Cracks in the Egg:
improving performance measures in business incubator research

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Abstract

Early research into business incubators focused on describing how they were operated and what activities were undertaken to assist in the survival of tenant firms. The only measures of effective operation were based upon the economic agenda of those sponsoring the incubators, that is, whether jobs were created and firms successfully developed beyond the protected incubator environment. The theoretical considerations used by researchers were, as a consequence, limited largely to either economic or financial models of performance. Much can be learned, however, from the management literature, which examines performance through organisational theory. It is suggested that further research into incubator effectiveness be undertaken using a framework that incorporates both the actors (incubator sponsors, managers and entrepreneurial tenants) and the earliest stages of new firm development from idea to start-up.

Introduction

The first business incubator, a privately owned for-profit centre, was started in Batavia, New York in 1959 (Brown *et al*., 2000). The concept of business incubators took off slowly with Universities becoming the breeding ground for such developments for the next twenty years (Smilor and Gill, 1986). Beginning in 1973, The United States National Science Foundation supported a series of experiments with innovation centres through its Experimental Research and Development Program (Scheirer *et al*., 1985). By 1981, the program had expanded to include eleven centres which served as the basis for continuing university efforts to turn research into innovative new businesses (Allen and Weinberg, 1988).

During this same period a few forward-looking corporations and individuals were making a business out of renting facilities to start ups (Nyrop, 1986). By offering dilapidated buildings at cheap rent, by putting together commonly used resources such as photo-copiers and secretarial services and by bringing in business advisors from, for example, retired business people, local and regional government's hoped to build on the incubator concept to create economic development in decaying city centres (Smilor and Gill, 1986). Despite this interest, the growth of business incubators was slow. By 1984, there were only 26 such centres in the United States (Meyer, 1987, p.53). Over the next twenty years, growth accelerated. By 1998 North American incubators had "graduated" nearly 19,000 companies employing over 245,000 people (McKinnon, 1998, p.2). By 2000 there were over 900 incubators in the USA and Canada, with new business incubators opening at the rate of one per week (Rosenwein, 2000, p.64). Today there are over 1000 incubators in the USA alone (Lalkaka, 2003). There are over 700 incubators spread throughout Western Europe; the UK having the largest percentage of these (35%) (European Commission Enterprise Directorate –General, 2003). Incubators exist not only in developed western countries but also in developing nations such as Turkey, Nigeria and Brazil (Lalkaka, 1996). There are over 1000 incubators in Asia and over 3,500 incubators in operation worldwide (Lalkaka, 2003).

Alongside the proliferation of incubators came a number of research studies that examined, among other things, such aspects of the phenomenon as the effectiveness of incubators, their modes of operation and the differences between types of incubators. This study was

undertaken in order to categorise previous research in this field and to delineate gaps in that research that would reward further effort. The section that follows defines business incubators and describes related initiatives designed to further the development of small enterprises. Thereafter, research into incubators is classified into categories and reviewed for the contribution made to our understanding of the phenomenon. Some discussion of the theoretical approaches taken or mooted is given before, finally, describing what we believe are areas where further research is warranted.

Defining Business Incubators

Incubators are commonly linked business support networks and technological innovation programs. Scholars of the concept have agreed that small business incubation is a dynamic process where young firms are nurtured to help them to survive and grow during periods of uncertainty, particularly during the start-up phase. Incubators are designed to address inherent market failures such as an inequitable access to information and capital as well as a lack of focused business advice for new small businesses (Campbell, 1989). A business incubator is generally described as a facility providing favourable controlled conditions to aid in the growth of new ventures (Petree *et al*., 1997). They are also referred to as innovation centres, enterprise centres, and business enterprise centres or technology centres (Petree *et al.*, 1997).

The US Small Business Administration defines incubators as:

> *physical facilities that provide new firms with the supportive network necessary to increase their probability of survival during the early years when they are most vulnerable.*
> *(websitehttp://www.sba.gov/gopher/Business-Development/Success-series/Vol2/Incu/incu2.txt)*

In Australia, the Commonwealth Department of Industry, Tourism and Resources, which has the current responsibility for incubator funding, defines them as:

> *a facility designed to assist new and growing businesses to become established and profitable by providing premises, advice, services and support. The incubation period is normally from one to three years, during which time fledging businesses can become established before graduating into the wider business community (DEWRSB, 2001, p.128).*

Smilor and Gill (1986) defined the business incubator as a place that maintained and controlled conditions for the cultivation of a small or medium sized enterprise (SME). Well-managed incubators, not only make growth more affordable, they aid in establishing realistic milestones through graduated rent structures; they help in the creation of a polished professional image, they provide business consulting assistance and networking facilities (Schermerhorn, 1980; Birley, 1985; Merrifield, 1987). These definitions emphasise that incubators provide commercial space at low costs and include a host of business services (NBIA, 1992).

History

As stated in the introduction, the first incubator, a privately owned for-profit centre, was founded in 1959 in Batavia, New York (Brown *et al.*, 2000). One of its tenants was a poultry producer and it is believed that this is where the name "incubator" was conceived (McKee, 1992, p.41). The incubator concept spread internationally. One of the first incubators in Europe was established at Cambridge Science Park and Sophia Antipolis in France in the late 1960s (Storey and Tether, 1998). The dispersion of incubators to the rest of Europe was relatively slow. The concept spread in the United Kingdom (UK) more quickly with Business Innovation Centres (BIC) being developed more than 20 years ago (OECD, 1999). BICs and Science Parks are part of a continuum of such services offered in the UK. The only distinction between them being that Science Parks usually have formal and operational links to academic institutions while BICs, being property based initiatives, do not have these links (Storey and Tether, 1998).

In Europe, a uniformly accepted definition of business incubators does not exist (Monck *et al.*, 1988) although they appear to apply the same model as seen in the United States (Colombo and Delmastro, 2002). A variety of names are applied to these centres including, among others, Science Parks, Business Innovation Centres, Technology Centres, and Research Centres (Storey and Tether, 1998; Monck *et al.*, 1988; Lindelof and Lofsten 2002). The first incubator in Germany was built in Berlin (Berliner Innovation-und Grundersentrum-BIG) in 1983. It was set up jointly by the government and the Technical University to commercialise technology projects (OECD, 1999, p.49). The incubator concept was spread nation-wide, driven by city councils. German incubators are monitored by a special Government program (Arbeitsgemeinschaft Deutscher

Technologiezentren), which was established as part of the unification between East and West Germany and the economic restructuring of East Germany (OECD, 1999). As at 1999, there were 103 incubators in the east and 27 incubators in the west.

Finland was ranked first in the UNDP Technology Development Index for its strength in innovation and in the networking skills that take place between companies and research institutions (National Technology Agency of Finland, 2002). This has been due in large part to the successful application of the science park and business incubator concept (Tarkianen, 2002) and demonstrates why the idea has spread so broadly. Incubators were tarnished by the excesses of the internet boom in the late nineteen-nineties. Some 400 incubators worldwide developed companies that rapidly listed on stock exchanges to take advantage of this boom (Lalkaka, 2001). Then, as technology shares started loosing their value, many of the incubators that had supported these companies collapsed along with their graduates. Despite this, incubators are still a growth industry.

The development of incubators in Australia was supported by both federal and state governments for the same reason as they were supported elsewhere. Incubators were evident in almost all Australian states by 1989, with 17 incubators in operation (Small Business Council, 1989). Of the 17, only 2 were privately funded. Most had direct or indirect connections with academic institutions (UoW and RMIT being the first to have incubators located on campus (Small Business Council, 1989).

Seventy-eight million Australian dollars were set aside by the Commonwealth Government in June 1999 for the development of incubators that focused on the commercialisation of ideas, research and technology in the information technology and communications area. This was done under the Building on Information Technology Strengths (BITS) Program, intended to increase the long-term success rate of new ICT-related business formations. The outlay of this funding is still ongoing, continuing until 30 June 2004 (DCITA, 1999). There are currently 10 ICT focused BITS incubators around Australia, eight are for-profit and two are non-profit centres (DCITA, 2003, p.29). In total, Australia has more than 60 incubators in operation (ANZABI, 2003). The majority of these are a part of state or local government economic development initiatives.

Incubator Research Initiatives

Beginning in 1973, the National Science Foundation supported a series of experiments with innovation centres through its Experimental Research and Development Program (Scheirer *et al*. 1985). By 1981 the Program had expanded to include a total of eleven centres. These served as the basis for future university efforts in launching innovation/incubator centres (Allen and Weinberg, 1988, p.200). However, scholars did not pick up the phenomenon for examination until the early 1980s. By this time, common principles underlying the definition of what we now call business incubators had emerged in the literature. These common features included shared premises, pooled administration, interaction between tenants (synergies), business advice networks and the manager as a value-adding agent (Smilor and Gill, 1984). Given its popularity as an economic development instrument and the role of the incubator as a business life support system, a number of interest groups started commissioning research on the concept.

Operations:

Campbell and Temali conducted the first major US survey of incubators in 1984. Most incubators were established in existing or vacant buildings donated by private corporations. Most received some proportion of their funding through government loans and grants (Plosila and Allen, 1985). The Campbell and Temali (1984) study identified key services offered by incubators. These included flexible leasing and management of space, centralized services to help reduce overhead costs for tenant companies as well as various types of business assistance. Smilor and Gill (1985) suggested that the services offered to incubator tenants fell into four categories; secretarial, administrative, consulting and other. These were also reflected in Allen's (1985) study that identified three general categories of services provided to tenants; logistical or physical, shared office support, and management consulting. These same offerings held a decade later when Rice and Mathews (1995) examined the still relevant question of precisely what made an incubator an incubator. They, too, concluded that incubators could be defined as business assistance programmes providing the entrepreneur with advice and counsel as well as providing network access to other people and resources, as needed.

As interest in the function of incubators grew, research questions were broadened. Scholars began to go beyond the exploratory studies that provided descriptive

examinations of the phenomenon (including individual cases) to an examination of the contribution of incubators to economic development and an analysis of how this contribution was made. Birch (1979) suggested that the rapid growth of incubators was fuelled by the recognition that small to medium sized enterprises were making a major wealth creation and employment contribution to the national economy (Birch, 1979). This inaugurated a series of studies into the actual contribution of incubators and into how this contribution was accomplished.

Economic Role:

The consensus, reached by researchers, was that the major contribution of incubators was in their ability to increase the survival rates of new businesses. That is, the authors of these studies suggested that business incubation was (and is) an effective business development tool. It requires only a modest capital outlay and provides a fair return on investment to regional economies (Campbell, 1989; Lyons, 1990; Tornatzky *et al.*, 1996; Molnar *et al.*, 1996).

The NBIA undertook annual research, beginning in the mid nineteen-eighties, on the state of business incubators in America. The research tracked the progress of incubators and their economic impact on local communities (McKinnon *et al*., 1998). It was descriptive, providing statistical information to NBIA members and the Government (Molnar *et al*., 1997; Bearse, 1998). This study showed that incubators were maturing and fulfilling their objectives as useful economic development tools providing a wide range of services to tenants. Others, too, found that fledgling firms did benefit from a supportive environment, which could be structured to achieve a balance between entrepreneurial independence and linkages to incubator organizations (Cooper, 1986).

Types of Incubators:

Efforts to determine how incubators assisted firm development quickly became an examination of incubator categories. The primary research question was whether one sort of incubator offered more value to tenants than another. An early effort to group incubators was based on their use, i.e. some incubators targeted firms in product development or manufacturing while others were open to mixed usage (Plosila and Allen,

1985). Another way of categorising incubators was by their sponsorship. Sponsorship could be public, private, university or hybrid (Nyrop, 1986; Allen and McCluskey, 1990). However, like much of the other research up to this point, these efforts were still largely descriptive, providing statistical information such as location, age and structure. They did not provide an insight into *how* incubators provided these services or their actual impact on tenant firm performance.

In an attempt to break away from the descriptive analysis of incubators Allen (1988) developed the "facility life cycle model". This model divided incubators into categories based upon the development stage reached by their tenants, e.g. start-up, business development and maturity. Allen suggested that the management style of incubator administrators changed focus as they targeted different groups of tenants or as tenants evolved within the incubator. This research not only provided the industry with an understanding that different sponsors had different objectives, it added value to the industry by allowing incubator management to determine admission policies, recruitment programs, tenant subsidy and graduation policies in the light of what they knew of the incubators' sponsors (Plosila and Allen, 1986; Allen and Weinberg, 1988).

Continuing in this attempt to understand incubator sponsorship and motivation, Allen and McCluskey (1990) created a value added continuum among incubators based upon discreet groups of investors or incubator sponsors. Incubators within these groupings were said to be more similar with respect to their missions, policies, services and performance than incubator programs across different groups. The four distinct groups were:

a) For –Profit Property Development Incubators,
b) Non-Profit Development Corporation Incubators,
c) Academic Incubators and
d) Business Development For-Profit Seed Capital Incubators
(Allen and McCluskey, 1990, p.64).

The value added continuum is called such as the first group functions like a real estate development operation adding no real value to tenants. The value offered to tenants increases going down the list until group 'd' which includes those incubators that function as enterprise development programs (Allen and McCluskey, 1990, p.64). This value added continuum did not include the combination groups of sponsors, known collectively as

Hybrid Incubators[1] (Nyrop, 1986). Although they demonstrated that incubators were sponsored by different parties with differing objectives, they unexpectedly found no variation in the types of services provided by incubators to their clients (Allen and McCluskey, 1990).

Effective Incubators:

While researchers were beginning to understand incubator operations in general terms and were able to categorise and delineate between incubators, there was a broad consensus among researchers that no one really knew what made up a "successful" incubator (Allen, 1985; Smilor and Gill, 1986; Campbell *et al.*, 1988; NBIA 1993). Exploratory studies conducted by Rice (1992) and Lichtenstein (1992) had examined the relationships among entrepreneurs in an incubator and between entrepreneurs and the incubator management respectively. These studies were not intended to nor did they provide a means for evaluating differences between incubators but they did suggest another category to be considered in the evaluation process. There continued to be no model for benchmarking an incubator's effectiveness (Mian, 1997; NBIA, 1993; Campbell *et al.*, 1988; Smilor and Gill, 1986; Allen, 1985). Mian (1996; 1997) attempted to redress this.

Mian (1996) sought to determine the effectiveness of inputs from a single category of incubator, university technology business incubators (UTSB). He rated tenants' perceptions of the usefulness of specific university-related inputs, such as university image, laboratories and equipment, technology transfer programs and student employees. In his 1996 study he did not measure the impact of value added services such as business consulting and mentoring on venture development. A year later, he reapproached these same incubators and surveyed both management and tenants. He attempted to determine incubator effectiveness using a model comprised of three dimensions: (1) program sustainability and growth; (2) tenant survival and growth; and (3) contributions to the sponsoring university mission. The scope and effectiveness of management policies and the services provided were also assessed (Mian, 1997). He proposed that incubator

[1] An example of a Hybrid incubator is a private and for-profit incubator which started with substantial assistance from the public sector. Their investors have agreed to meet a variety of pubic sector goals in return for public monies provided to defray the steep costs associated with constructing or renovating a building. (Nyrop, 1986, p.7).

performance, and hence effectiveness, should be measured by the growth of rentable space, growth in tenant sales, press coverage and number of incubator visitors.

Effectiveness had been examined earlier in the research of Allen and McCluskey (1990) who found that the greatest value added (one interpretation of effectiveness) lay among those incubators who were categorised as Business Development For-Profit Seed Capital Incubators. At this extreme of the continuum there are problems surrounding measures such as sales growth and profitability. Start-ups have few or minimal sales. Any sales represent a geometric increase that would skew the performance indicators used to benchmark incubator effectiveness. Bearse (1998) pointed out that incubators are commonly evaluated on the basis of meeting their goals and objectives, a benchmark that seems eminently sensible. Thus, job creation is a common objective and a performance indicator used by most government funded incubators. However, as Bearse (1998) has also indicated, the paucity of data available limits the ability of researchers (and sponsors) to determine the appropriate benchmarks for evaluating the effectiveness of incubators across the various types (Bearse 1998).

Theoretical Considerations

As the research summarised demonstrates, incubators have received an increasing level of attention, from sponsoring private and public bodies, as either an economic development tool or as a means of commercialising new ideas. As a consequence, much of the research into incubators has had the underlying assumption that the supply of appropriate facilities would satisfy a demand for such facilities from intending entrepreneurs. However, as has also been evident in the literature, incubators have been increasingly competitive in offering better or more complete services to potential entrepreneurs to attract those new ventures that would best create the economic growth sought in the region in which the incubator has been located. Few have questioned the assumption that the entrepreneurs who can create such growth are out there.

Incubator stimulated growth has, indeed, been examined. In the incubation literature the term “growth” has been measured through observations of employment growth, profit growth and sales growth. Studies such as that by Lindelof and Lofsten (2002), undertaken in Sweden, compared such growth statistics for similar firms located in and outside science

parks. They found that those within Science Parks did benefit from their location. Their growth measures fit nicely into financial models that were derived from theories of corporate investment. However, as most small business researchers are aware, financial theory derived in the corporate context does not always apply to small firms.

Incubators are commonly evaluated on the basis of meeting their goals and objectives (Bearse, 1998). Business incubators seek to add value by offering clients a combination of facilities and services that cannot be so easily obtained from other sources. The nature of these services and the way in which they are delivered will usually have an important influence on the success of incubator tenants and hence the performance of the incubator (European Commission Enterprise Directorate-General, 2002, p48). The type and the range of support services provided by an incubator is believed to vary depending on the type of incubator and the objectives of the investors financing it (European Commission Enterprise Directorate-General, 2002, p.49). Thus the management literature has contributed to the theoretical constructs used to examine incubators.

Research on performance measurement has come from organisation theory and strategic management (Murphy *et al*., 1996, p.15). The three fundamental approaches from organization theory are the goal-based approach (Etzioni, 1964), the systems approach (Georgopolous and Tannebaum, 1957) and the multiple constituency approach (Thompson 1967). The goal-based approach suggests that organisations be evaluated by the goals they set. However, goals vary from one organisation to another and this makes cross-firm comparisons problematic. The systems approach compensates for problems in the goal-based approach by considering the simultaneous achievement of multiple generic performance aspects. This still fails to adequately provide an effective performance framework for examining organisations (Murphy *et al.*, 1996, p.16). The multiple constituency approach examines to what extent the agenda of stakeholders are met by the firm (Thompson 1967; Pennings and Goodman, 1977).

Strategy researchers have integrated the three organizational perspectives and developed performance measures in terms of multiple hierarchical constructs (Venkatraman and Ramanujam, 1986). The first is financial performance in terms of organisational effectiveness (Chakravarty, 1986). The second is organizational effectiveness measured by

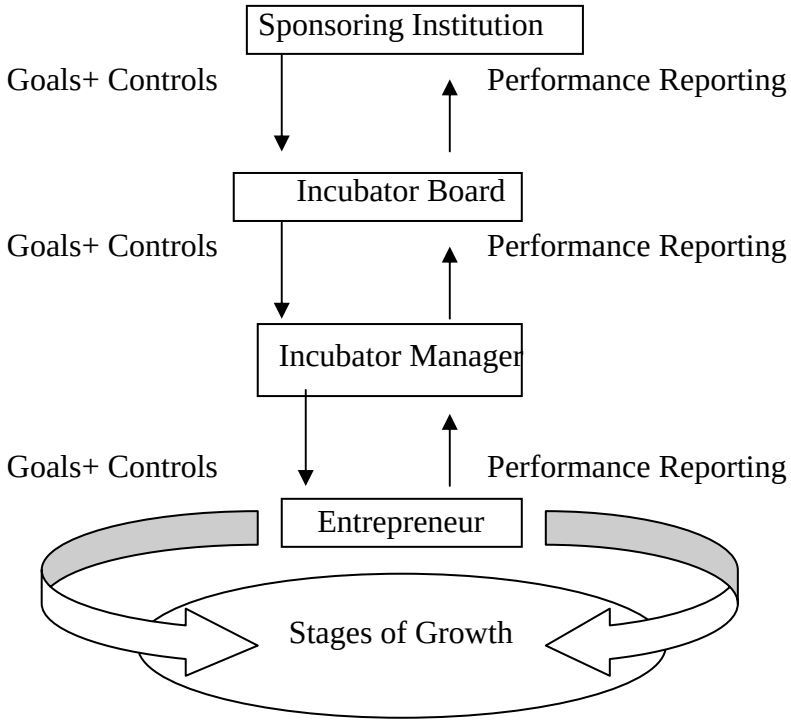
product quality and market share. Financial performance measures allow for competitive analysis where firms compare financial data regarding market share, sales, production costs or the budgets of competitors (Yasin, 2002, p.217). In essence performance evaluation provides responses to questions such as whether, how and why an organization succeeds. Again, these approaches work well when applied to the corporate environment where long term data can be analysed and compared with that from other organisations. However, once again the problems inherent in small firm research confront those attempting to apply these theoretical perspectives to research into incubators and their tenants. However, non-financial operational performance measures have been used in small firm research (Murphy *et al*., 1996, p.16). Given that it is problematic to collect financial data from new ventures or small businesses, operational measures form a suitable base for building a framework for measuring the performance of start-ups located in incubators.

Further Research

The incubator industry still lacks a complete evaluation framework for incubation practitioners that will allow for benchmarking activities and outcomes. Research in this area has not gone beyond looking at how many jobs are being generated and how many firms have graduated from the incubator. These are very broad based evaluators that fail to provide a detailed picture of the impact of incubator programs on business development. This is a critical drawback in the incubation literature (Bearse 1993, Appendix J-2).

The key elements in the success of a new venture located in an incubator appear to be the sponsoring institution, the incubator services and the entrepreneur. Small firm research has examined many of these elements individually, eg., the effect of the entreprenueur's personality and experience on venture success (Cooper and Gascon, 1992; Lee and Tsang, 2001). Research into incubators has listed the sorts of services provided by such institutions (Bearse, 1993; McKinnon and Hayhow, 1998). The requirements of sponsors have been documented (Lalkaka, 1996). The steps in the transition from small business to listed company have been analysed (Churchill and Lewis, 1983; Scott and Bruce, 1987). What appears to be missing is a holistic analysis of the interactions between the key elements mentioned above and the smallest steps taken in the transition from an idea to a small business. When these small steps in business growth taken within an incubator are

examined cross-sectionally, it may be possible to return to the question of the effectiveness of incubator services. The framework proposed for further research, then, is summarised in the following diagram.



A framework for exposing venture growth in an incubator

Conclusion

In order to develop a comprehensive performance evaluation model of incubators, the performance of new ventures entering and graduating from that incubator must be tracked. A number or relevant suggestions emerged from the literature reviewed:

1) A complete and useful evaluation methodology should examine the program implementation and corresponding outcomes (Lichtenstein in Bearse 1993).
2) The evaluation of performance or outcomes requires that like incubators be compared (Lichtenstein in Bearse 1993).
3) It is essential to develop a better understanding of the business development process and how the incubator adds value (Lichtenstein in Bearse 1993). Value addition involves those specific activities in incubation programs that enhance the ability of tenants to survive and grow in business (Allen and Bazan, 1990).

Despite the increasing number of incubators and the research conducted on their effectiveness, there is still uncertainty about whether incubators are achieving their goals

and exactly what their impact is on their tenants. There is a gap in our knowledge about how an organisation develops in the protected environment of an incubator. The impact of differing institutional backers is still unknown. The discovery of the influence of sponsoring institutions, the value added by incubator management and the impact of offerings on the emergence and growth of a start up forms the model for a performance evaluation framework.

Bibliography

Allen D.N. (1985). Business Incubators: Assessing Their Role in Enterprise Development, *Economic Development Commentary*, 9(4): 3-8

Allen D.N (1985). An Examination of Public, Private and University incubators from a Local Development Perspective, *Economic Development Commentary*, 9(4):3-8

Allen D.N. (1988). Business incubator life cycles, *Economic Development Quarterly*, 2(1): 19-29

Allen, D.N., & Weinberg, M. (1988). State Investment in business incubators. *Public Administration Quarterly* 12(2): 196-215

Allen D.N. & McCluskey (1990). Structure, Policy, Services, and Performance in the Incubator Industry, *Entrepreneurship, Theory and Practice*, Winter 1990: 61-77

Allen D.N., Bazan, E.J. (1990). *Value added contributions of Pennsylvania's business incubators to tenant firms and local economies.* Report to the Appalachian Regional Commission and the Pennsylvania Department of Commerce, Washington, DC

ANZABI (2003), accessed on 1 July 2003 at http://www.anzabi.com.au

Bearse P. (1993). *The Evaluation of Business Incubation Projects- A Comprehensive Manual*. Athens, Ohio, NBIA

Bearse, P. (1998). A question of Evaluation: NBIA's Assessment of Business Incubators, *Economic Development Quarterly*, 12(4): 322-333

Birch D.L (1979) *The Job Generation Process*, Cambridge, MA: MIT Program on Neighbourhood and Regional Change

Birley, S (1985). The role of networks in the entrepreneurial process. Journal of Business Venturing, (1) 1: 107-118

Brown M., Harrell M.P., Regner W.(2000). Internet Incubators: How to invest in the new economy without becoming as investment company , *Business Lawyer*, 56(1): 273-284

Campbell C (1988). Change Agents in the New Economy, Business Incubators and Economic Development. Minneapolis, MN: Charles Stewart Mott Foundation

Campbell C (1989). Change Agents in the New Economy, Business Incubators and Economic Development, *Economic development Review*, 7(2): 56-59

Chakravarthy, B.S. (1986) Measuring Strategic Performance, *Strategic Management Journal*, 7: 437-458

Churchill, N.C. and Lewis, V.L. (1983). The five stages of small business growth, *Harvard Business Review*, May/June

Colombo M.G., Delmastro M. (2002). How effective are technology incubators? Evidence from Italy. *Research Policy*, 31: 1103-1122

Cooper, A.C., Gascon, F.J. (1992). *Entrepreneurs, Processes of Founding, and New Firm Performance* in Donald Sexton and John Kasarda, The State of the Art of Enterpreneurship, PWS-Kent Publishing, Boston.

Cooper, A.C. (1986). *Entrepreneurship in high Technology*. In D.L Sexton and RW Smilor, eds., The Art and Science of Entrepreneurship, Cambridge, MA, Ballinger.

DCITA (1999). *Building on IT Strenghts (BITS) Incubator Program- Program Guidelines and Application Form*. Canberra, accessed on 20 November 2002 at http:///www.dcita.gov.au/Article/111650,00.html

DCITA (2003). *BITS Incubator Program- Pilot Evaluation.* Report prepared for the Department of Communications by The Allen Consulting Group (2003),, Information Technology and the Arts, February 2003

DEWRSB (2001). Department of Employment and Work place Relations and Small Business Annual Report 2000-2001, Canberra

Etzioni, A. (1964). *Modern Organisations*, Prentice-Hall, Englewood Cliffs, NJ

European Commission Enterprise Directorate-General (2002), Final Report Benchmarking of Business Incubators, Centre for Strategy & Evaluation Services

European Commission Enterprise Directorate-General, Cordis Incubator Database, accessed 1/7/2003 at http://www.cordis.lu/incubators/

Georgopolous, B.S. & Tannenbaum, A.S. (1957). The Study of Organizational Effectiveness, *American Sociological Review*, 22: 534-540

Lalkaka R. Bishop J (1996). *Business Incubators in Economic Development: an initial assessment in industrialising countries*, United Nations Development Programme, New York, Organisation of American States, Washington DC, United Nations Industrial Development Organisation, Vienna.

Lalkaka (2001). *Best Practices in Business Incubation: Lessons (yet to be) Learned*, paper presented at the International Conference on Business Centres, Brussels, November 2001, accesses on 25 December 2002 at http://www.cses.co.uk/conferences.html

Lalkaka D (2003). *Best Practices in Asian Business Incubation.* NBIA 17th International Conference on Business Incubation, Richmond, Virginia, May 20, 2003

Lee, D.Y., Tsang E.W.K (2001). The Effects of Entrepreneurial Personality, Background and Networking Activities on Venture Growth, *Journal of Management Studies*, 38(4): 583-602

Lictenstein, G.A. (1992). *The significance of relationships in entrepreneurship: A case study of the ecology of enterprise in two business incubators*. Ohio: NBIA

Lindelof, P. & Lofsten, H. (2002). Growth, management and financing of new technology –based firms-assessing value added contributions of firms located on and off Science Parks, *The International Journal of Management Science*, 30: 143-154

Lyons T.S. (1990). *Birthing Economic Development: How Effective Are Michigan's Business Incubators?* Research Report. Michigan: Social Science Research Bureau, Michigan State University

McKee, B. (1992). *A boost for start-ups*, Nations Business, August: 40-42

McKinnon S., & Hayhow S. (1998). The State of the Business Incubation Industry. Athens, OH: NBIA Publications

Merrifield, D.B. (1987). New Business Incubators, *Journal of Business Venturing*, 2: 277-284

Meyer, S. (1987). Business incubators: hatching new companies, *American Way*. April 15: 52-57

Mian, S. (1996). Assessing the value-added contributions of university technology business incubators to tenant firms, *Research Policy* ,25: 325-335

Mian, S. (1997). Assessing and managing the university technology Incubator: An Integrative Framework, *Journal of Business Venturing*, 12: 251-285

Molnar L., Adkins D., Yolanda B., Grimes D., Sherman H, Tornatzky L. (1997). *Business Incubation Works*. Athens, Ohio: NBIA Publications

Molnar L., DePietro R., and Lizabeth G. (1996). *Sustaining Economic Growth: The Positive Impact of Michigan Incubator Industry, 1985-1995*. Athens Ohio: NBIA

Monck, C.S.P., Porter, R.B., Quintas, P., Storey, D.J., Wynarezyk, P.(1988). *Science Parks and the Growth of High Technology Firms*, Croom Helm, London

Murphy, G.B., Trailer, J.W., Hill, R.C. (1996). Measuring Performance in Entrepreneurship Research, *Journal of Business Research*, 36: 15-23

National Technology Agency of Finland (2002), *Growing Business From Technology*, High Technology Finland, The Finnish Academies of Technology.

NBIA (1993). *The Evaluation of Business Incubation Projects*, P. Bearse, ed. Report Prepared for Economic Development Administration, US Department of Commerce, Athens, Ohio: NBIA

NBIA (1992), State of the Industry Report, Athens, Ohio

Nyrop, K. (1986). Business incubators as real estate ventures. *Urban Land*, 45(12), 6-10

OECD (1999). *Business Incubation- International Case Studies*, Organisation for Economic Cooperation and Development Publications, Paris, accessed on 5 December 2002 at http://www.oecd.org

Pennings, J.M. & Goodman, P.S. (1977). *Toward a Workable Framework in New Perspectives on Organizational Effectiveness*, P.S Goodman and J.M. Pennings eds, Jossey-Bass, San Francisco, CA: 146-184

Petree R., Petkov R., & Spiro E. (1997) *Technology Parks-Concept and Organisation*, Summary Report prepared for Center for Economic Development, Sofia, accessed 24/8/2002 at http://www.ced.bg/

Plosila, W.H., & Allen D.N. (1985). Small Business Incubators and Public Policy: Implication for State and Local Development Strategies, *Policy Studies Journal*, 13(4): 729-734

Rice, M.P. (1992). *Intervention Mechanisms used to influence the critical success factors of new ventures: An Exploratory study*. Troy. New York: Centre for Entrepreneurship of New Technology Ventures, Rensselaer Polytechnic Institute

Rice M.P., & Mathews J. (1995). *Growing New Ventures, Creating New Jobs: Principles and Practices of Successful Business Incubation*, Quorum Books, 1995

Rosenwein R. (2002). The Idea Factories: Incubators that actually work? You won't find them only in Internet space, *Inc Magazine*, accessed 20/08/2002 at http://www.inc.com/articles/ops/operations/incubators/20906-print.html

Scheirer M.A, Nieva V.F, Gaertner G.H, Newman P.D, Ramsey V. (1985*). Innovation and Enterprise: A Study of NSF's Innovation Centres Program*, Report prepared for the National Science Foundation, December

Schermerhorn, J.R. (1980). Interfirm cooperation as a resource for small business development. Journal of Small Business Management, 18 (2): 48-54

Scott M. and Bruce R. (1987) Five Stages of Growth in Small Business, *Long Range Planning*, 20 (3): 45-52

Small Business Council (1989), *Business Incubators*, Australian Government Publishing Service, Canberra.

Smilor R.W. & Gill M.D. (1986). *The New Business Incubator : Linking Talent, Technology, Capital, and Know-How*, Massachusetts: Lexington Books

Storey , D.J., Tether, B.S.(1998), Public Policy measures to support new technology-based firms in the European Union Research Policy

Tarkiainen T. (2002). *Turning high-tech ideas into business*, High Technology Finland, The Finnish Academies of Technology, Finland.

Temali M, Campbell C (1984). *Business Incubator Profiles: A National Survey*, Minneapolis: University of Minnesota, Hubert H. Humphrey Institute of Public Affairs

Thompson, J.D., (1967) Organizations in Action, McGraw Hill, New York

Tornatzky L., Batts Y., McCrea N., Quitman L. (1996). *The art and craft of technology business incubation.* Research Triangle Park (NC): South Technology Council

US Small Business Administration, Definition of Small Business Incubators, accessed 30/6/2003 at http:// www.sba.gov/gopher/Business-Development/Success-series/Vol2/Incu/incu2.txt

Venkatraman, N., Ramanujam, V. (1986). Measurement of business performance in strategy research: a comparison of approaches, *Academy of Management Review*, 11: 801-814

Yasin, M.M., (2002) The theory and practice of benchmarking: then and now, *Benchmarking. An International Journal*, 9(3): 217-243