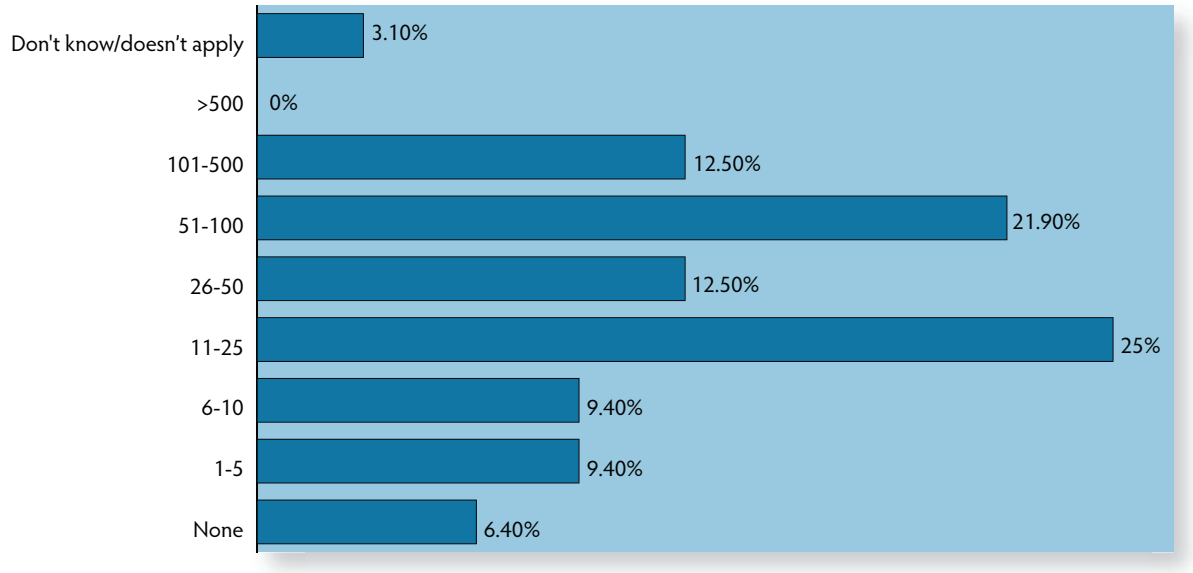
[7] For an assessment of the effects of business incubation in Germany, see also Schricke and Liefner, 2006.

[8] One must be careful with using viability as a success measure. For example, a company that has been bought out by a larger firm would no longer exist. However, from an economic perspective, value has still been added to the economy, and the "exit" of the small venture cannot be described as a failure. For example, an evaluation of New Zealand's business incubation program showed that approximately 29 percent of the sample of graduated enterprises experienced a change in ownership as a result of increased shareholders, company mergers, the formation of a new company, or IP buyout/licensing.

Creating innovative enterprises and enhancing viability

Incubation seems an enabling tool for innovative enterprise creation and viability. 150 business incubators in infoDev's business incubation network report that they are currently assisting 12,500 early-stage enterprises, and 92 business incubators report that they have graduated 4200 enterprises. According to the MEIA – which assessed 49 business incubators, over one third of the business incubators helped to start more than 50 new businesses (see Figure 3).

Figure 3. Number of new businesses set up by an incubator



Note: Most of the business incubators surveyed were less than five years old and were not yet at a "mature" enough stage to measure impact.

Source: MEIA.

A collection of infoDev success stories, described in details in the Appendix to this chapter, profiles 14 innovative enterprises that have graduated from developing country business incubators, and reached the break-even point. These enterprises are mostly five to six years old. In all instances, the enterprises were true start-ups when they entered the business incubator. They had not yet, or barely, made their first sales. Today, these enterprises have reached annual revenues ranging from US$70,000 to US$2.8 million, and employ between six and 32 employees. These ranges appear to be fairly typical for successful enterprises across the infoDev network.

These stories illustrate the range of innovations that can be effectively commercialized with the help of business incubation, ranging from biogas stoves in Rwanda, to beeswax production technology in the Ukraine, to organic crop boosters in India, a GPS-based bus fleet management system in Brazil, mobile-based electricity vouchers in South Africa, and software solutions that enhance business processes in Romania. Table 3 provides illustrations of innovations in products, services, business models, and production processes, which have been brought to market.

Enhancing enterprise viability

Few countries keep systematic data on the survival rate of graduated incubatees. As shown in Table 4, current statistics indicate that business incubators generally have a very high success rate in generating viable new enterprises, ranging from 80 to 90 percent. By way of comparison, business incubators in infoDev's network—comprised only of developing countries—report that 75 percent of graduated enterprises are still in operation three years after graduation, a much higher number than the general enterprise survival rate. In Brazil, for instance, the survival rate of incubatees is about 80 percent, while 50 percent of all start-up companies do not survive the first year. These numbers are encouraging, given the very difficult business environments in which many of these business incubators operate.

Table 3. Innovations brought to market

Innovation brought to market	Entrepreneur/Innovator
Product	Energy, Environment and Sanitation Company Limited (ESSCO Ltd), in Kigali, Rwanda, produces and sells institutional cooking stoves fueled by biogas. The low-carbon stoves were developed by the Kigali Institute of Science and Technology (KIST), and were brought to market by two Rwandan entrepreneurs. In Rwanda, wood accounts for about 90 percent of household energy consumption. Burning wood emits carbon dioxide, and growing trees absorb it. However, once a tree is cut down for fire wood, it takes several years for a new one to grow to the same carbon absorption level. The collection of fire wood also causes soil erosion, leading to a further adverse impact on the environment and on the livelihoods of the poor. To preserve the environment, the government of Rwanda has, therefore, placed strict limits on deforestation. Thus, the biogas cooking stove is of immediate value for consumers, the protection of the environment, and future generations. As of December 2008, ESSCO's stoves had been on the market for a year and a half, and the company was already earning a small profit. ESSCO was incubated by the KIST Business Incubator. The founders were an engineering professor and a graduate student.
Service	PV Inova, in Porto Alegre, Brazil, is improving the bus transportation experience for both passengers and operators through telephony and tracking products. TELO provides passengers, who cannot afford mobile phones with an inexpensive way to make phone calls during their commute. TELOTrack uses GPS to provide bus fleet managers with the capability to quickly identify and react to problems in public transportation by performing automated identification, diagnosis, and resolution of any deviation or abnormality and to immediately provide critical information to the fleet management team. The products were successfully launched in Porto Alegre and Rio de Janeiro in 2007 and 2008. Three pilots are in operation in the United States, and business negotiations are proceeding in Angola, Argentina, Chile, and South Africa. PV Inova was incubated by the Genesis Institute. The founder was a Brazilian graduate student, who had worked for development banks for several years.
Business model	Expertron, in Pretoria, South Africa, facilitates easy access to prepaid electricity for lower income consumers. When prepaid electricity was introduced in South Africa, municipal cashiers handled sales of prepaid vouchers. Due to the low volume of purchase points, many customers had to travel long distances and stand in long queues to purchase their electricity. As the customers could only afford small amounts of electricity at a time, many had to make the trip several times per month, resulting in a very high cost of electricity for the consumer, and an increase in theft of electricity. Expertron developed a cell-phone vending system to improve service delivery and simultaneously create jobs, by involving people from the community in the process of selling electricity. The system uses standard GSM mobile telephones as affordable point-of-sale (POS) devices to sell and distribute prepaid electricity tokens/vouchers. Any individual having a mobile phone and sufficient funds to purchase prepaid "electricity stock" may become a vendor, and earns a commission on his sales. Today, Expertron has an annual turnover of US$630,000. Expertron was incubated by the Innovation Hub. The founders were three professors in electronic engineering.
Production	Kharpchelo, in Kharkov, in the Ukraine, sells honey and beeswax production equipment to beekeepers. Leveraging his background in engineering, the founder of Kharpchelo has found a way to improve on production technology imported from Russia to develop production equipment that consistently produces high quality honey. Kharpchelo reached US$400,000 in annual revenues in 2008, and employed 20 permanent and 40 seasonal employees. Kharpchelo was incubated by the Kharkov Business Incubator. The founder was an aircraft engineer.

Table 4. Innovations brought to market

Country/Region	Incubated enterprise survival rate	General enterprise survival rate
New Zealand[a]	87% continue to operate after 2 years	69% continue to operate after 2 years
United States[b]	85% continue to operate after 3 years	50% continue to operate after 4 years
Europe[c]	89% continue to operate after 3 years	…
OECD	…	60% continue to operate after 3 years
Germany[d]	90% continue to operate after 3 years	…
Brazil[e]	80% continue to operate after 3 years	50% continue to operate after 1 year
South Africa[f]	80% continue to operate after 3 years	…
infoDev's incubation network	75% continue to operate after 3 years	…

Sources: [a] New Zealand, 2008; [b] National Business Incubator Association; [c] European BIC Network, 2008; [d] Schricke and Liefner, 2006; [e] ANPROTEC Brazil; [f] Small Enterprise Development Agency, 2008.

Accelerating enterprise growth

The hypothesis is that business incubation accelerates enterprise growth, thus saving valuable time and money, and generating social and economic benefits at a faster pace than would otherwise be the case. Ideally, the revenue growth rate of incubated enterprises should be measured against industry benchmarks.

There do not appear to be many systematic studies assessing the revenue growth rates of incubatees, as compared to industry benchmarks in developing countries. However, to illustrate this point, three incubators in Panama, Uruguay, and Costa Rica, all focused specifically on supporting innovative, early-stage, high-growth enterprises have together graduated 63 enterprises with an average annual turnover of US$90,000 at graduation. These enterprises had no, or less than US$15,000, annual turnover at the start of the incubation process, and, on average, were incubated over a period of three years.

New Zealand is one of the few countries that systematically and reliably tracks the impact of business incubation on enterprise growth rates. According to an assessment in 2008, incubator graduates had better revenue growth outcomes than industry benchmarks. Of the graduates reporting turnover, 59 percent surveyed had achieved an average growth rate of 20 percent over the last five years, and 40 percent reported an overall growth rate of at least 150 percent. In contrast, a control group recorded 11 percent of firms achieving a minimum of 150 percent turnover over five years.

Creating jobs

In infoDev's Business Incubation Network, 92 business incubators report that they have graduated 4,230 enterprises employing 62,000 people. This translates into an average of 14 jobs per enterprise. As these business incubators and graduates are still young, it is not yet clear how many additional jobs will be created over time. In Brazil, where business incubation has a longer history, ANPROTEC, its business incubator association, estimates that over the last 20 years, Brazilian incubators have graduated 1,500 enterprises and generated 33,000 jobs, representing an average of 22 jobs per enterprise.

If the broader objective of the business incubator is to facilitate the creation of innovative enterprises, job creation in itself is not a sufficient result indicator, since many start-ups do not necessarily create the most immediate jobs. Nevertheless, the creation of sustainable jobs is an important outcome of support to innovative, early-stage enterprises.

Improving the enabling environment

There are several frameworks for characterizing environments that are conducive to linking innovation and entrepreneurship. Most include an emphasis on legal and regulatory incentives, such as the ease of registering a business, intellectual property protection; incentives for R&D; education reforms stimulating research and more intensive relationships between universities and industry; initiatives to expand access to capital, such as private and public investments in small and medium enterprises (SMEs); and infrastructure improvements to improve electrification, roads, ports and airports, and information and communication services. These are all, of course, critical factors in creating an enabling environment.

What is often overlooked in these frameworks, however, is the importance of "cultural capital."[9] Cultural capital does *not* refer to a nation's ability to innovate. Rather, it refers to the level of tolerance for risk and the interpersonal trust that exists in that society, which affects entrepreneurs' decisions to start a business, and the decisions of others to invest in it. Even in the best of business environments, developing a new innovative venture is risky and requires confidence and patience. Thus, an encouraging environment is key to enable entrepreneurs willing and able to take this risk.

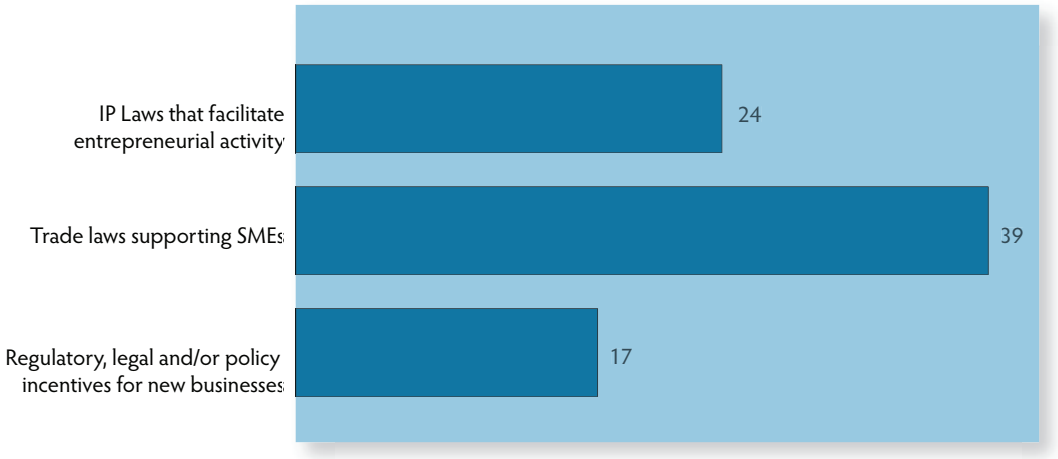
Perhaps the most salient finding of the MEIA was the significant impact of business incubators on the enabling environment achieved through their effective linkages with other actors in the innovation and entrepreneurship ecosystem. Following are a number of examples:

Policy and Regulation. Most of the policies and regulations in the developing countries we analyzed are not optimized for technology entrepreneurs (see Figure 4). Trade laws supporting SMEs exist in fewer than half the surveyed countries; legal incentives to start new businesses and the assurance of intellectual property (IP) protection are weak in three-quarters of the surveyed countries. And over 80 percent of the business incubators reported that regulatory, legal, or policy incentives for new businesses do not exist at all in their countries.

The majority of incubators actively advocate for policy and

[9] See Fairbanks, "Changing the Mind of a Nation: Elements in a Process for Creating Prosperity." Available at: http://www.sevenfund.org/pdf/Changing%20The%20Mind%20of%20a%20Nation.pdf

Figure 4. Regulatory and policy incentives for SMEs



Source: MEIA.

legal reforms that will benefit entrepreneurs and small business owners across the economy. ARC, an incubator in Bulgaria, for example, actively participates in committees and in working groups to advise policymakers, and is currently involved in drafting the National Innovation Strategy and Regional Innovation Strategy for the South Central Region. Another example is CID in Peru, which has formed an association of 11 businesses to draft and guide public policy on SMEs. Several other incubators, including two in Yangling and Tianjin in China, ANPROTEC and RMI in Brazil, TRECSTEP in India, ISTT in Iran, UBICA in the Ukraine, and Ingenio in Uruguay all report that they are regularly consulted by their governments on issues affecting the local business environment for SMEs.

Financing. Eighty percent of the business incubators reported that their incubatees are limited because they do not have access to risk capital and appropriate financial offerings in their local business environments. There was a general feeling that entrepreneurs were "stuck in the middle" between the micro-enterprises served by microfinance institutions and the deals that banks and private investors find attractive. A later study completed by infoDev, entitled "Financing Technology Entrepreneurs and SMEs in Developing Countries," found that the financing gap is particularly pressing, in the range of US$50,000 to US$1 million, and that for SMEs competing in the information and communication technology (ICT) industry and ICT-related activities, the challenge of accessing growth capital is particularly acute, because these enterprises possess few tangible assets that can be leveraged as collateral for loans.

The MEIA revealed that business incubators have derived a variety of approaches to overcome the financing challenge. A few business incubators have opted to take equity in their client enterprises (e.g., Raizcorp in South Africa and the Panama Technology Business Accelerator). But incubators seek more often to facilitate access to financing for their client, and more broadly to improve the macro-environment for SME financing. For example, CIE-TEC in Costa Rica is collaborating with a local bank to establish a financing fund for SMEs. Octantis in Chile created the country's first network of angel investors. To date, this angel network has invested US$4.3 million in the creation of more than 60 new companies and 12 international patents. The companies have, in turn, achieved aggregate sales of US$30 million.

Culture. Research has shown that environments that embrace risk, diversity of thought and action, and interpersonal trust are correlated with high levels of innovation. However, 85 percent of the business incubators felt that there was very low tolerance for risk or failure in their business environments. Most business incubators identified the contrast between innovative entrepreneurship and risk-averse local values as a key challenge for their clients, and many cited culture as their cli-

ents' most significant barrier. Incubator managers in Sri Lanka cite the discouragement entrepreneurs face, as manifested most explicitly by parents who urge their children to get "real" jobs. Incubators in Uzbekistan and Kazakhstan are confronting the additional challenge of cultural legacies where failure (by entrepreneurs) was once seen as criminal.

Thus, business incubators can serve as "an oasis of cultural safety" for entrepreneurs in business environments where entrepreneurship is not encouraged. They also contribute to stimulating more entrepreneurs to pursue their dream of creating their own company, simply by illustrating that it is possible. More than 70 percent of the business incubators said they are working to promote role models to raise awareness of, and confidence in, pursuing entrepreneurship as a career option. An Armenian incubator was described as bringing "a new climate of democratic entrepreneurship" to an economy that he perceived to be dominated by large enterprises and monopolies.

As discussed earlier in this chapter, business incubation is still relatively new in the developing world. As these business incubators mature, more systematic assessments of their effectiveness are needed. That being said, the evidence above illustrates the positive effects that business incubators have already had both in creating viable, innovative, high-growth enterprises, and of positively affecting the broader innovation and entrepreneurship ecosystem.

Key challenges and success factors

While business incubation can be an effective tool to stimulate the creation and growth of innovative enterprises, business incubation is by no means easy. Many business incubators are confronting operational and strategic challenges.

The number one challenge of most business incubators is reaching financial sustainability. It takes time to experiment and arrive at the right revenue model in a given context. While partnerships and strategic alliances are key to both effectiveness and sustainability, it is difficult to manage the expectations and demands of a variety of stakeholders, while at the same time remaining focused on the core objective of the business incubator.

A second important challenge for business incubators is finding and retaining management teams with the right mentality and skill sets. The MEIA established that the effectiveness of business incubators can be linked directly to the skills, vision, commitment, and entrepreneurial leadership talent of their management teams. Yet 93 percent of the incubators surveyed reported significant difficulties in finding and keeping staff. Thirty percent cited scarcity as an issue, and more than 40 percent said that limited resources kept them from making needed investments in staff. Due to the level of trust necessary to effectively incubate and the many relationships required to run an incubator effectively, frequent management turnover can be very costly to the incubator and hinder the progress of incubatees.

Finally, many developing country business incubators struggle with getting adequate "deal flow." In some instances, the reason for these problems may be that they have not got their "selling proposition" and/or pricing right. But often the culture of entrepreneurship is also a factor, as well as the number of potential candidates in the business incubator's vicinity. As discussed above, only a fraction of entrepreneurs are growth-oriented.

infoDev has identified a number of success factors critical to overcoming these challenges:

- A thorough feasibility assessment is key to success. Business incubators that fail have often not done a thorough job at the feasibility stage.
- There is no one-size-fits-all business incubator model that will work in all contexts. As in any business, the services provided and the business model of the business incubator must be designed in response to local market conditions.
- Founders of business incubators must ensure that managers have the right skills and mentality for the job, and that there is sufficient incentive for that person to stay. They should also be prepared to relinquish control, if the business requires a different set of management skills than those of the founders.
- Business incubators must be set up in such a way that they can operate in a business-minded fashion, even if an academic institution or a government agency is a co-owner or the sole owner.
- Business incubators must ensure that their selection criteria for incubatees are in line with the core objectives of the business incubators and with local market needs, and that there is explicit agreement between all stakeholders on the core objectives.

- A certain size is required for effective business incubation in order to maximize the likelihood that the incubator will achieve financial sustainability. infoDev's experience indicates that 20 to 30 incubatees at any given time and a space of at least 2000m^2 is ideal in most situations, but this may differ from environment to environment.
- Private sector partnership in business incubation is critical. In the MEIA report, incubators were asked how they would structure their organization differently if they were to start again, and the most frequent answer was greater investor and private sector involvement.

Governments considering investment in business incubation should think of business incubators as an integral part of a broader innovation and economic development program that strengthens the over-all innovation and entrepreneurship ecosystem. As discussed above, the most effective business models for business incubators comprise a mix of earned and non-earned income and, in this context, funding support from well-recognized organizations lends credibility to local business incubators and enables them to get the local buy-in required for long-term sustainability. Furthermore, the willingness of risk capital to invest in the incubated ventures as they graduate is the ultimate market test of the sustainability of the incubator's model.

Conclusion

Innovation is key to social and economic progress. The capability to innovate is innate in human beings everywhere. Policymakers and donor agencies can help facilitate the creation of an innovation and entrepreneurship ecosystem that encourages entrepreneurs, who are willing and eager to take the risk of bringing new ideas to the market, to turn the potential of their idea and ambition into real social and economic value. Business incubation is one vehicle for providing such assistance.

As shown in this chapter, promising results are emerging from the early efforts of business incubation in developing economies. It could be that business incubation will serve an even more important function in these economies, given the absence of an enabling environment and business networks that are more prevalent in the developed world. Business incubation may also play an even more important role, in light of the demographic make-up of developing economies, which have large populations of youth, who, though open-minded and ambitious, do not have the networks, capabilities, or credibility to get a business off the ground. Business incubation may provide the type of support that these young entrepreneurs need to start their own businesses.

References

ANPROTEC Brazil. Available at: http://www.anprotec.org.br/publicacao.php?idpublicacao=538

Bosma, Niels, Zoltan J.Acs, Erkko Autio, Alicia Coduras, and Jonathan Levie. 2008. *Global Entrepreneurship Monitor—2008 Executive Report.* Babson College and Universidad del Desarrollo. Available at: http://www.gemconsortium.org/download/1253659064034/GEM_Global_08.pdf

Center for Strategy and Evaluation Services. 2002. *Final Report: Benchmarking of Business Incubators.* February.

European BIC Network. 2008. *BIC Network in 2007 Facts and Figures.* Brussels. Available at: http://www.ebn.be/

Fagerberg J., D. Mowrey, and R. Nelson. 2004. *The Oxford Handbook of Innovation.* Oxford: Oxford University Press.

Fagerberg, Jan, Martin Srholec, and Bart Verspagen. 2009. *Innovation and Economic Development.* Maastricht: United Nations University and Maastricht Economic and Social Research and Training Centre on Innovation and Technology.

Fairbanks, Michael. "Changing the Mind of a Nation: Elements in a Process for Creating Prosperity." Available at: http://www.sevenfund.org/pdf/Changing%20The%20Mind%20of%20a%20Nation.pdf

infoDev. 2007. "Innovation and Entrepreneurship in Developing Countries: Impact Assessment and Lessons Learned from infoDev's Global Network of Business Incubators." Available at: http://www.infodev.org/en/Project.77.html

———. 2008. *Financing Technology Entrepreneurs & SMEs in Developing Countries: Challenges and Opportunities.* World Bank.

———. 2009. *A Model for Sustainable and Replicable ICT Incubators in sub-Saharan Africa.* World Bank. Forthcoming.

Lundvall, B. A. 1992. *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning,* London: Pinter Publishers.

Monitoring and Evaluation Impact Assessment (MEIA). Available at: http://www.infodev.org

National Business Incubator Association. Available at: http://www.nbia.org/

Nelson, R. 1993. *National Innovation Systems: A Comparative Analysis.* New York: Oxford University Press.

New Zealand Ministry of Economic Development. 2008. *Incubator Support Programme Evaluation Report*. May.

Schricke, Ester and Ingo Liefner. 2006. "20 Jahre Technologie- und Gründerzentren in Niedersachsen—Eine Untersuchung der regionalokonomischen Effekte," University of Hannover. February.

Small Enterprise Development Agency (SEDA). 2007–2008. *Annual Report 2008*. Pretoria. Available at: http://www.seda.org.za/content.asp?subID=922

Smith, Keith and Jonathan West. 2007. *Innovation Policy, Productivity and the Reform Agenda in Australia: A Framework for Analysis*. Australian Innovation Research Centre. University of Tasmania.

Appendix. More successful infoDev business incubations

Enterprise and incubator	Country	Innovation	Founder
Recycla Chile, incubated by Octantis	Chile	Recycla is the first e-waste recycling company in Chile. Recycla extracts and separates the raw materials of computers, printers, cell phones, and scanners, etc., so that they can later be transformed and re-used. Materials that cannot be re-used, such as batteries and computer screens are treated in a certified hazardous waste treatment center. In 2003, Recycla entered a joint venture with Maxus Technology Inc. of Canada and the U.S., becoming the first Chilean SME to sign an alliance with a NASDAQ-traded company. In August 2003, less than two months after the initiation of operations of the plant, Recycla shipped its first export of recycled copper to China in a 20-foot container. Today, the company is profitable and has an annual turnover of US$2.8 million.	Three Chilean brothers: two were owners of a construction company in the US, and the third was an accountant in Chile with expertise in metal trade and recycling.
GloTech Organics, incubated by TREC-STEP	India	NEMATE GRO is an ecologically friendly and efficient way to improve fertilizer efficiency, which facilitates disease and pest management. SEAMIC is an organic liquid containing six essential nutrients that strengthen the plant's immune system and boost its growth. The effectiveness of the product was demonstrated in 15 field trials for grapes, tomatoes, cluster beans, and carnation flowers, among others. The cluster bean yield doubled and increased in quality; tomato plant root-wilt and stem-rot were eradicated; grape yields increased; and carnations grew faster. The products have reached 2000 farmers in Tamilnadu, Nasik, and Pune, and have substantially increased farmers' incomes. Business links have already been established in Sri Lanka, Malaysia, Mauritius and in several African countries. Today, GloTech Organics is profitable and has an annual turnover of US$71,000.	Engineer working in the R&D department of a large fertilizer company for nine years. The fertilizer company closed its R&D Department, giving him the final push to start his own company.
Focus Solutions	Jordan	Focus Solutions identified a market gap among remedial and legal departments of banks in the Middle East and North Africa, which seek to reduce bad debt, non-performing account receivables, revenue risks, and cost of collections and debt recovery, and to improve their operational risk management compliance for Basel II, the management of write-offs, and performance tracking and reporting. Current customers include CitiBank, Standard Chartered Bank, ABC Group, Arab Bank, and Jordan Bank.	Two university graduates.
Cochlear Implants, incubated by the City of Knowledge	Panama	Cochlear Implants is the first provider of cochlear implant operations in Panama. It is a good example of an entrepreneur commercializing a foreign innovation for the benefit of Panamanians. It is estimated that about 25,000 people in Panama suffer severe or profound hearing loss. Their only option for being able to hear again is to receive a cochlear implant. Cochlear Implants has been serving the hearing-impaired in Panama for a year and already has a waiting list of over 100 people. To date, 60 speech therapists and five local doctors have been trained to perform the procedure.	Dr. Cynthia Guy, an accomplished Panamanian doctor, who studied and worked in the United States.
SoftTechnica	Romania	SoftTechnica provides IT solutions for businesses in Romania. The company specializes in consulting, from analysis and production software, to installation and network configuration, integration of systems and turn-key solutions, including digital signature applications, management information systems for bars, restaurants, beauty salons, and hotels, and for real estate developers, who generate all documents needed for real estate development in Romania. SoftTechnica is becoming known as a high quality provider that is less expensive than foreign service offerings. The company has served more than 100 clients in Romania and has an annual turnover of US$280,000. They are currently exploring expansion into Croatia, Moldova, and Albania where the hospitality industry is expanding and where the products could be easily adapted.	A team of three: two were employed IT professionals in larger international companies, and one was a university graduate.

Enterprise and incubator	Country	Innovation	Founder
TechnoCAD	Romania	TechnoCAD offers computer-aided design (CAD) services in the field of mechanical engineering, focusing on the automotive industry. CAD has been associated with lower product development costs and a shortened design cycle. TechnoCAD provides 3D modeling design for machine building, finite element analysis simulating and indicating stresses and displacements that must be planned for in the engineering, and consultancy to companies that wish to transition from paper to modern CAD systems. TechnoCAD prides itself in the quality of services provided, and currently serves companies in Romania, Germany, France, Austria, Spain, and the U.S. The company currently has an annual turnover of US$800,000 and employs 32 people.	An electronics and telecommunications engineer with 12 years of experience in industrial electronic equipment maintenance.
Naledi3d Factory Ltd., incubated by Maxum	South Africa	In Africa, poor literacy skills and language barriers often pose huge challenges to learning and skills development. The Naledi3d Factory creates visually interactive content based on Virtual Reality (VR). Its intensely visual nature transcends literacy and linguistic barriers by *showing* as opposed to *telling*. The Naledi3d Factory uses the technology to create learning material that is both content- as well as context-rich, in semi-realistic and visual three-dimensional environments. The "***interactive3d learning object***" (or ***i3dlo***) is a self contained piece of visual learning that can be reused in different ways and, most importantly, easily translated into any African language. Even advanced technical subjects can be packaged into reusable *i3dlo's* and made available to a broader learning community. The benefits of this innovative approach have now been successfully demonstrated in areas as diverse as health, technical, life skills, and agriculture. Naledi3d Factory has reached an annual turnover of US$160,000.	A transport engineer, with a strong ICT component, who had worked for nineteen years at the Council for Scientific and Industrial Research (CSIR). In his last two years at CSIR, he developed a major VR center on behalf of the Council.
Rotasoft, incubated by METU Tech	Turkey	Rotasoft develops "edu-tainment" children's books in Turkish that interact with a computer to bring the book to life with 3D animations. Rotasoft has now partnered with one of Turkey's largest book publishers, which sold more than 5000 books after three months on the market.	Graduates.

Source: infoDev, outreach to business incubators.