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Commercialization of R&D: The Role of Science Parks[1]

Business development in any country has become an important topic for not only economic but also political reasons. For transitional economies, it has become even more significant due to the need to move rapidly into the modern economic mainstream while building on traditional strengths and combating the restrictive recent history of control economic systems.
With that economic perspective or paradigm in mind, a science park must be a combination of groups and organizations which interact with one another in other to create and grow businesses. A key component or actor in that interaction is the government. A variety of areas for government interaction are discussed ending with the example from Denmark of NOVI Science Park
Keywords: ***economic theory, neo-classical, interactionism, science park and entrepreneurship***

Introduction

The core concept driving the development of science parks has been the perception that if an industrial area was in close geographical proximity to a research and development organization, then the "park" might benefit from that research environment through new industries, job creation, and economic development in general. This was one of the basic concepts surrounding the establishment in the early 1950s of an industrial park close to Stanford University in Palo Alto, CA. In that case, the industrial, technology, research or science park area was owned by the university so that Stanford University benefited not only by the commercialization of its research, but also through the rents collected from the tenants of the park.

The Stanford University experience, which became the foundation or as they might say in California, the "epi-center" for Silicon Valley, was not rooted in any particular economic theory. Indeed, the originators of these and related concepts of economic development for the entire northern California region were engineers, not economists, urban planners or politicians. What they foresaw however, was the need to link basic and theoretical research to the real world: the world of commerce, trade and business. This link was good for R&D and was equally good for the placement of their students directly into industry. And in many cases, the students formed their own firms and hence become "self-employed".

There are countless examples of the same professors who became Board members, advisors and even investors in these new young firms. Some scholars call these relationships "networks" when in reality they are closer to the notion of "kinship" whereby faculty and students keep close contacts and as they move into different fields and firms, they continually assist one another. A very formalized example of this in the USA (and not as common in Europe) is the "Alumni Association."

There is another aspect of the development of science parks seen in the early days which will elaborate on below: the primary source for R&D funding and customers in the early days science parks was the US government either through the defense or military industries during the 1940-50s

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1 Science Parks are not defined as one particular type of organization such as a research or industrial park or even as an incubator. Instead, science parks are seen and defined in the paper as a combination of three elements: real estate, start up company support services, and finance.

or as customers for the products developed for these industries. The dominance of this close relationship between the defense and industrial sectors become a very significant point made by President Eisenhower as he left office in his year in office. He called this the "military-industrial complex" which is still dominant in American economic theory for the research, development and commercialization of new advanced technologies.

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Over the decades, research, technology, industrial or science parks were established close to universities in various USA cities as well as in other industrialized nations. For the most part, theory followed or mimicked practice. As a recent report from Twente University in Holland put it: "The knowledge-intensive entrepreneurship flourishing in the Twente region did not develop as the result of a master plan. Nobody ever sat down and plotted out how it would all come together. The Twente Concept is the result of an organic development process – not a 'revolution', but an 'evolution' – that retained everything that was good and discarded what was wrong." (Twente, 1998: 4) It is precisely this issue of economic development that will be explored in this paper.

Consider, for example, the European Commission definition (1990) of an "incubator, science or technology parks": a business incubator is a place where newly created firms are concentrated in a limited space. Its aim is to improve the chance of growth and rate of survival of these firms by providing them with a modular building with common facilities (telefax, computing facilities, etc.) as well as with managerial support and back-up services. The main emphasis is on local development and job creation. The technology orientation is often marginal.

The key elements for science parks by the millennium, then appeared to focus on the creation of firms for job creation. Technology was "often marginal". However, the creation of new firms and hence entrepreneurship needed to be advanced yet it was a field all but forgotten in the economic literature until the 1990s. Small-medium size (SMEs) firm development; and technology transfer began to be noticed and considered seriously. After all, new firms meant job creation a well. Reviews of theories about entrepeneurship usually centered upon Schumpeter and the Austrian School. The neo-classical economists who tended to be so concerned over "free markets", competition and the promotion of clusters had failed to explore the economic theories about the creation of new firms. And seriously lacked any cogent theories of the firm. Entrepeneurship became a serious and legitimate subject of study, research and application.

In this paper, within the context of science parks, we focus on the basic elements that underlay science parks as a strategy in economic development: the creation of the firm, technology transfer, entrepeneurship, and the role of the state or government. Each of these areas of concern must be combined together in the creation of science parks.

Creation of new jobs (firms and industries): role of government

While much is made of the need for entrepreneurs and the creation of new businesses, the commercialization of technologies through entrepreneurial activities is rare. Instead, new technologies are better seen as business ventures through existing firms (large and small). Finding the right company is the trick. And they need not necessarily be located in the USA.

Europeans have acknowledged the source of new inventions and research for decades through the "firm" or company. The difference, however, is how other countries define a firm and a market economy. Thus, in Scandinavia, for example, the "network economic model" has developed primarily from scholars at Uppsala University in Stockholm (Hakansson, 1994 and Hakansson and Snehota, 1994). However, the northern Europeans are not alone. Studies by American scholars in recent years about business networks in Northern Italy (Benetton in particular) and Switzerland (Swatch as well) indicate that new inventions and research are often implemented through existing companies. A more thorough discussion of networks themselves follows below.

For Americans, the new business start-up is romanticized in the form of the entrepreneur. This independent or Don Quixote type character will often charge out into the business world in order to create a new business where none existed before. The dream result for many Americans is a new business with fame and uncountable riches for the founders. The entrepreneurial

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spirit is what drives many Americans into taking risks and starting their own firms.

However, the creation of new businesses does not necessarily mean that such a business or expansion had not existed. Instead, an important measurement of the commercialization of any technology is its adaptation and usage within an existing firm. This is internal adaptation of new ideas, processes, and technologies are known as "intrapreneurship."

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While new entrepreneurial business may be more likely to take a new technology and attempt to move it into the marketplace. They are also more likely to fail in the new venture (statistics show that 80% of new business ventures fail within the first three years of operations) and therefore not commercialize the technology. In short, new business creation must be sustainable and on-going. New business creation need not be in the form of a new company; and in most cases is best within the confines of a firm or set of companies or network of small enterprises.

Historically in the USA, R&D organizations hired attorneys, employed licensing experts, and depended upon staff personnel who perform market data base analyses. The basic concern in most of these organizations was to find a "customer" to license its technologies. While some commercialization successes can be found, this "technology push" approach through violated basic business practices that required a "market or technology pull".

In short, the business school approach argues that the marketplace knows its needs best and must pull technologies from the research and development communities, rather than the other way around. Below, another more "interactive model" is advocated because the basic drawback with the business school model of market pull applies to technologies as well: often the market has no idea about what it wants – now or in the near term. Despite vast resources being spent on market analyses and surveys, business executives rarely know what the customer wants. When executives claim that they do know the customer, as to their Board of Directors or the staff, they are basing their knowledge on quantitative data that is dated by the time of its presentation and certainly non-predictive let alone capable of understanding the longer term needs of the customer.

The field of technology transfer would be far more effective if it were oriented toward "technology commercialization" (Clark, 2000). In fact, that is exactly the direction to which the field appears to be headed today. Rather than attempting to push technologies upon industry, the business community is being increasingly asked what technological areas are needed to enhance their market shares and make them more competitive.

For the USA, the basic issue concerns the distinction between "Science and Technology". The American Congress is debating this issue in terms of national funding, but the fundamental question involves the relevance or lack thereof for science and commercial technologies. What is clear, however, is that technology is the "hook" for commercialization (industrialization, manufacturing of goods and providing services).

The USA has since it's founding been a leader in innovation. The American Constitution guarantees citizens rights to protect their intellectual property. The American patent system, while under pressure to change to a "first to file" rather than its historical "first to invent" in order to be in "harmony" with almost every other country, remains the most comprehensive benchmark for the world. More than double the numbers of patents annually are filed in the USA than an other country in the world.

The pattern is clear. Researchers, when interacting with other people outside their own field such as the business community, become "academic entrepreneurs" in the sense that they are exploring new research areas, discovering new fields of study, and creating new networks of people across many disciplines. This is a long term research perspective. It is not market or technology driven. It is an (perhaps, according to some scientists, the "only") approach to basic science, whereby researchers interact with a variety of people in order to make new discoveries and solve societal problems.

Science Parks: A Technology Transfer Model

If there were a Technology Transfer Model to be derived from these cases, it should work within an Interactionism Economic Model (Clark and Fast, 2001) and include along several components, among them:

- *People as Actors*

Throughout any business development, people are key. The researchers, the corporate champions, government employees, the teachers/professors and their

students. However, without doubt, the ideas that formed the basic concepts for learning came from the creativity of the researchers at UCB. It was their insights, strength and resolve that made the FOSS program. Years of research and development can often depress and discourage any research team. Persistence and belief must be a strong part of the characteristics that make the transfer of technology successful.

Not to be forgotten are the people within the corporation who also championed the product technology. For them the challenges were equally difficult. They had to struggle with the internal challenges and yet lead the company in a new market. The effort meant the commitment of resources and funds. People were key. Some had to be removed or transferred because they did not understand the technology product; or they were caught in their traditional habits and products.

When asked, what did all these key people have in common? They attributed much of their success to "instinct" and "persistence". Each one seemed to know that they had "something" and needed to "stay the course". This was not easy on either a personal or professional level. Several suffered personal and family problems. Others had to suffer professional skepticism and even a degree of humiliation. In the end, they persevered; they won.

- *Innovation and Technology*

New ideas. There are many. There will never be an end to inventions and ideas. In fact, patents and copyrights continue to increase. Any new technology is difficult to develop into a commercial product. Yet basic research translates into new technology and must be developed into new products. Companies can not exist alone on grants and investors. They must make products and sell them at some point in time.

Some corporations try to calculate the probability of success for new technological development in order to determine where and how to place their resources. Chart I illustrates this view. If an old technology is commercialized along old or traditional methods, then its chances for commercialization is low (3%). However, from the corporate point of view, this is the safest and least risky approach, since it would use its proven methods with an established technology.

The riskiest area is where new technologies are tried with new commercialization areas. Here the rewards are high, but so are the risks. Most companies will not take these risks and therefore fail in this area. The best corporate approach is the 10% range with old technologies in new commercial areas.

Chart I.
Chances of Technology Commercialization

	Technology	
	Old	New
Old Customers	3%	25–30%
New	10%	30%+

Key: The lower percentage, the lower risk in the commercialization of a technology and lower profitability. Matrix adapted from Bechtel Corporation, San Francisco, CA, USA

- *Kinship and Networks*

There are at least three kinds of interpersonal networks that contribute to technology transfer and commercialization. Networks operate on a vertical and horizontal plains (Hakansson, 1994). One concerns the researchers themselves. They do work together; attend meetings; and conduct reviews of each other's works. This interaction among researchers is critical for research purposes, but is also significant for commercialization of their research work. Connections and ties are made. The process can be outlined in the Chart below:

Chart II.
Network Formation and Interaction

	Horizontal	Vertical
	Other	Teachers
Researchers	Researcher	Business Exec.
	Other	Researchers
Business Exec.	Business Exec.	Teachers
	Other	Researchers
Teachers	Teachers	Business Exec.

(From Clark and Decker-Ward, 1995)

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The horizontal perspective connects the researchers to the end-users, and with the business executive for the commercialization of technology. For the continued success of the research effort, both dimensions are important.

The business networks parallel the researchers, but are, by

definition different. The business executive has networks made into related businesses and into the end-user or customer base. The company retains these networks in order to continue to sell its products. New distribution networks allow other technologies to flow forming an entirely different business stream.

Finally, there are the customers or end-users (teachers) themselves. They have their own series of parallel networks, defined along similar lines as the researchers and business executives. The customers will need to interact with others as well.

Successful use of networks can lead to enormous successful technology commercialization. The multi-dimensional nature of networks allow people to interact with others for specific purposes, but more importantly, link them together in personal and professional ways over a longer period of time.

● *Criteria for Success*

In the context of technology transfer, there is only one way, according to the neo-classical theory, to measure of success: profits. The company needs to make money. These profits allow the company to operate and continue its marketing and sales of the technology. The University and the researchers also see profits in terms of royalties and benefits including other contracts. In short, the most fundamental criteria for successful technology transfer are its commercialization.

However, given a particular technology, such as FOSS, two other measures must be added. One is clearly the impact upon students. Research results indicate remarkable success and advances in children learning science. A side benefit has been that science is now becoming popular with female students and those from diverse ethnic and cultural background. The other success criterion for the researchers is publication of the results. For technology transfer to success, the researcher or inventor must see professional advancement and benefit.

● *Entrepreneurship*

For the purposes of this paper on technology commercialization suffice it note that researchers and inventors do make technologies commercial. Instead, there needs to be an entrepreneur in the team at the creative level; and equally ones within the company and at the user-end. Entrepreneurs are the doers and the "deal makers." they seek out the opportunities and go after them.

Barth (1962) noted the entrepreneurial role in his early studies when he described individuals within government, universities, or any community as being the people who create or see new synergetic connections between ideas, people, and organizations. Freeman et al. (1989) have documented the entrepreneur further in their studies. Of course, Schumpeter (1934) pioneered research and theory in this area.

"For the commercialization of any technology, the individual researcher and the organizational act or process of licensing, for example, are not enough. Technologies must be developed and marketed from the beginning of the research activity."

The issue for technology transfer concerns the need for entrepreneurship to be a strong part of the process. In order to transfer technologies, an entrepreneurship team must be formed. UCB and EBEC had such teams. However, all to often, researchers and inventors are alone. In fact, the model often described (Schumpeter, 1934 and Freeman, 1989) singles out the individual as the entrepreneur responsible for business activities.

For the commercialization of any technology, the individual researcher and the organizational act or process of licensing, for example, are not enough. Technologies must be developed and marketed from the beginning of the research activity. While this was not exactly the case in the FOSS example, the development of the products clearly involved EBEC which contributed financially as well as with its own marketing expertise to its success – defined as both profitability for the company and professionally for the scientists.

Science Parks: a case study

Within Europe, there are several interesting examples of science parks. Consider one and how it has included the various elements identified above in order to make them viable, practical and replicable elsewhere. In each case, the science park is considered successful in terms of the metrics identified earlier; it produced profit in 1999; secured government support for a large seed capital fund; and in 2001 will be "replicated" in Kopenhavn.

NOVI A/S (for profit)
Aalborg, Denmark

From a translation of the original (1987) planning document for NOVI titled: The science park concept and the initiative of North Jutland

The Science park of North Jutland (Nordjyllands Videnpark), NOVI, is a research park. By research park is understood, according to "The International Association of Science Parks", a property possessive initiative, which:

1. Has formal and reel relations to a higher educational facility or research institution
2. Is created to promote the establishment and development of science-based companies
3. Has a management, which is actively engaged in transfer of technology and skills related to business to the clientele of the science park.

In USA and Europe app. 135 science parks presently exist of which the majority has been established within the last 10 years. The background for this rapid growth in the spread of research parks is the research parks' high success rate with regards to the number of company establishments and the companies' ability to survive. The research parks have had significant importance not least as instruments for regional business development.

The research parks have long been an unknown concept in Scandinavia, but within the last 4-5 years a series of initiatives have seen the light of day – most with tremendous prosperous results. In recent years Denmark has entered with the research park Symbion in Copenhagen and Århus Forskerpark.

The research park initiative of North Jutland, which was initiated in January of 1986 by rector Sven Caspersen, AUC, has had a strong backing from the business environment of North Jutland and from authorities, who see the park as a vehicle for promoting the redirection of the regional business structure and creating industrial growth in the region.

Within the last 8 months under the umbrella of "The self-owned institution for the establishment of The Science Park of Northern Jutland" an intensive planning of the North Jutland Research park, with active participation from a broad circle of company and authority representatives, researchers etceteras, has been undergone. The consultant firm Sverdrup-Jensen & Partners A/S, whom has also formulated the total concept for NOVI, have coordinated the planning work.

Today, NOVI opened in 1989 and has "attained a unique competence in the area of knowledge-based development projects. A total of 40 companies employing app. 450 people occupy the NOVI 1 and 2 buildings and the adjacent business park called NOVI Park. A multimedia centre for both academic and commercial activities was inaugurated in 1999. The multimedia centre will be housed in new buildings, NOVI 3 and 4." (NOVI, 1999). From the 1999 Annual Accounts, NOVI consists of three major elements:

- *The Science Park*

The 9,600 m² NOVI Science Park houses entrepreneurs, development projects and technological advisor companies as well as the Aalborg University Centre of Personal Communication. Companies typically want to transfer part of their development activities to NOVI to have peace and quiet for their research and to benefit from the expertise and services offered by NOVI.

The 55,000 m² NOVI Park is situated close to the NOVI Science Park. The area is reserved for the establishment of knowledge-based and high-tech companies. So far, 3 companies, namely Maxon Cellular Systems (Denmark) A/S, Force Institute, and L.M. Ericsson have started activities in this area. Maxon has stated that the environment of NOVI, Aalborg University with the Centre of Personal Communication, and the North Jutland telecommunications industry as a whole, was the reason for Maxonís establishment in NOVI Park.

- *Technology Transfer*

NOVI mediates knowledge from Aalborg University and other research institutions in Northern Jutland to industrial companies in the area, ensuring that the latest research and knowledge is incorporated in the development of new projects. Conversely, industrial research requirements are mediated to the academic institutions.

NOVI has been appointed "Innovative Environment" by the Danish Ministry of Business and Industry, allocating an amount of up to 750,000 Danish kroner per project for feasibility studies and related activities.

- *Networks*

The park was originally was established with Aalborg University and community to support a unique situation in the region: the wireless or mobile industry. While the region was known for its shipping and repair industries, a decline and shift in the industries to other regions lead to significant unemployment in northern Denmark. Nevertheless, AaU based engineer faculty and students remained interested in the wireless technology.

Studies (Dalhum, 1995) have documented the impact of AaU in the region with a number of new entrepreneurial firms being established in the late 1980s and early 1990s. These firms in some cases grew or were merged or acquired by other firms. Nevertheless the founders and employees continued to interact with one another and spend time both in social and business activities.

NOVI built on that system of networks and took the activities further into formal meetings and gather-

ings. Meanwhile in the early 1990s, AaU saw the value in these same networks and established a Network Center to facilitate the wireless networks, identify new ones, and promote them in various ways. The process has been extremely successful.

In the wireless area along, AaU and NOVI have international reputations in research, design, and engineering for the mobile industry. Most of the major wireless firms have staff associated with NOVI while the AaU has one of the most distinguished departments in "Personal communications" (known as CPK) in the world with outstanding professors and graduate students.

- *Venture Capital Company*

NOVI is the only science park in Denmark with a venture capital that is earmarked for investment in commercially attractive development projects. Seed investments are made in start-up companies utilising the Danish university environment and the special environment of the Danish science parks. Seed investments are regarded as high risk and require thorough prior investigation. The investment can be based on a product or business idea of an individual (inventor and/or entrepreneur), an existing company or research establishment. Highest priority is given to ideas that have novelty value, are unique, with a high knowledge content and promising commercial potential.

NOVI has up till now invested about 54 million Danish kroner in 35 companies.

NOVI aims to withdraw as an investor after a limited period, usually of five to eight years. Upon withdrawal, NOVI disposes of the shares to the originator of the idea or finds a new investor, preferably an existing company that can contribute to further success of the development company.

The finance area is what makes NOVI unique among most science parks. In its own words from the Annual Accounts 1998 (1999), the Innovation Environment funds from the Danish Agency for Trade and Industry means: that about DKK 20 m are available over the coming three years for the identification of propitious ideas conceived in the research environments in Northern Jutland and subsequently for the investment of publicly financed pre-project capital in the most propitious ones.

The combination of NOVIs formerly having been appointed a state-approved seed venture company subject to a 50% loss guarantee on investments and NOVIs new role as an innovation environment offers a unique opportunity to create a profitable business based on the commercial exploitation of research results.

Furthermore,

To assure a sufficient number of commercialisable ideas for NOVI's venture activities contracts have been formed with some of the other science-park based innovation environments.

These contracts have led to the establishment of joint companies in the individual innovation environments which aim at continuing the most propitious projects right through to final commercial optimization. This financial approach has lead to an innovative method such that NOVI can select the most appropriate projects from among the volume of ideas created on the basis of publicly financed pre-projects to the tune of DKK 50 m annually.

Once fully developed NOVI will act upon the basis of its three-legged structures to combine its anchoring to the regional know-how centres and regional trade and industry with a purposeful openness towards the need for venture capital experienced by other Danish innovation environments (e.g. groups or organizations).

A third dimension in NOVIs strategy is a global aim, both in terms of attracting international businesses to the region and in terms of determining the best possible business opening to realised project ideas. Unlike the situations in other science parks: NOVI will try to have the raising of additional capital covered by the rules governing state-guaranteed seed venture companies, preferably in a modified form, which would allow for the great differences found in the risk profiles of investments in projects that are 3-5 years old and those which NOVI is mainly involved in, i.e. seed investment in virgin project ideas.

The results have been impressive. At the end of 1998, for the Annual Accounts, NOVI could report for the coming year: a stable income is expected from the current activity area of Forskerparken NOVI. The completion and putting into operation of NOVI 2 will have a favourable impact on the second half-year of this financial year.

As a consequence of this approval as an innovation environment, NOVI Innovation will progress to a considerably higher activity level. Activities within this field are expected to be sustainable thus providing some cover of NOVIs capacity costs. NOVI A/S is made a profit in 1999. On May 17, 1999, the Managing Director of NOVI (Svend Valentin) reported a profit for the first time in its ten year history (Brock, 1999:12).

Conclusions

We must break out (some researchers call, "reframe") from the conventional ways and views for understanding economic development and business cre-

ation. Public policy makers must take a global view and not one based in the conventional neo-classical approach common to the UK and USA. Much more can be learned and practiced within the context of free markets by adapting ideas and programs from other countries.

Clearly different ideological economic perspectives provide different approaches to theory and practice in understanding the firm and the role of government in providing support and assistance for it. We need to reject either standard conventional approaches or ones that are based upon biases from particular cultures or heritage. What is intriguing is that in the area of science parks, there does not appear to be too much evidence to point to one economic theory or another. As one practitioner noted, it appears to be organic or even "evolutionary" in how these parks develop.

What is known, however, is that there needs to be a regional approach; a university or research center is key; and then there must be a consensus for community support and interaction. Once the parks are established, moreover, there are key elements that appear to mark each science park to one degree or another. If one park is considered more successful than another, the definition of success will define the metric calibration. Success will rest in the region and its own goals over a period of time.

The science park role for a "market" through "pulling" innovation or in "pushing" new technologies are important, but it is necessary to study more in depth these aspects to better understand how to "facilitate" the process of innovation As noted earlier, he "technology push" model argues that R&D centers have developed technologies that industry needs and will therefore make them available. The most common manifestation today is the widespread use of technology transfer programs within research centers and universities (as well as increasing numbers within industry).

The basic assumption is that a research organization has spent large sums of money on research and the outcomes must get something useful – technologies – to industry. These technologies are then licensed to industry or other businesses. Once "transferred" or licensed, the R&D institution then goes on to research and develop other technologies. However to conduct further research, an organization needs additional funding before the final commercialization of the technology could be tested, designed and conclusively demonstrated. It is that link to industry that science parks need to provide in whatever manner that makes sense for their particular region.

What we have done is look into the various elements that have evolved in making science parks viable as well as meeting local or regional economic, social and political needs. Among the key elements have been the need for a "place" or real estate development with new business ventures as the main tenants, alto in most cases, more established companies often seek these locations to be in close proximity with the R&D community. Too much emphasis on "rent seeking" can cause problems for the science park.

Networks, business support services and courses in business are clearly areas that all science parks provide for the new ventures. Many are also looking toward global and international networks for sales, distribution, investment, and other business connections. The issue will most likely be how these efforts will fare in the long run.

The most progressive and actually strongest business need is in the creation of seed and venture capital funds. For European commentates, this is difficult in that there is not a history of discretionary savings made from other successful ventures to reinvest in new companies. This has been one of the key elements in the creation and development of such funds for the Silicon Valley region in California (Clark, 1993). For most of Europe, however, the government must play an active role. There are European models for doing this type of investment successfully (Clark and Jensen, 2000) that need to be examined in detail and applied to the needs of science parks and its demands of new start-up ventures.

In the American industrial marketplace, short and long term markets for new technologies must be balanced repeatedly and often to the need for quick short term research solutions (as Demrig, 1999 calls it "short termism"). Currently this is the case in America. Short termism hurts long term strategies and plans. A new technology commercialization model appears to be the best solution to providing that delicate balance or interaction between the push and pull demands of businesses (Clark and Fast, 2000). The Science Park in whatever form, plays a key role in business development and expansion.

Government regulation and funding of research programs that become commercialized, especially in some sectors like energy and environment must take into account this fact: government funding is critical. And as Reinert (1998) notes the "common weal" had held a consistent and constant role for government in developing new businesses since the creation of the Italian "city-state", and hence contributes to economic development while producing socially positive results. Consideration of the effective allocation of public and private financial resources upon societal well-being is a significant role for science parks.

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