THE EVOLUTION OF BUSINESS INCUBATION

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ABSTRACT

Key words: Business incubators, Discontinuities, Environments

The genesis, development, and proliferation of business incubators are well documented. However, fundamental questions pertaining to their origins and evolution as the dominant organizational form for promoting institutional entrepreneurship and stimulating new business formation have not been posed. The origins and evolution of business incubators, as a collectivity, were traced to the presence and emergence of a range of discontinuities in multiple and diverse environments which threatened the social, economic, and financial security of communities and generated tremendous opportunities simultaneously. Consequently, perceptions and interpretations of the meaning and significance of these discontinuities among institutional stakeholders led to the strategic and instrumental deployment of business incubators as a tool to leverage or stabilize emergent discontinuities in the environment.

INTRODUCTION

The genesis, development, and proliferation of business incubators[1] are well documented (Allen, 1985; Smilor and Gill, 1986; Campbell et. al., 1988; Hansen et al. 2000). However, fundamental questions pertaining to their origins and evolution as the dominant organizational form for promoting institutional entrepreneurship and stimulating new business formation have not been posed. Twenty years ago, most business incubators did not exist. Yet, today, business incubators continue to increasingly attract significant scholarly and professional attention (Allen, 1985; Smilor and Gill, 1986; Campbell et. al., 1988; Hansen et al. 2000). The creation and implementation of business incubators has generated national and global interest because it reinforced the ideology that the availability, accessibility, and affordability of resources through business incubation[2] programs would provide opportunities for entrepreneurial firms and generate many desirable social and economic outcomes. The generalized premise that business incubators would stimulate new business formation, promote economic development, and create social wealth in relatively short time spans attracted a diversity and multiplicity of institutional stakeholders, constituencies, and interest groups, whose roles and contributions financed the birth and growth of the field and legitimated their rise in both public and private domains and across many social and economic sectors. While the spectacular growth in the scale and scope of business incubators might be indicative of the versatility or adaptability of the concept, it also underscores the notion that business incubation means different things to different institutions—governments, academic and research institutions, business and industry, professional, industry, and trade associations, religious institutions, ethnic collectivities, foundations, philanthropists, and civic organizations, etc., and even the United Nations[3] which demonstrated their interest by conducting a global study of the business incubation phenomenon (UN Economic Commission for Europe, 2000).

The genesis of business incubators was traced to the emergence of initial prototypes in the late 1950s and early 1960s. Batavia Industrial Center[4] (BIC), recognized as the first formal business incubator in the country (Adkins 2001; Wolfe et al. 1999; Hughes 2000), was founded in the Finger Lakes region of New York State, in 1959, as the prudent, logical, and practical solution formulated by the town of Batavia to recruit small businesses and stimulate job creation following the termination of a local industrial plant and the resulting economic devastation of the local economy that generated massive fiscal losses and relatively high unemployment. BIC was a social construction and the intellectual and practical justification was predicated on the need to address local economic development challenges. The term “incubator” was coined by Joe Mancuso, a member of the family that owned BIC, as he observed the routine operations of one of the original tenants—“Mount Hope Hatchery” in a scene with thousands of chickens in various positions—on floors, on rafters, laying eggs, prior to processing. Joe Mancuso was so amused at the sight of a poultry farm in an industrial commercial building that he analogized the actual hatching of eggs as identical to his efforts to recruit and grow

multiple small businesses and designated BIC, the building, as his incubator (Hughes 2000). Thus, while the term "incubator" was derived from observations of the routine operations of a hatchery, it was also chosen for its symbolic or allegorical significance. However, it was not until the 1980s and 1990s that the label became extremely popular and its application dominated references to and identifications with organizations routinely providing incentives and subsidies to stimulate the recruitment and retention of entrepreneurial businesses. Either way, the label "incubator" originated with chickens and eggs. Several years after the BIC founding, the University City Science Center[5] (UCSC) was inaugurated in Philadelphia in 1964 (Adkins 2001; Hughes 2000). Unlike the BIC that was deployed as a tool to promote local economic development through small businesses support and job creation, UCSC was launched to mobilize "institutional resources", aggregate interests, and facilitate the regional cooperation and collaboration of scientific research among academic and research institutions with the objective of facilitating technology transfer and research commercialization. Now considered to be the nation's first urban research park, UCSC attracted startups firms and performed tasks and activities currently identified with business incubation. However, variations in social and economic contexts as well as divergence of institutional interests and developmental goals of these archetype business incubators did not precipitate a mass ideological adoption of business incubators. Rather, the business incubation ideology was dormant for about two decades until the early 1980's when Temali and Campbell (1984) documented 12 in the nation. A decade later, their dramatic growth from 140 in 1986 to 548 by 1996 was confirmed by McKinnon and Hayhow (1998). Currently, the NBIA[6] estimates over 1100 business incubators operate across the nation (Hughes 2000) even though empirical evidence (Eshun 2004) suggests the size is understated given the practice of the NBIA to restrict tallies only to affiliates within their membership networks.

The growth and legitimacy of business incubators as the newly emerging organizational forms specifically dedicated to entrepreneurial firms received significant boost and reinforcement during the late 1970s and early 1980's because 'powerful' syndicates of institutional stakeholders embraced and adopted the concept and deployed them to execute distinct social and economic roles and routines aimed at facilitating entrepreneurship and stimulating new business formation as a strategy to address new and emerging economic development challenges. A massive federal government-sponsored public relations campaign during the 1980s promoted the ideology and strategy of business incubators as an economic and community tool and heightened public awareness and sensitivity to the concept. Information about the availability, accessibility, and affordability of resources to support entrepreneurial ventures through business incubation programs were disseminated through institutional networks to encourage trial.

The creation of the first formal business incubator unquestionably made the United States a pioneer, however, the business incubation phenomena did not remain an American exclusivity but rapidly diffused into the global environment during the 1990s and early 21st century. For example, in 2001, "The First International Workshop on Technology Business Incubators[7]" was held in India (ITBI India 2001) at a conference attended by over 300 participants—entrepreneurs, venture capitalists, policy makers, business developers, and academicians from 11 countries including China, Egypt, Japan, Germany, India, Malaysia, Mongolia, Pakistan, Republic of Korea, Russian Federation, Singapore, South Africa, United Kingdom, and the United States. Moreover, one of the significant policy initiatives was the resolution to organize the conference every year. Presently, outside of United States, it is estimated that 3500 business incubators operate worldwide with nations such as Japan, China, the Ukraine, and Poland showing intense business incubation activity. Furthermore, in spite of the spectacular increase in the size and scope of business incubators, researchers (Hansen et. al. 2000) acknowledge that many are only a few years old—an attribute that underscores the novelty of the business incubation concept and its dynamic and persistence adaptation across nations, societies and cultures.

Even with these developments, scholarly interest in the history and origins of business incubators is lacking, in spite of the overwhelming public interest in the topic. Most accounts have presumed their preexistence and perpetuate the notion that they were created in a historical vacuum. That past events are significant, affect institutional structures, influence historical evolution, and shape social and economic outcomes has long been recognized by sociologists but more recently by economists (David 1993; Arthur 1994), who have hypothesized the "path dependence" paradigm to explicate the emergence of agglomeration economies and the assembly of high technology firms in Silicon Valley. Thus, the aim of this study was to provide an objective account of the history and origins of

business incubators, devoid of political and ideological biases, and grounded in more rigorous and versatile empirical methods so that the range of factors advanced to hypothesize the founding of diverse populations of business incubators are not be theorized in isolation from one another. Moreover, given the focus on the historical origins, particularly, the contexts and conditions that shaped the founding and implementation of business incubators, many important issues and sociological outcomes related to the development and proliferation of business incubators are excluded from the analysis. In addition, the research focuses on the organizational level as the unit of analysis, therefore issues pertaining to perceptions and experiences of client firms as well as the efficacy and performance of business incubators as tools for promoting economic developmental goals and generating desirable social and economic outcomes are excluded.

METHOD & DATA COLLECTION

Data for this research came primarily from an ethnographic study of a population of business incubators in New York, New Jersey, and Pennsylvania. Qualitative and quantitative data was collected through numerous participant observations and interviews with informants including managers and developers of business incubators; state and local economic development practitioners, academic administrators, etc. This was supplemented with analysis of archival data, and published reports from governments and the popular press. The field research was conducted between mid 2001 and early 2003.

Procedure

A list of the population of business incubators was generated from several sources including (1) A directory of membership information compiled by NBIA (2) References and published reports from the popular press, professional/academic journals, and trade magazines and newsletters (3) Electronic links from website (4) Personal contacts and referrals from business incubator managers, and state and local economic development practitioners, and government officials, etc. All business incubators in the population were contacted to verify information (mailing addresses, titles), identify interviewees, and discuss proposed research agenda. Interview dates were scheduled, participant observations and interviews were conducted, taped interviews were transcribed and analyzed.

RESULTS

Population

178 business incubators were identified in the population:

- 130 (73.0%) were operational
- 48 (27.0%) were non-operational,
  - -17 (9.6%) were being planned
  - -8 (4.5%) had failed, terminated/ceased operations.
  - -23 (12.5%) were inaccessible and therefore excluded from the analysis

(Please see Table 1 and Figure 1).

Legal Form of Organization

- 98 (76%) were legally organized as 501(c) 3 not-for-profit entities
- 29 (22%) as private for-profit partnerships.
  - -3 (2%) were subsidiaries of public corporations.
  - -None in the population was legally organized as a sole proprietorship

(Please See Table 1 and Figure 2).

Language

Institutional stakeholders, constituencies, and interest groups used key words to designate and label business incubators including “incubator”, “accelerator”, “venture”, “technology center”, “innovation center”, or “knowledge”, “science center”, “research center”, “laboratory”, “industrial center”, “community development center” or “enterprise center”. (Please see Table 1 and Figure 3).

- 138 (70%) were designated or labeled with the aforementioned key words
- 39 (30%) did not use any of the aforementioned key words

  25 (19.2%) adopted “incubator”, “accelerator”, or “venture”;

  32 (24.6%) adopted “technology”, “innovation”, or “knowledge”;

  5 (3.8%) adopted “science center”, “research center”, or “laboratory”

  29 (22.3%) adopted “industrial center”, “community development” or “enterprise”.

Discontinuities in diverse and multiple environments

The origins, creation and implementation of business incubators, as a collectivity, were traced to the presence and emergence of a range of discontinuities in multiple and diverse environments. Analyses of the nature and type of discontinuities revealed the interplay and influence of distinct "institutional and technical environments" (Scott 1995).

- 55 (43%) originated primarily due to discontinuities in the economic environment
- 8 (6%) in the political-legal environment
- 33(25%) in the technological environment
- 8 (6%) in the socio-cultural environment
- 26 (20%) in the financial/investment environment (Please see Table 1 and Figure 4).

DISCUSSION

The Population

The population—New York, New Jersey, and Pennsylvania—offered a rich diversity of contexts and conditions and an extensive distribution of business incubators in urban, suburban, and rural areas. 178 business incubators, about 15% of the national sample, were identified in the population, in a region considered to be among the most densely populated regions of the entire nation with approximately 40 million people (U.S. Census Bureau 2000) and a disproportionate share of annual new business starts—30, 000—(Dun & Bradstreet Business Starts Records 1996 cited in U.S. Census Bureau 2000). In addition, this region is home not only to the first and oldest formal business incubator in United States, but also the first urban research park in the country (NBIA 2000; Adkins 2001, Hughes 2000). Given her history as the area where initial prototypes emerged, institutional familiarity with and exposure to business incubation phenomenon and routines is dated. Third, with over 2005 institutions of higher education (U.S. Census Bureau 2000), the region ranks nationally in annual federal R&D funding—a total of 6.7b (RAND 2000), and related output. Between 1990 and 1996, 12, 427 patents were generated (U. S. Patent & Trademark Office 2000 cited in U.S. Census Bureau 2000) indicative of a thriving intellectual property (IP) industry. Fourth, the population ranks among the top in the nation in R&D spending (NSF Science & Engineering Indicators 2002; 2004) with expenditures of $71.8b in 1999 & 2000. Besides these quantitative measures, the region is residence to the corporate headquarters of many Fortune 500 firms; enjoys the presence and visibility "Wall Street" (the global financial services industry hub), "Madison Avenue" (the epicenter of the world's largest advertising and media empires), and the headquarters of the United Nations, among others. These attributes collectively endow the region with unrivaled metropolitan and cosmopolitan features constituted by a wide-ranging social, economic, and cultural milieu, and typified by an extensive diversity and multiplicity of international and national ethnic groups and associations, and a rich intensity of business exchanges and interactions among institutions that promote innovation, facilitate technology transfer, reinforce entrepreneurship, and generate many social and economic outcomes. More importantly, the scale and scope of the region is increasingly attractive to various stakeholders, constituencies, and interest groups—governments, academic and research institutions, business and industry, professional, industry, and trade associations, religious institutions, foundations, civic groups, philanthropists, ethnic collectivities, and voluntary organizations, among others. For a variety of motivations and social and economic logic, these institutions embraced and adopted the business incubation paradigm in pursuit of their own interests and agenda.

Legal Forms of Organization

The implementation of business incubation programs required multidimensional resources and technologies embedded in various institutional stakeholders. Therefore, it was not unexpected that none, not even a single business incubator was legally organized as sole proprietorship. During the early 1980s, the premise and growth of business incubators was hypothesized on the notion of public assistance to early stage firms (Lewis 2001). Therefore an overwhelming majority (76%) of business incubators were legally organized as 501(c) 3 not-for-profit entities. However, growth and popularity in the late 1980s and early 1990s stimulated private sector interest and participation with the outcome that many business and industry implemented or participated in business incubators but were legally incorporated as private for-profit partnerships or subsidiaries of public companies. Thus, an increasing representation of corporate interests is evident and about 25% were established for-profit. This raises questions about the validity and efficacy of a theory of business incubation grounded in public administration or public sector assistance to early stage firms (Lewis 2001). An empirically validated theory of business incubation is required. However, it should be adequately robust to

accommodate both public and private motivations and interests.

Language

Sociologists of language, and social and cultural anthropologists have long generalized the notion that "language is a not a universal means of communication but rather a means of communication within a particular culture" (Whorf 1956). He argued that each language shows and preserves a unique worldview—a general frame of reference that shapes the cognitive expressions of its users. Following Whorf's propositions, Tepstar & David (1991) demonstrated the relationship between context and language by comparing and contrasting the vocabularies of English and Arabic in reference to camel. They concluded that while English language is relatively rich in vocabularies for transportation, it is relatively poor in terms of her vocabulary for the camel and its parts. Hannan and Freeman (1986) proposed that language is indicative of the rise and emergence of new organizational forms. More recently, Clippinger (1999) posed the question, "What's in a name?" and insisted "Everything: identity, power, prestige, and stigma." Similarly, in the emerging business incubation field, various stakeholders, constituencies, and interest groups designated their business incubators by adopting certain key words and specific labels as a strategy to create a collective identity and delineate the distinctive features of a fledgling organizational field differentiated from others by language, routines, and a subculture. Thus, business incubators have many called many things—"Greenhouse Business Facilities", "Business Centers", "Business and Technology Centers", "Innovation Centers", and "Enterprise Development Centers" (Daneke 1985). Sometimes the labels adopted reflected the demands of spatial and temporal contexts as when Udell (1990) found that business incubators were named "Science Centers" and "Incubators" in the 1970's and 1980s, but "Accelerators" in the late 1990s. Moreover, business incubators have been differentiated from "science parks" "technology" or research parks", primarily because they facilitate the ongoing recruitment and "graduation" client firms. However, rapid growth and proliferation during the 1980s and 1990s coupled with consolidations during the so called "Dot.com" boom and collapse tarnished their image. As a result, many stakeholders introduced new labels to create new identities aimed at dissociating and differentiating themselves from disrepute. While 138 (70%) identified with the "business incubator" label and designated their incubators with one or more of the key words (Table 1 Figure 3), however, some rejected and substituted with "venture technologists", "mentor capitalists", and "technology outlets". They explained their rationale:

> We don't see ourselves as incubators. In fact we reject the label incubator. We see ourselves, our organization, as a technology outlet—an outlet for our technology that bridges the gap between early development and what companies wanted to buy—our products…. This is the Sarnoff model…
>
> (Personal Interview, Sarnoff Corporation, Princeton, New Jersey).
>
> We call ourselves mentor capitalists…that would be our model…if you really want to talk about modeling…we are primarily mentors…a secondary funding source…we are obviously utilizing our mentoring and strategic development …and advising the entrepreneurs that we have here…and the strength of our advisory board help develop appropriate models for businesses…the approach really was to mentor individuals…have them come in…explain to them what we do…this is how we generate value.
>
> (Personal Interview, Business Incubation Group, New York, New York).

While this plethora of labels might be indicative of the adaptability or versatility of the business incubation ideology and strategy and its potential usefulness in producing many desirable social and economic outcomes, it is also demonstrative of the notion that business incubation mean different things to different stakeholders, constituencies, and interest groups. Therefore, it is important for research to probe the motivations and interests of stakeholders as well as their ideological orientations and preferences in the identification with or rejection of labels deployed to designate business incubators in pursuit of political, economic, and social agendas.

Discontinuities in Diverse and Multiple and Environments

The history and origins of business incubators were traced to the presence and emergence of a range of discontinuities in multiple and diverse environments including economic, political-legal, social, cultural, and technological. These discontinuities were catalyzed by plant closings, corporate downsizing, business terminations, legislative enactments, deregulation, ratification of trade agreements/economic pacts, scientific advancements, technological innovations, decline or obsolescence of social infrastructure, lower standards of living, new and emerging beliefs and value systems, paradigm shifts, and changing demographics and psychographics, among others. Some of these destabilized local and regional environments and generated adverse social and economic outcomes. Others created new and emerging opportunities. Even so, perceptions and interpretations of the meaning and significance of these discontinuities in terms of the threats they posed or the opportunities they presented compelled syndicates of stakeholders, constituencies, and interest groups to take action. In response, they implemented business incubators as a tool to stabilize or leverage emerging discontinuities in the environment. Also, while these diverse and multiple environments are interrelated, they have been separated for analytical purposes only.

Discontinuities in the Economic Environment

Discontinuities in the economic environment, typified by industrial plant closings, corporate downsizing, business relocations/exits, terminations and bankruptcies, etc. dominated the social and economic premise and intellectual justification for the creation and implementation of business incubators. They were also exemplified by many occurrences. In Schenectady, Albany, and adjacent towns, several manufacturing plants owned by General Electric, IBM, and Corning, etc. closed down, restructured or downsized operations during the 1980's and 1990s due to competitive challenges. In addition, massive reduction in federal expenditures in defense-related sectors—the outcome of the end of the "cold war"—generated significant economic hardships for many small businesses and suppliers that traditionally depended on government contracts. The way and manner the introduction of these discontinuities triggered the founding and implementation of business incubators was briefly explained by several managers:

> Schenectady County historically accounted for a huge percentage of its employment on a very small number of companies…the chief of which was General Electric…At the height of their employment in the 1950s, General Electric had over 40,000 employees in this county…they now have 7000. As employment decreased at the General Electric plants downtown, Schenectady County fell on hard times. So, this incubator is very, very much an economic development tool, which is why we are pursuing grants to do economic development on Albany Street…plain and simple…the reason for this incubator is to produce new businesses for the county that will produce jobs for the citizens of this county. For all of our vision statements and goals and what have you, it's very simply an economic development plan.

The genesis of this incubator started with the Schenectady County Chamber of Commerce. About 6-7 years ago, the then President of the Chamber of Commerce was developing a new strategic plan for the Chamber and looked upon entrepreneurship… actually started looking at incubators and put together a group of about 15-16 business leaders, political leaders, county employees, business people, and we all went and visited a micro enterprise incubator in Mobile, Alabama, which, at the time, was then, and is now, one of the most successful micro enterprise incubators in the country. The group came back and we spend 3-4 days in Mobile and came back and said "we have to do this." There is absolutely no reason why we could not duplicate it. Over the next couple of years the chamber began to try to find funding sources for the incubator. The chamber got funding from the county to do a feasibility study. The study took about 8 months to do and the study came back and said not only was there room for one incubator in Schenectady

> County, but there was like room for 3 and they listed a lot of constituents that could be served by it. As a result of that feasibility study, the County of Schenectady took up the effort and actually put together the funding sources for this incubator. That was about 3 years ago. Construction was started 2 years ago and a year ago in September we opened on September 1st, 2000.
>
> (Personal Interview, Schenectady County Community Business Incubator, Schenectady, New York)

The same defense-related downsizing of the 1980s that generated economic hardship in one place simultaneously generated opportunities for displaced scientists, engineers, and technicians in Long Island to pursue self-employment and new business formation activities, a condition that led to the founding of a local business incubator:

> Since defense downsizing was the economic condition, very brilliant people were out of work…who decided that they wanted to take a chance at starting their own business. Something we've noticed more recently, which is interesting, is when the market was very good people wanted to start their own businesses. When defense started to downsize here, it had a severe impact on Long Island…however, these talented scientists, engineers, and technicians didn't want to leave so they started their companies based on their intellectual knowledge and professional experience…There were no incubators at that time, except for the big one at Stony Brook and they were charging real rent which they couldn't afford…so all of these little companies had no place to go. That's when people would approach us and ask if we can we help them make something. We looked at this building and said OK, we could take care of a couple of companies and try to support them.
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> [Abstracted from Field Notes and Personal interview Long Island Forum of Technology, State University of New York (SUNY) at Farmingdale, Farmingdale, New York].

At the New Jersey Institute of Technology the driving motivation for the creation of the campus-based business incubator was predicated on economic uncertainties and past experiences with job losses:

> Our incubator originally opened in 1988 as a small program with a part-time manager to demonstrate the university's commitment to economic development in the city and state. The city had gone through traumatic experience with job losses…the incubator aligning with economic development potential of the university…university and incubator seen as a job creation and technology…we are the first incubator in the state… Right now, we only accept technology developers—startups developing unique technologies, not just utilizing new technologies…something proprietary. The incubator program has expanded with two currently operating centers and one under construction…almost 100% completed
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> (Personal Interview, New Jersey Institute of Technology, Newark, New Jersey).

In 1990s, the federal government terminated operations at the Fort Dix military airport and processing center in Burlington County (New Jersey). That government action devastated the tri-state economy including Philadelphia (Pennsylvania) and Baltimore (Maryland). Therefore, the creation and implementation of the High Technology Small Business Incubator at Burlington County Community College was driven by the need to "do something" to diminish the social and economic impact on the region:

> What you probably don't realize is that in the 1990s this area is …the Silicon Valley of southern New Jersey…so there are a lot of high tech companies. In order for an

> incubator to be successful…you need the people or companies that will have high tech businesses. Number one, location. Number two, in Burlington County there are 2 major military bases…Fort Dix and McGuire Air Force base. In the early 90s the government made the decision to close Fort Dix as a processing center. That was going to mean that 4,000 people were going to lose their jobs. So the federal government gave the county some money to do some things that might economically offset the closure of Fort Dix. And Burlington County College, in conjunction with the county freeholders, recommended that some of that money be spent to build a high tech incubator …
>
> (Personal Interview, Burlington County College High Technology Small Business Incubator, Mount Laurel, New Jersey).

Similar economic discontinuities occurred in Western Pennsylvania. My interviews with a consortium of business incubator managers shed light on the impact of these changes. This is the group that achieved statewide recognition for establishing the now defunct Pennsylvania Incubation Association (PIA) which promoted business incubation in the late 1980s and early 1990s. All of them—economic development practitioners from neighboring townships—Corry, Franklin, Girard, Greenville, Meadville, Sharon, and Venango embraced and adopted business incubation as a strategy and objective of economic development due to a combination of economic recession, industrial plant closures, business relocations, and relatively high unemployment:

> Venango Manager: In Greenville our incubator started in 1986 and the main justification was the unemployment ratio. We had large companies that were closing and everybody was out of work and they were looking for another avenue.
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> Meadville Manager: It was like that in Meadville too…
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> McNeilly Manager: Yeah…ours was in 1983. Our unemployment rate was around 24%. Large companies closed. A matter of fact, our incubator is the very facility where the old company used to be
>
> Interviewer: Why were the companies closing? Was it because, you know, they could not compete in the marketplace? Why were they laying off?
>
> Corry Manager: Because they were older companies…In my area they were rail car businesses, bridge and iron businesses. They were large manufacturing companies.
>
> Franklin Manager: Now don't forget – this was the 80s. The 80s was a tough time in this country. A lot of companies were laying off, going out of business, etc.
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> Girard Manager: The zipper factory which is where our incubator is located, they moved to South Carolina for cheaper wages.
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> Corry Manager: Rail cars were a business with a 30 year cycle. They had already manufactured enough rolling stock out there to take care of what was there.
>
> Franklin Manager: Yes. You'll see that come back but it will be another 10 years or in another country
>
> Mercer Manager: It most generally will be done in another country, probably Mexico where the labor is cheap
>
> (Personal Interviews, Corry Industrial Center (Corry); Girard Area Industrial (Girard); McNeilly Business Center Greenville), Meadville Industrial Center (Meadville), Mercer County Industrial Center (Sharon), and Venango Area Industrial Center (Franklin).

Similar problems confronted large businesses in northeastern Pennsylvania notable among them were the competitive challenges that

contributed to the closure, downsizing, and relocation of Bethlehem Steel and Mack Trucks, which led to the establishment of this incubator:

> In 1983 competitive—industrial competitiveness—was the big thing in the world…in the US anyway because we were, you know, industrially we were being beaten by Asia primarily….and so the Governor at that time…I believe it was Thornberg and his folks wanted a program that will help industry address competitiveness issues…we were moving towards total quality management things, there was a lot of industrial engineering kinds of improvements going on, and that really sort of where Ben Franklin got started….and also diversification was another… economic diversification and so the Ben Franklin program came to…participate in competitiveness enhancements and also new business creation. So there were only going to be three centers, and of course Bethlehem Steel here was in the midst of what was like a 30-year slide, and Lehigh University partnered up…as far as I can tell the two key partners were Lehigh and Bethlehem Steel…decided to get together and try and do a center here… and wrote a proposal…and …remember…this was ..the campus here all this was…the campus here was all Bethlehem Steel property. This was all Bethlehem Steel up here. Bethlehem Steel was still in a couple of the buildings up here. For the most part its Lehigh now…and so the incubator….this building kind of …was of available at that point…Bethlehem Steel was vacating buildings and Lehigh is just down the hill here…and so there was this reason to be together…and the best way...the best place to kind of formalize that was to get the Ben Franklin Center…
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> (Personal Interview, Ben Franklin Technology Center, Lehigh University, Bethlehem, Penna.).

Discontinuities in the Political-Legal Environment

Discontinuities in the political-legal environment were precipitated by the passage of new and amendment to existing legislations, deregulation, and ratification of trade agreements, etc. These government actions generated opportunities that provided the context and conditions for the founding of business incubators, particularly, technology transfer and/or research commercialization models at academic and research institutions.

The Bayh-Dole Act of 1980

In 1980, the federal government through the United States Senate enacted the Bayh-Dole Patent and Trademark Act (P.L. 96-517, Patent and Trademark Act) and deregulated the federal ownership of intellectual property (IP)—the output of research traditionally conducted by academic/research institutions but funded by the government. Prior to the passage of this law, existing regulations prohibited academic/research institutions from pursuing the ownership of IP. Thus, the passage of this law eliminated existing barriers and created opportunities for academic and research institutions to pursue the ownership of IP through patenting and licensing. The motivations and interests of the federal government's were laid out by the policy:

> It is the policy and objective of the Congress to use the patent system to promote the utilization of inventions, arising from federally supported research or development; to encourage maximum participation of small business firms in federally supported research and development efforts; to promote collaboration between commercial concerns and nonprofit organizations, including universities; to ensure that inventions made by nonprofit organizations and small business firms are used in a manner to promote free competition and enterprise; to promote the commercialization and public availability of inventions made in the United States by United States industry and labor; to ensure that the Government obtains sufficient rights in federally supported inventions to meet the needs of the Government and protect the public against nonuse or unreasonable use of inventions; and to minimize the costs of administering policies in this area." (35 U.S.C. 200).

The opportunities and incentives provided by the Bayh-Dole Act was confirmed by managers:

> …The University's overall plan was to capitalize on the Bayh Dole Act and one of the attractions to the university and the city was the Bayh-Dole Act. (1) to use its faculty's research products (2) To develop the property nearby (3) To improve the landscape. The implementation of the business incubator represents the need to attain these goals and realize these interests.
>
> (Personal Interview, Executive Director, Audubon Center, New York, NY)
>
> Our incubator started in 1986. The idea grew out of technology transfer act of 1980—the Bayh-Dole Act. Technologies developed by the army—the government could not be commercialized. To facilitate transfer—license technology—facilitate collaboration, a partnership between Picatinny Arsenal decided to do it but were not willing to manage it. Explored partners and chose Morris County College—chosen because it was a non-profit entity and college was willing to manage it through the Cooperative Research Agreement—another legislation in 1986—Equipment no money changing hands between the government and tenant companies. Washington—Pentagon had to be convinced because the Arsenal is a federal research lab used to manufacture bullets and ammunition…it is a federal property run by the army consisting of scientists, engineers, technicians. Tenants must have a cooperative agreement with the army, have a relationship with the mission as military contractors, and other companies the army shows interest in …
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> (Personal Interview, Picatinny Arsenal, US Army, New Jersey).

Nelson (2001) observed that prior to the passage of the Bayh-Dole Act, only a handful of universities were actively commercializing their inventions because of government prohibitions. However, after the enactment of the Bayh-Dole Act, many universities established technology transfer and commercialization offices to promote and protect IP, hosted and collaborated with other institutions to operate business incubators, increased academic patenting and licensing activities, and influenced the formation and spectacular growth in membership of the Association of University Technology Managers (AUTM) in response to a new found institutional interest in the production and commercialization of intellectual property: AUTM's mission is to:

> "To promote…the global academic technology transfer profession through …education, training and communication." (1) To create broad understanding of the technology transfer process and its impact on society; (2) To develop and promote best practices in the profession; (3) To enhance the value of AUTM membership; (4) To communicate effectively with members; (5) To make AUTM an international organization; and (6), To ensure that AUTM has the organizational and governance structure to achieve its vision and mission.
>
> (AUTM Licensing Survey Full Report, 2000).

The role and contribution of academic and research institutions was not confined to the formalization of technology transfer and research commercialization. They also produced scholarship and disseminated knowledge on business incubators. In the mid 1980s, editors of the journal, Frontiers of Entrepreneurship Research generated significant exposure and reinforced the legitimacy of business incubation as a viable subfield of inquiry under entrepreneurship by facilitating the presentation of several papers on the topic in 1985. This event has been recognized as pivotal (Lewis 2001) because it generated extensive awareness, stimulated interest, and contributed to the widespread acceptance of the definition of business incubator—as physical facilities with subsidized rents, shared services, logistical support, and business consulting assistance (Gatewood et al. 1985; Allen 1985; Peterson et al. 1985). In addition, it initiated an intellectual dialogue that created a collective conscience of

business incubators. More recently, this conception has evolved with Hansen, Nohria, and Berger's (2000b) publication of the report "The State of The Incubator Marketspace" business incubators are conceptualized as a "market" with exchanges, productive output, and distributed interests among service providers and clients.

The Ratification of the North Atlantic Free Trade Agreement (NAFTA)

The ratification of NAFTA eliminated legal barriers, combined the economies, and consolidated the markets of United States, Canada, and Mexico into the world's largest trading block with 370 million customers and $6.5 trillion GNP (Peach and Adkisson 2000). This political-legal discontinuity contributed to the founding of several business incubators in the Buffalo area. The city provided direct and proximal access to the huge Canadian market and hundreds of entrepreneurial firms located in Buffalo and their social and economic activities aimed at leveraging the potential benefits of this colossal market catalyzed the demand for industrial and commercial real estate and stimulated capital investments by governments and industrial and commercial real estate developments and contributed to the founding of business incubators, particularly, real estate types that offered commercial industrial space for rental income. One manager summarized how NAFTA precipitated the founding of several incubators in the area:

> NAFTA created opportunities for entrepreneurial businesses because it generated a need for entrepreneurs, startups, and small businesses to maintain cross-border presence—offices—in these multiple nations and markets. Because of its strategic location on the US-Canada border, Buffalo appealed to them and became a preferred city of choice. These conditions generated a demand for office, manufacturing, and distribution space—commercial real estate. Governments and their economic development agencies and private property developers took advantage not only of the opportunity to recruit entrepreneurs, startups, and small businesses, but also to diversify their economic base and generate rental and fiscal income from providing commercial real estate to support businesses. Several commercial real estate facilities were developed by the Buffalo Economic Renaissance Corporation (BERC) as an incentive to "attract new business startups, expansion, and/or relocation, targeted to the international community through the offering of industrial flex-space and incubator modules".
>
> (Field Notes & Personal Interview, Buffalo Free Trade Complex; Can-Am Building; River Rock Industrial Incubator, and William Gaiter Parkway, Buffalo, New York).

The United States Small Business Administration

The federal government's role in advancing business incubation was not restricted to direct resource allocation and legislative enactments but also public relations campaigns that disseminated knowledge and reinforced the business incubation paradigm. For example, in 1984, the United States Small Business Administration (USSBA) convened a conference in Chicago attended by over 500 participants including government officials, policy makers, economic development practitioners, and small business development representatives where a massive marketing and public relations campaign was launched to generate interest, promote awareness, and encourage trial of business incubation. Information about the availability of resources to support business incubation programs was disseminated through various publications and the business incubation ideology and strategy was reinforced (USSBA 1986; Hughes 2000).

The Role of State Governments

Like the federal government, state governments also passed legislation, created new and restructured existed agencies, and allocated resources to initiate a paradigm shift in pursuit of a business incubation agenda. In 1984, the Pennsylvania State Legislature enacted Act 111 (P.L. 555) which created the Ben Franklin Technology Partnership (BFTP) with the mandate to promote technology-based economic development initiatives across the state, and "provide funds through loans to establish small business incubator facilities". This legislation, part of the then-Governor Dick Thornburgh's regional strategy, was designed to provide solutions and stabilize the regional economy following the

economic devastation of the state's manufacturing industries. The passage of this law as well as the structuring of BFTP was a fundamental departure from previous routines because for the first time, public resources were directly allocated to small firms and business incubators were developed as a strategy to facilitate the recruitment and retention of entrepreneurial businesses. This legislation contributed to the diffusion of economic development types of business incubators across the state. According to policy document:

> The purpose of the small business incubator was defined: The small business incubator program is designed to assist the formation of facilities where new start-up businesses can begin and grow. Encouraging the formation of new firms is a high priority of Pennsylvania's economic development strategy because these firms generate new job opportunities and often incorporate advanced technology into new or improved products, accelerating the transition to a more diversified economic base. The small business incubators facility will offer low cost space and business development services to a number of tenant firms housed in the incubator building.
>
> (Pennsylvania Economic Revitalization Fund. Procedures for the Application and Distribution of Funds, Small Business Incubator Loan Program, 1984).

Similarly, the New Jersey Commission on Science and Technology (NJCST), was inaugurated in 1985 under the permanent statutory provisions of state law (Title 52:9X, sections 1-10), to promote economic development and create employment by facilitating the development of scientific and technological programs statewide. Likewise, business incubators were a fundamental feature of this government strategy. At the 15th anniversary of NJCST, in a letter addressed to the Governor and the State Assembly and signed by the Chairman and Executive Director plans were emphasized to expand business incubators in the state as part of their technology-driven economic development policy:

> "We have also prominently featured our plans to expand the number of 'technology incubators' serving the development needs of early-stage technology-based firms statewide, in both urban and suburban settings. We believe we will easily meet the challenge issues to us by the Governor and the Legislature".
>
> (New Jersey Commission on Science and Technology, Annual Report 1999-2000)

More recently, in 1999, the enactment of the Jobs 2000 (J2K) legislation by the New York State legislature dissolved the erstwhile New York State Science and Technology Foundation and simultaneously formed the New York State Office of Science, Technology & Academic Research (NYSTAR) with the mandate:

> "To assume full responsibility for several programs aimed at promoting the development of "high-technology academic research and economic development" including construction of several world-class, state-of-the-art research centers, the modernization of existing research centers and the rapid transfer of technologies from the research lab to the marketplace". (NYSTAR website accessed August 2002).

The formation of NYSTAR was demonstrative of the renewed interest of the state in funding and intensifying the pursuit of science and technology-based research with the objective of ensuring the state's competitiveness in attracting an increasing share of federal grants to support R&D as well as recruit and retain top caliber scientists and researchers at her academic and research institutions. NYSTAR oversees the design, construction, and management of laboratories and research centers (incubators) to perform R&D and pursue programs to accelerate the transfer of technologies from labs to the market via patenting, licensing, and commercialization of IP in hopes of generating many desirable social and economic outcomes—royalties, high tech firms, spin-offs, new lucrative jobs, and higher fiscal incomes.

Discontinuities in the Socio-Cultural Environment

The economic devastation of the 1980s and 1990s generated direct, indirect, and induced effects including relatively high aggregate unemployment,

diminished fiscal revenues, private sector disinvestments, and declining physical infrastructure In addition, shrinking budgets impaired the capacity of municipal governments to fund social programs in education and law enforcement and welfare. Moreover, additional disincentives in the form of declining physical and social infrastructure inhibited new business recruitment. Political and constituent pressure and concerns about the lack economic opportunities and falling living standards created an urgent need for economic revitalization and social reform. "Enterprise Zones" (EZs) (Bondonio 1999; O'Keefe and Dunstan 2001) were created by governments to stimulate economic growth and business retention. While EZs were pioneered by state governments, the federal government adopted the concept and reproduced identical programs across the nation as a "social policy" designed as economic development tools to revive depressed communities, reduce unemployment, and alleviate poverty, etc. Scalar and Hook (1993:48) asserted that "Since 1980 federal policy has looked at cities as places where many people live, rather than as efficient sites of production for the leading industries of the twenty-first century." 81 out of the 151 EZs in the population (53%) implemented business incubators. As a microcosm of the community business incubators appealed to and reinforced the program objectives of EZs (Please see Figure 4).

> We are not-for-profit…we are a 501(C) 3…the building is owned by the county but the incubator is operated by the Schenectady County Community Business Center, Inc. We have only recently within the last month gotten our 501(C) designation so we have not been able to pursue grants up to this point in time. But now we can, at least we're legally allowed to….first of all, we are in an Empire Zone here. Second of all, we are in an economically challenged neighborhood….Empire Zones are state designated areas where joblessness… where a significant proportion of the community were living below poverty levels, and unemployment was above a certain level. There are a few other criteria. They are basically tax zones which give significant tax advantages to companies that are willing to locate in an empire zone. There are all kinds of tax advantageous. You can't get all of them, but you can qualify from everything from sales tax, income tax benefits, etc. So they are significant…
>
> (Personal Interview, Schenectady County Community Business Center, Schenectady, New York).
>
> The Carbondale Technology Transfer Center got started as…initially it was a project explored by the Pennsylvania Enterprise Development Zone which is an organization, non-profit formed by the City of Carbondale in 1988/1989 to administer the Pennsylvania Enterprise Development Zone and a number of functions go with that. One of the functions is technology transfer, another function is business incubators
>
> (Personal Interview, Executive Director, Carbondale Technology Transfer Center, Carbondale, Pennsylvania).

Other socio-cultural discontinuities were illustrated by the rise of an 'entrepreneurial economy' (Drucker 1984), and the visibility and social and economic contributions of "Silicon Valley"—occurrences that provided a compelling logic for institutional stakeholders to reexamine traditional approaches to facilitating economic development. There were several intellectual reasons. Saxenian's (1994) comparative study of "Silicon Valley" and "Route 128" argued that primary differences in the cultural environment—norms, structures and processes—of the two regions, despite identical historical backgrounds and technologies accounted for variations in performance and outcome. This finding stimulated significant interest in the cultural dynamics of local and regional environments. Other regions such as "Research Triangle" (Rosan 2002) reinforced empirical evidence that culture—mindset—of regions contributed to the nature and intensity of entrepreneurship. Symbolized by innovation, technology transfer/research commercialization, and business incubation, culture was recognized as an important determinant in the capacity of regions to generate desirable social and economic outcomes—increased new business formation rates, patenting and licensing activities, resource availability and accessibility, venture

capital, and job creation. Daneke (1985) emphasized how these newly emerging state level economic development programs in the 1980s placed unprecedented focus on providing resources and support for entrepreneurial firms and argued that this was a "radical departure from previous policies" aimed at recruiting large manufacturing firms to locate new plants or businesses in a state. Other intellectual justifications for these new value orientations and normative changes were David Birch's (1979) seminal finding that two-thirds of all new jobs created between 1969 and 1976 came from firms with 20 or fewer employees and four-fifths from businesses with less than 100 employees. Even though his finding generated controversy within the academic community, especially among economists Harrison (1997) and Shahidi (1998) stressed how this contributed to formulation of public policy that endorsed and legitimized entrepreneurship and elevated the social and economic status of small firms and startups in economic development. These new empirical evidence shaped government policy and influenced the formulation of economic development strategies that embraced and adopted business incubation programs. In addition, the "experiment by the National Science Foundation to foster entrepreneurship and innovation" (Campbell at al. 1988) at major academic and research institutions raised awareness, stimulated interest, and encouraged trial of business incubation. The result is that entrepreneurship is recognized as a "meaningful lifestyle and career identity" with 4% of all adults attempting to start a new firm at any given time (Reynolds and White 1997) Likewise, growing interest in and demand for courses in entrepreneurship in the 1990s particularly in graduate business schools (Venkataraman 1997) as well as the growth in educational and professional positions at academic and research institutions, foundations, think tanks, professional associations and academic journals dedicated to issues in entrepreneurship (Katz 1991; Robinson & Haynes 1991; Sandberg & Gatewood 1991) have been collectively linked to a strongly emerging culture of entrepreneurship. In their attempts to reevaluate existing paradigms, many policymakers and institutional stakeholders implemented business incubation programs to initiate a paradigm shift and leverage the potential benefits of incubation. One manager narrated how the creation of their campus business incubator reflected the value of an entrepreneurial culture, provided opportunities to integrate scientific and technical research with new business development programs, and enriched the experience of faculty, staff, and students.

> Our incubator started in 1980 under the directorship and leadership of the then President of the University—it was his vision. He had been a director of the Apollo 11 program at NASA and from that experience realizing that there was tremendous value in linking corporate research—NASA itself had experience in developing new businesses out of the technology that came from other areas to them…saw the incubator as an important thing for RPI for three reasons: (1) as a mechanism for transferring technology from RPI (2) in line with our mission to create and refine technology for common good and purpose and (3) and getting it to the market.
>
> (Personal Interview, Rensselaer Polytechnic Institute, Troy, New York).

Another recounted how the creation of their incubator "reinforced" the entrepreneurial heritage" of the university:

> The incubator has reinforced the focus of Stevens on the entrepreneurial heritage of the school. It is a real life opportunity to translate academic activities and events to practice. The incubator programs allow the university to play a role in other life experiences of students and faculty in running businesses and in so doing gain experience and exposure to business demands and challenges
>
> (Personal Interview, Stevens Institute of Technology, Hoboken, New Jersey)

Discontinuities in the technological environment

The technological environment offered one of the most dynamic sectors illustrating the pace and intensity of the business incubation agenda. Driven by major scientific and technological advancements primarily in biomedical technologies, computing, and telecommunication sectors, it spurred extensive applications development, increased patenting and licensing activities, and facilitated the convergence and emergence of new scientific and technical subfields such as bioinformatics. In addition, the growth and revolutionary impact of the Internet and

World Wide Web as a global broadcasting medium, a tool for disseminating information and promoting exchange and interaction regardless of geography stimulated the flow of investment capital into these industries, and fueled the emergence, rapid growth, and expansion of information and communication technologies sector and related businesses. The so-called "Dot.com" boom and subsequent fall reflects the dynamism, volatility, and heightened business formation activities in this sector during this period. These scientific and technological discontinuities characterized by rapid growth and development in this sector increased the demand for specialized resources and services targeted to the unique and specific needs of entrepreneurial firms in flourishing sectors such as biomedical technologies, ceramics, glass, and advanced materials, and Internet-related services, etc. It also provided the impetus and created the conditions for the founding of specialized business incubators targeted to demands in these industry sectors/subsectors. One manager stressed how her incubator was designed to recruit and nurture scientific research and development in the new and rapidly developing bioinformatics subfield.

> Our incubator was created to focus research and development work in biotechnology in general, especially Bioinformatics…This is one of the "hottest" scientific fields now…it is a merger of biology and information technologies and concentrates on developments in genome bioinformatics and computational biology…
>
> (Personal Interview, Port of Technology, a subsidiary of UCSC, Philadelphia, Pennsylvania).

Another described how the founding of their incubators was driven by the increasing institutional demand to pursue projects and "incubate" businesses and products using digital technologies:

> Our objective is to create products and services using digital technologies …based on collaboration with anyone…faculty and researchers—to create intellectual resources …to support the university's academic and research goals….and to help the campus community use digital media to connect with peers, prospective students, alumni, etc….the incubators facilitates collaboration among specialists and experts in market-research and business-development to identify and exploit opportunities to develop and distribute the content-based intellectual property of the University….a project idea for a new program or resource may originate from diverse resources—faculty, administrator, a third party, or incubator staff whose research has identified an opportunity….building on this idea, the incubator management teams collaborates with relevant stakeholders and constituencies to conduct a feasibility study, formulate a proposal, explore funding sources, develop a detailed plan that specifies the scope of the resource or program; its method of delivery; a budget; timeframe for production; and expected revenue (if any)..
>
> (Field Notes, Columbia Digital Knowledge Ventures, New York).

The manager of the only recognized biotechnology incubator in New York City also briefly discussed the history and origins of this specialty incubator:

> The origins came out of the notion from some state administrators that New York could have a decent amount of biotechnology companies—reasons were not clear….other teaching hospitals in the city had had successes and generated massive amount of intellectual property which was a good source of ideas for starting companies. The state government decided to jumpstart the process by providing funding for space for these companies and the university became interested. However, the size, the state of disrepair of the Audubon facility and the inability of the city to keep it secure prevented the university from developing the property because no investors were interested. Remember university buildings are usually financed with private money…However, things changed and the University's overall plan

was to capitalize on the Bayh Dole Act and the creation and implementation of the business incubator represents the need to attain these goals and realize these interests.

(Personal Interview, Executive Director, Audubon Center, New York, NY)

Discontinuities in the Financial/Investment Environment

Discontinuities in the financial/investment environment were rooted in the outcome of fundamental changes in the structure of the U.S. economy since the 1980s characterized by a transition from the "industrial age to the information age" (Acs 1984). In this epoch, the social and economic role and impact of small firms is increasingly important, requiring the specialized routines of financial services firms, especially those executed by investment banks and venture capital firms. Many labels have emerged to identify these structural changes: Kuttner (1997) called it the "new economy" while Kelly (1997) named it a "network economy". Prior to that Drucker (1982) identified the rise of an "entrepreneurial economy" that was creation and outcome of many different events and activities. For example, the $18b tax reduction bill—the Revenue Act of 1978—enacted by the United States Legislature reduced individual income taxes, corporate tax rates, capital gains tax rates, and revised deferred compensation and pension plans. Earlier, the Employee Retirement Security Act of 1974 (ERISA) deregulated the administration of pension funds and established minimum standards for private industry. Many outcomes were produced by these laws. It increased individual disposal or savings income and investment returns from risky ventures. Industry experts recognize the significance of these amendments, that is, the investment of small quantities of pension funds into risky venture capital funds as signaling the genesis and later dramatic growth of the venture capital industry because it lowered the financial barriers and increased the availability, accessibility, and affordability of financial capital to support new and risky ventures. While it created the conditions leading to the founding, growth, and proliferation of business incubators in general, it particularly shaped the rise of financial/investment types. One New York City executive and incubator manager affirmed:

> The origins of this incubator...go back to the New York City Investment Fund…and Henry Kravis…the founder of that …they really saw a gap in New York…New York is known as a place for big businesses…not as a friendly place for entrepreneurs …it's a difficult place to start a business…there is a lot of barriers…real estate… tax…the expense of doing business here…a lot of barriers for entrepreneurs …they looked around and saw that a lot of the intellectual property that was being developed by the universities--NYU, Columbia, Rockefeller University… was all getting funded and leaving the city…we were losing a lot of the intellectual capital that we had in the city…so the idea was to start a venture capital fund…and to start a program like this that would be supportive of entrepreneurs and that would bring together what we thought were the elements that would be necessary to support entrepreneurial activity in NY—meaning from the academic community…the venture capital community and the corporate community…so that's what this effort is to do …we are using real estate as a kind of nexus to bring all of those things together…so we are again trying to keep all of the intellectual property being developed and coming out of the universities…keeping it in NY as well as the other entrepreneurial activities …so that's really the kind of background…was that the need that we saw…to fill a gap.
>
> (Personal Interview, Telemedia Accelerator, City University of New York, New York)

Another stressed the properties of the financial investment model when he emphasized their high selectivity and stringent screening process as well as their equity stake in portfolio companies:

> At the height of the incubator boom we were bombarded with over 2400 business plans within a year,

> of which we invested in only 40. Chances are we will not invest in your business… if you (the entrepreneur) want to utilize us take advantage of the venture, you must be willing to listen…and open to ideas, especially since we think outside the box a lot…we may come up with a very creative new approach and if we are going to drag…and rub plates over that we almost rather not get involved …and the last thing that we really look at is…what kind of added value we are really are …we pride ourselves on our integrity and we don't want to be an expensive pair of suspenders…we are interested in the stuff that we provide…and we have to make sure that what we are…the information we are imparting is really added-value to your business…if not we are just very expensive...and it's a waste of your equity.
>
> (Personal Interview, Business Incubation Group, New York, New York)

CONCLUSION

Business incubators have attracted significant scholarly and professional interest as a dominant institutionalized form of facilitating entrepreneurship and stimulating new business formation. However, fundamental questions about the history and origins of business incubators, as a collectivity, have not been posed. Business incubators were not created in a historical vacuum. Empirical evidence indicated that their creation, development, and implementation were driven by the presence and emergence of a range of discontinuities in diverse and multiple environments. Typified and catalyzed by various events and activities, the discontinuities simultaneously imposed threats and generated opportunities. As a result, perceptions and interpretations of the meaning and significance of these discontinuities among institutional stakeholders provided a compelling need and social and economic logic to "do something". In response, institutional stakeholders adopted business incubators as an ideology and strategy to leverage or stabilize emergent discontinuities in the environment.

Several findings clearly emerged from this study. First, business incubators did not originate, emerge, and proliferate out of the gallant and heroic efforts of a single entrepreneurial firm or institution. Rather, consortia of stakeholders, constituencies, and interests groups cooperated and collaborated to catalyze and capitalize the growth and development of the field. Governments allocated resources, enacted legislations, and ratified trade agreements; Academic and research institutions established technology transfer/research commercialization offices to regulate the production and protection of intellectual property and intensify patenting and licensing activities; Professional, industry, and trade associations mobilized resources, aggregated interests, and created a collective identity to professionalize the field; think-tanks established intellectual platforms to disseminate knowledge to institutional hierarchies on the merits of entrepreneurship to the local and regional economies; religious institutions, foundations, philanthropists, and ethnic collectivities allied with governments and business/industry to pool resources and deliver programs to stimulate economic independence, self employment and business ownership in pursuit of social and economic reform.

Second, business incubation[3] mean different things to different syndicates of stakeholders, constituencies, and interests groups (Fig. 6) and this miscellany of meanings is indicative not only of her embeddedness in diverse 'technical and institutional environments', but also demonstrative of the reality of various institutional ideologies, strategies, and interests that inform and guide the implementation of programs.

Third, seven distinct, yet overlapping types of models of business incubators were classified from the population (Fig. 7). Most were hybridized, and constituted by one or more types with hybridization providing a mechanism for the representation of various interests and the pooling of resources in pursuit of multiple development goals simultaneously.

Fourth, business incubation programs require multidimensional resources, routines, and technologies embedded in various institutions. Therefore, the nature and degree of collaboration and cooperation among various institutional stakeholders was a significant determinant of performance—the capacity to meet developmental challenges and goals and generate desirable social and economic outcomes.

Finally, the population sample and ethnographic approach validated the empirical realities of unknown business incubator populations, reinforced the reality of the heterogeneity of types, debunked previously hypothesized homogeneity of types, and confirmed how variations in social, economic, cultural, institutional contexts—parameters—shaped program content and strategies as well as the criteria used to evaluate performance and outcome. Business incubators have grown in popularity and increasingly recognized as a dominant organizational form for promoting entrepreneurship and stimulating new business formation as proven by their growth and proliferation in diverse social and economic sectors and across nations, societies, and cultures. However, despite her popularity with various institutional stakeholders including governments, academic and research institutions, and businesses and industry, foundations, and religious institutions, among others, business incubation mean different things to different stakeholders, constituencies, and interest groups. Therefore, perceptions and interpretations of the meaning and significance of business incubators to institutional stakeholders as well as knowledge of what business incubation symbolizes or represents to them is essential in promoting an understanding of why institutional stakeholders invested resources to finance and support the growth and development of business incubators.

Previous research assumed that creation and implementation of business incubators were driven by identical problems and social and economic, therefore the mission, developmental goals and strategies were also the same. As a result, previous research either did not distinguish among types or classified them in ways that obscured typological attributes, deemphasized distinctions among their social and economic roles and routines, and rendered comparability problematic. Likewise, the identification and selection of quantitative and qualitative indicators and measures of performance also followed the path of homogeneity and assumed that all business incubators were supposed to execute indistinguishable social and economic roles and generate identical outcomes regardless of variations in spatial, temporal, and institutional contexts and conditions. It does not come as a surprise therefore that many local communities have not been able to leverage opportunities and the potential benefits of creating and sustaining entrepreneurship and stimulating new business formation via business incubation programs because the criteria for performance was imposed by institutional hierarchies without consideration and negotiation of local challenges and realities Many idealized roles and expectations have not been realized and no consensus has been reached among researchers, analysts, and practitioners regarding the effectiveness of business incubators as a strategy and objective of economic development.

Future research on business incubators should consider and explore how differences in contexts—spatial, temporal, social, economic, cultural, and institutional, etc. might shape variations in developmental goals and strategies and influence performance and outcome. Only then will research broaden our theoretical and practical understanding and inform and guide policy and managerial decision making.

THEORETICAL AND PRACTICAL IMPLICATIONS

The history and origins of business incubators were traced to the presence and emergence of discontinuities in diverse and multiple environments. Typified and catalyzed by various events and activities, the discontinuities simultaneously imposed threats and generated opportunities. Hence, perceptions and interpretations of the meaning and significance of these discontinuities among institutional stakeholders led to the strategic deployment of business incubators as instruments to leverage or stabilize emergent discontinuities in the environment. The study examined the range of social, economic, and institutional factors that influenced the rise and emergence of business incubators. A variety of contexts and conditions shaped the emergence of diverse populations as well as influenced their individual organizational histories. Moreover, the results indicated that different types of business incubators emerged from different institutional and technical environments and were framed according to institutional orientations and routines. Therefore, the developmental goals and strategies were indicative of institutional values and interests and the desirability in generating distinct social and economic outcomes. For example, technology transfer and commercialization models of business incubation emerged in academic and research institutions because of the values they placed on patenting and licensing activities. Similarly, economic development types of business incubators were predominantly underwritten or sponsored by governments because of their traditional routines in promoting and reviving local economic growth through new business formation and job creation based on their interests in generating fiscal incomes.

Thus, these empirical findings debunk previous work that assumed and hypothesized homogeneity of business incubator types regardless of institutional contexts and conditions and her social embeddedness in diverse institutional and technical environments. Moreover, the population diversity of business incubator was indicative of the heterogeneity of institutional ideologies, strategies, and developmental objectives. Together, these factors shaped the nature programs implemented and influenced the identification, selection, and evaluation of performance goals and outcomes. Finally, the increasing diversity and multiplicity of stakeholders, constituencies, and interest groups who entered the business incubation arena with diverging motivations and interests—profit or non-for-profit—job creation or patenting and licensing—fiscal income or royalties—suggested that business incubation can no longer be theorized as a public assistance activity and explicated from public administration theories as some proposed. A theory of business incubation is due but must be adequately robust to facilitate our understanding of what business incubation is, and how, where, and why they are created and implemented, by whom, and under what social, economic, political, conditions, and with what effects on existing and prospective entrepreneurs and the broader society.

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Table 1: Population and Frequency Distribution of Selected Measures

Measure	**Frequency**	**Percentage**
Population	178	100.0
-Operational	130	73
-Non-operational	48	27
-Under Planning	17	9.6
-Failed/Terminated	8	4.5
-Inaccessible	23	12.5
Legal Structure or Form of Organization		
501(c) 3 not-for-profit	98	76
For-Profit partnerships (LLC, LP, etc)	29	22
Corporation	3	2
Sole proprietorship	0	0
Language	138	70
"incubator", "accelerator", or "venture";	25	19.2
"technology", "innovation", or "knowledge";	32	24.6
"science", "research", or "laboratory";	5	5
industrial/community development/enterprise	29	22.3
No Recognizable key words or labels	39	30
Origins: Discontinuities in diverse and multiple environments		
Economic: Plant closings, Downsizing, Terminations, etc	54	43
Political-Legal: Legislation, Deregulation, NAFTA etc.	8	6
Technological: Scientific Advancements, Innovation,	33	25
Socio-Cultural: Paradigm Shifts, Psychographic Trends, ,	8	6
Financial/Investment: Venture Capital, Wealth Creation	26	20

Figure 1: Population Distribution of Business Incubators: Current Status

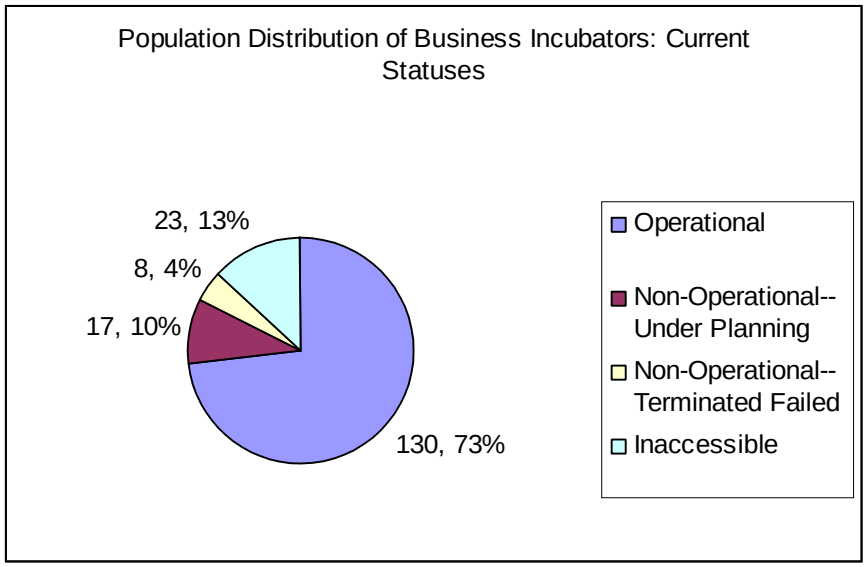


Figure 2: Population Distribution of Legal Forms of Organizations

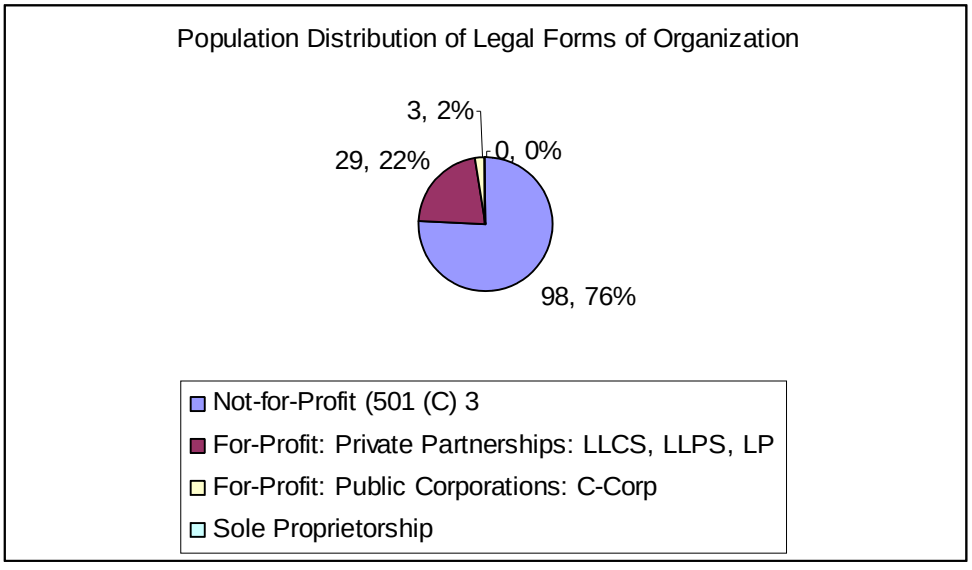


Figure 3: Population Distribution of Language: Key Labels Adopted To Classify Business Incubators

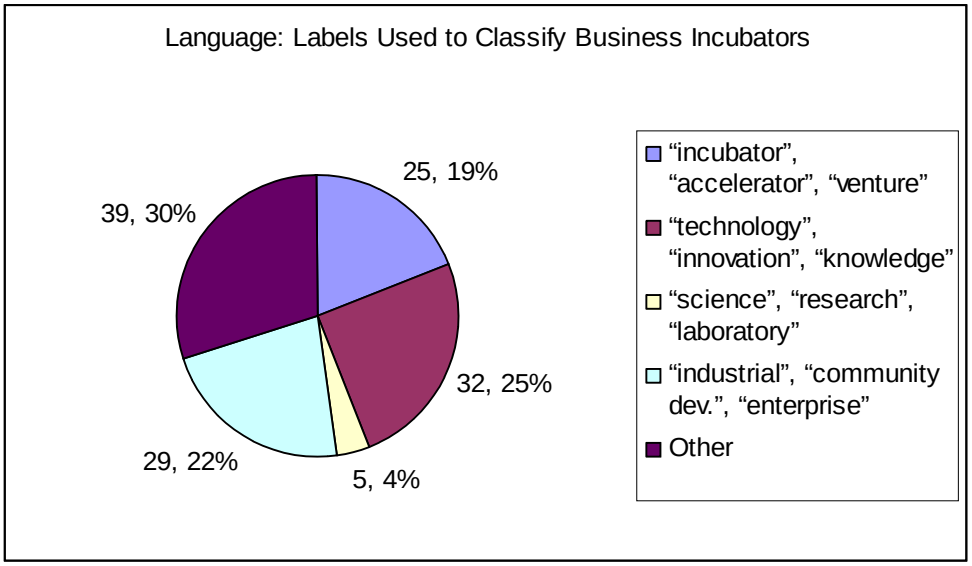


Figure 4: Population Distribution of Enterprise Zones (EZs) That Implemented Business Incubators

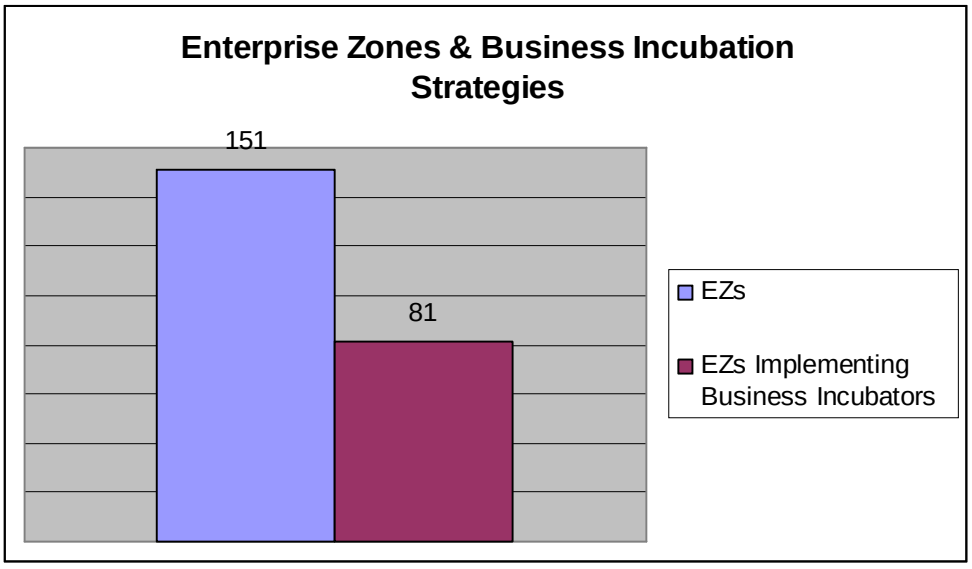


Figure 5: The Origins of Business Incubators: Discontinuities in Diverse & Multiple Institutional & Technical Environments

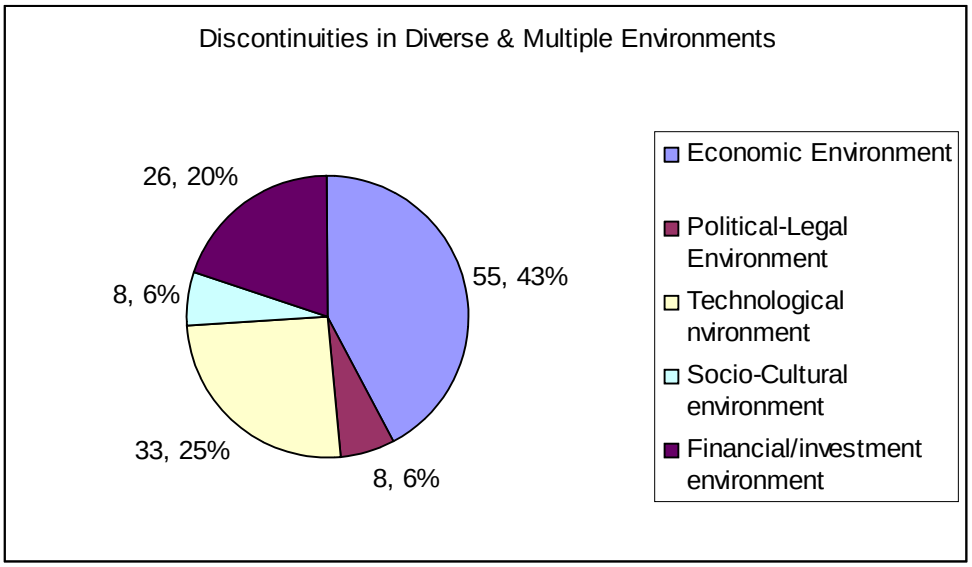


Figure 6: Primary & Leading Sponsors/Underwriters of Business Incubators

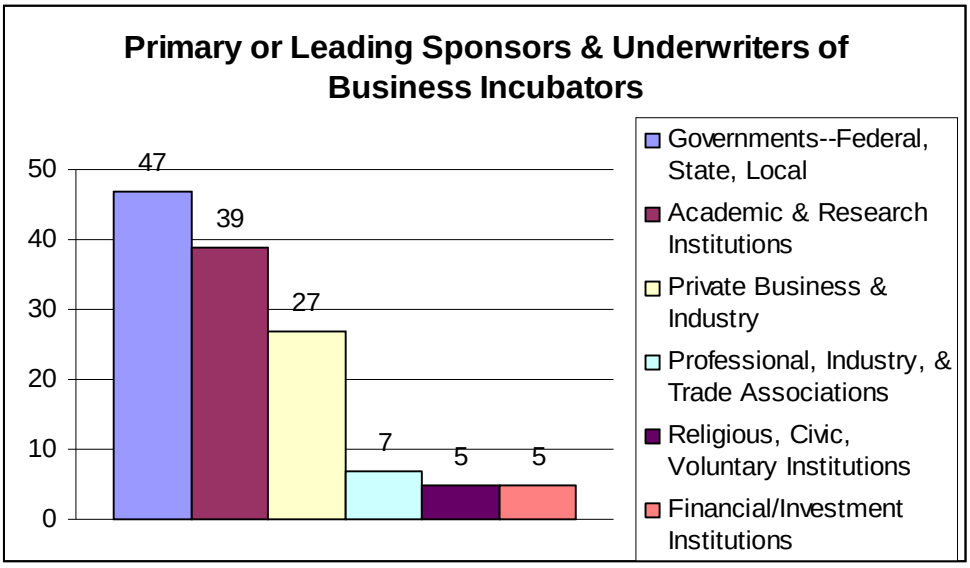
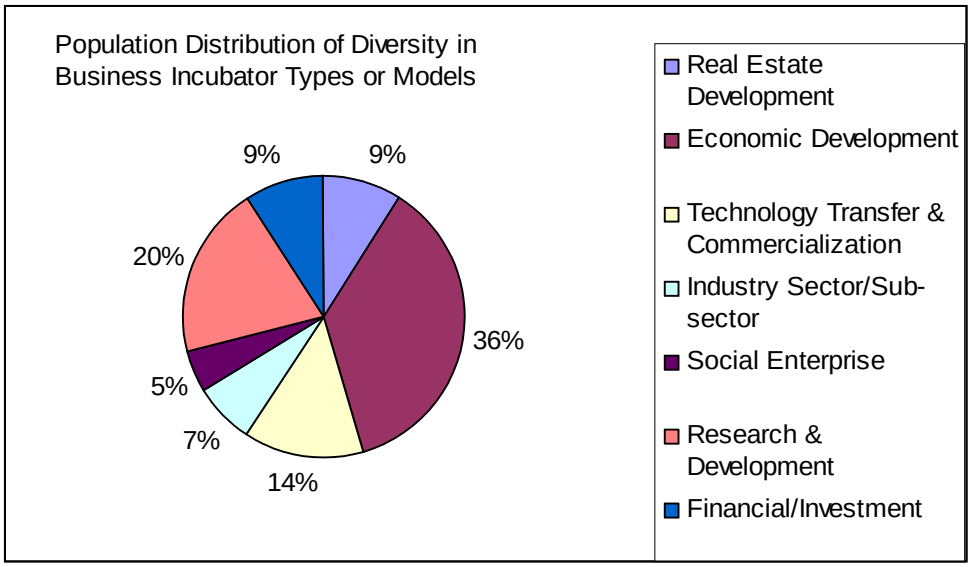


Figure 7: Population Distribution of Business Incubator Types or Models



[1] I define a business incubator as an environment designed to stimulate the growth and development of new enterprises by improving their opportunities for the acquisition and exploitation of resources geared towards the facilitation and acceleration of the development and commercialization of new concepts and business models. Unlike a science park, technology research, or research park, a business incubator is primarily characterized by an ongoing recruitment and exit or "graduation" of client firms.

[2] I define business incubation as a dynamic, market-driven, social and managerial process that facilitates and/or accelerates the discovery, validation, and application of new ideas, new concepts, and new business models intended for the development and commercialization of new products, new technologies, and new businesses

[3] The United Nations recently demonstrated their interest in business incubation by conducting a global study of the phenomena and publishing a report (United Nations Economic Commission for Europe, 2000) which recognized business incubation as "an interactive development process aimed at encouraging people to start their own businesses and supporting start-up companies in the development of innovative products."

[4] Batavia Industrial Center is recognized as the first or prototype business incubator. It was established in 1959 and has primarily retained the original characteristic as a family-owned real estate model of business incubator. The term "incubator" was coined by one of the family members.

[5] The University City Science Center is a nonprofit consortium of 30 academic and scientific institutions in Philadelphia. The Science Center incubates businesses, giving them relatively inexpensive rents and access to the nearby universities, hospitals and other research entities. With a 435,000-square-foot building is part of the 17-acre, 15-building University City Science Center complex in West Philadelphia. The entire Science Center totals about 2 million square feet of office and lab space in the heart of Philadelphia's research and academic hub.

[6] The National Business Incubation Association (NBIA) is the world's premier political and ideological organization promoting the advocacy, education, and dissemination of information on business incubation. It lobbies and maintains strong connections with federal and state governments

[7] The First International Workshop on Technology Business Incubators was jointly organized by the Asian and Pacific Centre for Transfer of Technology (APCTT), Department of Science & Technology (DST), Government of India, Directorate of Industries and Commerce, Government of Karnataka; sponsored by the United Nations
Development Program (UNDP); co-sponsored by Small Industries Development and Bank of India (SIDBI); inaugurated by the Union Minister of Science & Technology, HRD and Ocean Development; presided over by the Minister of Large and Medium Industries, Government of Karnataka; and convened at SJCE - Science &Technology Entrepreneurs Park, Mysore, India.