The Creation of Born Global Companies within the Science Cities: An approach from Triple Helix

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Abstract: This paper analyzes Prototypical Science City projects and extracts a Model of agents and roles in the process of the creation of new technology-based global companies (Born Global companies) within the Innovative Milieu as Science Cities, developing an approach from the Triple Helix. For this propose, we develop a qualitative study of the San Francisco Bay Area and the Barcelona Area, and how both areas develop different eco-systems with the same goal: the creation of new technology-based companies, with global reach. We conducted 48 in-depth interviews with key persons from the different spheres of the Triple Helix (university-industry-government). The article concludes with an instrument for the analysis of Incubation Systems of Born Global Companies.

Keywords: Triple Helix, Born Global, Science Parks, Incubation

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1. SCIENCE PARKS, SCIENCE CITIES AND PLANETARY SYSTEMS

1.1. FROM SCIENCE PARKS TO SCIENCE CITIES.

The innovation model is changing from a focus upon the individual firm to clusters of firms, and from clusters to double helices of industry-government and university-industry collaborations, toward triple helices of university-industry-government relations, with co-variation in the traditional Science Park model. We are witnessing replacement of the suburban environment of the Science Park by the Science City, a dense infrastructure of R&D clusters, universities, agencies to support innovation and hybrid organizations and networks encompassing elements drawn from academia, industry and government. This milieu has to response also to the challenge of the New Economy, and to provide the value of the global connections to the local environment.

Thus, Science Parks that had originated as government industry collaborations are developing stronger links with universities and/or developing a university on site. Regions that had mixed success with the classic science park model at Kista, Sophia Antipolis, Barcelona Area, etc, or wished to take advantage of an existing urban infrastructure with global connections, have turned to developing Science Cities.

Prototypical Science City projects such as the Porto Digital urban renascence science park in Recife; the urbanizing and academicizing of Kista Science Park in Stockholm, the network of Science Parks in Barcelona and the emergence of the Science City in Newcastle, as an extension of Newcastle University in relation to and other regional players are developing a good practice Science City model.

The Science Park originated at a "Greenfield site" adjacent to Stanford University, with innovation expected to take place within firm, aided by interaction with the university from which they had originated. This was followed by a purer version of the model, with universities in Research Triangle providing cultural ambiance to encourage firms to relocate labs. The classic Science Park with company R&D facilities, adjacent yet separate from each other, is outmoded in an era of integrated innovation formats. Just as the isolated R&D Lab is displaced by a networked format, sourcing inputs through an explicit technology transfer function and developing them through collaborations with other firms and universities, so the science park is changing to facilitate a networked model of innovation.

1.2. INNOVATION ECOSYSTEMS

The contemporary "Silicon Valley ecosystem" by analogy with the biological schema of location of a variety of species in a mutually supportive environment, is based upon a formula for translating ideas into businesses. In addition to venture firms themselves, the ecosystem includes successful entrepreneurs, representing start-up management expertise, banks and the financial arms of large corporations as sources of co-financing, university professors and technology transfer offices as sources of new technologies for firms and law firms as gatekeepers between entrepreneurs and investment opportunities.

Although there are notable exceptions, Silicon Valley venture firms rarely invest at the so-called seed stage. Such funds are expected to come from associates of the firm-founders, the so-called "fff" friends, families and fools. Even angel investors typically do not invest at the earliest stages of firm formation. They usually want to see a customer and revenues before they are willing to commit funds. They are business persons and expect to use business, not technical, criteria in evaluating investment prospects. Business Angels typically do not view universities as a source of

investments and are not usually in touch with university technology transfer offices (Frick, 2005).

Firm formation from academia in Silicon Valley is informally incubated in research labs and university housing. The gap in the early stages of financing a new firm from university originated technology has been partially filled by a previous generation of academics, who have earned funds from firm formation, as consultants or during leaves of absence, and by graduates who have become successful entrepreneurs. These "Science Angels" combine an understanding of the technology and its business potential given their academic and entrepreneurial experience. They may invest despite lack of revenues, customers and even a business model, the traditional signals of success.

1.3. FROM ECOSYSTEMS TO PLANETARY SYSTEM.

Silicon Valley has been defined as a new type of industrial environment where informal networks, among individuals sharing a common commitment to a technical area transcend the firm. Technical professionals exchanging ideas at a local bar, leaving a firm one day for employment at another, distinguished Silicon Valley from older industrial regions characterized by organizations with well defined boundaries (Saxenian, 1994).

Silicon Valley is evolving from an ecosystem of flat networks to a "Planetary system" of powerful entities with strong gravitational fields. Employees of some firms are under strict guidance not to speak about their technical work (Gebratsadek, 2005, Buyukkoten, 2005). In this mature innovation environment, older multi-national corporations, like Siemens, or new ones that have grown quickly like Google are creating a new, or at least more overt, centralizing dynamic. For example, Symantec, headquartered in Los Angeles, maintains a unit in Silicon Valley to draw local start-ups into its orbit while start-ups in the search space orient themselves toward Google and Yahoo in hopes of being acquired (Engel, 2005). Networks persist as routes to "gatekeepers" of angel networks and venture capital firms for newcomers and from academic entrepreneurs to venture capitalists and angels on behalf of their students (Etzkowitz, Sole and Pique, 2006).

"Planets" pull weak, yet promising, start-ups and niche organizations into their gravitational field as satellites. The remit of the Siemens Business Development Unit located in Berkeley is to identify technologies relevant to Siemens and access it either by hiring the inventor, where possible, or by offering to support a start-up. Siemens takes the angel investor/venture capitalist role in order to appear in a familiar guise to technology inventors who are more likely to be looking for funds for their start-up than seeking a position as an employee of a large firm. The Stanford University Office of Technology Licensing undertakes projects on behalf of small non-profit research organizations in the Bay area. The Stanford "brand" legitimates a technology to potential investors.

Silicon Valley is perhaps the first high-tech region with multiple interacting technology bases, interconnected through links between "planets" and "networks." The Director of the Siemens Business Unit, next to Berkeley, is at Stanford once a week. Nevertheless, gaps have emerged between formerly close partners. Planets, like Stanford University and Hewlett Packard, have drawn apart even though they are physically close. The director of university relations at HP suggests that "start-up fever" among faculty and students, has created a cultural divide with a mature corporation. HP is currently reconnecting to Stanford at several levels: individual faculty members, the Office of Technology Licensing and with the senior administration to jointly seek large scale government research projects.

2. "BORN GLOBAL" COMPANIES IN THE PLANETARY SYSTEM

2.1. INNOVATION SYSTEMS AND THE CREATION OF TECHNOLOGY-BASED COMPANIES.

Manuel Castells and Peter Hall (1994) in their book Technopoles of the World define the innovative milieu as the system of social, institutional, organizational, economic and territorial structures that create the conditions necessary to ensure a continued growth of synergies. The subsequent investment in a production process largely depends on this synergetic capacity, both for the production units that are part of this innovative milieu and for the milieu overall.

The development of this kind of innovative milieu aimed at the creation of technology-based companies becomes a key tool in generating wealth in a region. The Stock of scientific knowledge becomes a key issue in countries and regions, and the mechanisms for transferring this knowledge to the market are decisive in generating technological and business innovation.

The creation of innovation systems that allow a systematized relationship between the agents that intervene in the maturation process of entrepreneurial initiatives, together with the establishment of itineraries that maximize the contributions of all of the agents involved are key factors in setting up a System of Technology-based Companies.

According to Castells, there exists a paradox between the fact that in a world economy whose productive infrastructure is made up of information flows, and the fact that cities and regions are increasingly becoming decisive agents in economic development: the last entrepreneurs. If the above is true, regions must organize themselves so that they can come up with answers to the question of raising foreign investment, whilst promoting endogenous growth. This growth will be the result of local companies that are able to make the most of the externalities that regions offer to encourage their competitiveness and of knowledge-based companies in particular.

The creation of technology companies within the Innovation System constitutes one of the most important targets of the regions in order to reinforce their qualitative and quantitative growth. Systematized itineraries for entrepreneurs, innovation, location and financiers of the new companies in their process of incubation help the maximization of the contribution of the agents that accompany the growth of these new companies.

2.2. SCIENCE PARKS, SCIENCE CITIES AND THE INCUBATION SYSTEM.

In the official definition of a Science and/or Technology Park, the IASP states that one of the goals of the Parks is to encourage the creation and growth of innovative companies by applying incubation and spin-off mechanisms. Piero Formica (2002) and Luis Sanz (2002) hold that one of the key roles of Science Parks is to promote entrepreneurship and innovation.

This goal can be achieved if the social actors – universities, public administration, companies and investors, amongst others – involved in the creation of technology-based companies work together.

Philip Cooke (2001) argued that the best way to succeed in adapting scientific advances to the market was through marketing and the creation of new innovative companies. In his concept of the "region", he recognized the importance of the role played by regional institutions, such as chambers of commerce, industrial associations and public organizations; likewise, regional ministries with the power to support companies and innovation, particularly Small and Medium-sized Businesses and therefore new technology-based companies had a significant function. The role of Science and Technology Parks will be significant as long as they realize

that they form part of an interactive system of innovation, and that their purpose is to serve as intermediaries and linking points, to emerge as the innovative poles of a region. Successful examples can be found in Sophia Antipolis departments of research and its active policies to generate spin-offs.

In such a context, universities, as a source of knowledge and as one of the links in the chain of innovation, fulfil a vital role in the creation of a stock of knowledge as, for example, the application of knowledge to the market by creating technology-based companies. Likewise, universities contribute by training the entrepreneurial team in business management.

The role of the University (Etzkowitz, 1983) is going beyond teaching and research to include entrepreneurial initiatives, which involve universities in bringing about economic and social progress. The entrepreneurial university turns ideas into innovation, it capitalizes on knowledge, it creates new companies and services, and it manages risks. Three spheres of action can be distinguished in universities: Teaching, Research and Knowledge Transfer. One particularly useful instrument, in the sphere of Knowledge Transfer, is Technology-based Companies in which innovation plays an important role.

This Entrepreneurial University needs formal or informal structures that can efficiently mediate between scientific knowledge and the market. One such structure is the incubation of Technology-based Companies carried out by Science and Technology Parks.

The entrepreneurial university is not the industrialized university. It is not a university controlled by contracts with industry but a university that takes initiative in the larger society and plays this role in several ways. A lot depends upon conditions in the region. In a Greenfield site, the university incubator has a large task. It must internalize various elements to assist the entrepreneurs: provide a place for business assistance, such as visiting lawyers and accountants. These business support structures were in place at the University at StonyBrook incubator in an exurban area of Long Island. However, when the same incubator director moved to Albany to establish an incubator at the University at Albany none of these activities were present. The Director said that in the Albany context it wasn't necessary. The region had all of these activities. His role in this context was to network the firms in the incubator to these resources and activities. There was no need to reduplicate them in the incubator (Etzkowitz, 2002).

Thus, if we are benchmarking incubators, we can't benchmark them as individual stand-alone entities because that may be irrelevant to where they fit. We must look at their role in the region and the conditions in the region and ask: what role they are playing in that region and therefore what role they must play as an organizational entity. The answer to that question can be quite different depending upon regional conditions. These factors have to be taken into account. Benchmarking can't be looked in an isolated fashion in terms of what programs and activities an individual incubator has within its own framework.

2.3. GLOBAL ECONOMY, GLOBAL SCIENCE AND BORN GLOBAL COMPANIES.

The Global Economy provides the opportunity for internationalization from birth for the new technology-based companies. The Global Entrepreneurs – World Class - must take advantage of the Global Intellectual Property as a competitive advantage, and access global markets thorough the ways that another have learned and created. For companies with value propositions based on ICT, the internet has become a way to communicate, sell and provide services and products. The classic model of globalization, however, arises from the community of scientists.

Science is global by definition. Scientists, as a matter of course, check

with the Science Community and distribute their contributions around the world. This kind of knowledge is born global. The Science Communities are articulated in every area for global networks, sometimes not connected with the local industry. The challenge of the OTLs is to transfer this knowledge to the market. The new way to transfer this knowledge to the market is through a new company led by an entrepreneur. With this "technology transfer method" and the adequate protection of the IP, entrepreneurs get a competitive advantage for their value proposition, adding barriers for new competitors and providing solutions with an original knowledge coming from science.

Those new companies that are coming from global knowledge have the challenge to develop a global value proposition, and how to attend the global markets. Sometimes the market is very narrow, and you must born global because a local market it's not enough for a single company. The ways to be global can include platforms that another has used or experience of other companies or managers. For a new company, without the structures of large companies, the utilization of global networks or international platforms is the way to succeed in the objective. It will be necessary a "growth industry".

The authors of the International New Ventures theory, Oviatt and McDougall (1994) and McDougall et al. (1994) note several trends that contribute to an increasingly early internationalization: the increasing speed and efficiency of international communications and transportation, the increasing homogenization of markets, the emergence of international financing opportunities and the emergence of increasingly internationally mobile human capital. They define an International New Venture "as a business organization that form inception seeks to derive significant competitive advantage from the use of resources and the sale of outputs in multiple countries".

Much of the current empirical literature addressing the Born Global Companies phenomenon has been almost exclusively connected with new industries and high technology-based sectors (Rialp et al. 2005). The pattern of internationalization of technology-base companies are not the same as the classical international ways (Autio and Sapienza, 2000). This kind of companies captures the value faster than the classical. International entrepreneurship demands local and global externalities.

The Science Parks could play a key role in the globalization of those new companies, as growth factories for the new local companies, and as a landing factories for the new global companies that want to be connected to an innovation system linked to a science park. In this way the Science Parks play the role of "connector" of the local innovation systems with remote innovation systems.

3. OUTCOMES AND METHODOLOGY

It will be necessary to provide an analysis of the process of the creation of the new technology-based global company and the role of the agents of the innovation system. After the analysis of Prototypical Science City projects we develop a model of the process of creation of Born Global Companies.

The first outcome of this paper is to extract a Model analyzing the agents and roles in the creation process of new technology-based global companies (Born Global Companies) within the Innovative Milieu such as the Science Parks and Science Cities, developing an approach from the Triple Helix: University, Government and Industry.

The second outcome is a comparison of San Francisco Bay Area with Barcelona Area, and how both areas develop different eco-systems with the same goal: the creation of new technology-based companies, with global reach.

For this propose we developed a qualitative study. We conducted in-depth 48 interviews with key persons in the San Francisco Bay and the Barcelona Areas from the different agents: Universities, Science Parks, Companies, Government and Finance System.

From the Triple Helix Model we analyze every agent within an Innovative Milieu. Those agents develop different roles and interrelations and manage the resources in order to contribute to the Milieu. Roles in the incubation process are distributed between Universities and Science Parks, Companies, Government, Finance System and Market. There are also support groups such as chambers of commerce and other institutions that promote the internationalization of entrepreneurship.

4.- THE TRIPLE HELIX APPLIED TO THE CREATION OF TECHNOLOGY-BASED COMPANIES.

4.1.- TRIPLE HELIX AND THE CREATION OF TECHNOLOGY-BASED COMPANIES

From the Triple Helix model and the result of the analysis, the article models the Incubation System of Technological Basis within the Regional Innovation System. It incorporates the different agents that take part in the process: Universities, Science and Technology Parks, Financial System, Public Administration (Local, Regional and National) and the Market.

It is, however, clear that Universities play a central role, but here again we have to re-question our implicit assimilation of university to the elitist model of the "Research University". The Triple Helix is powerful at lies the components with its articulation with others.

The Triple Helix III model (Etzkowitz and Leydesdorff, 2000) can be expected to generate a knowledge infrastructure in terms of overlapping institutional spheres, with each taking the role of the other and with hybrid organizations emerging at the interfaces (Figure 1). One of the examples are the Science Parks, University Incubators and Venture Capital (Etzkowitz, 2005).

The differences between the latter two configurations of university-industry-government relations currently generate normative interest. Triple Helix I is largely viewed as a failed developmental model. With too little room for bottom-up initiatives, innovation was discouraged rather than encouraged. Triple Helix II entails a laissez-faire policy, nowadays also advocated as shock therapy to reduce the role of the state in Triple Helix I. In one form or another, most countries and regions are presently trying to attain some form of the fully-fledged Triple Helix III model.

The common objective is to realize an innovative milieu, consisting of university spin-off firms, tri-lateral initiatives for knowledge-based economic development, and strategic alliances among companies (large and small, operating in different areas, and with different levels of technology), research and technology transfer groups, university incubators and science parks. The institutional innovations aim to promote closer relations between university and industry.

The linear model either expressed in terms of market pull or technology push was insufficient to induce transfer of knowledge and technology. Publication and patenting assume different systems of reference both from each other and with reference to the transformation of knowledge and technology into marketable products. The rules and regulations had to be reshaped and an interface strategy invented in order to integrate market pull and technology push through new organizational mechanisms.

The Triple Helix Model has to answer how to connect local innovation systems with remotes, and what agents and roles will be necessary in this new stage.

Analee Sexenian, in her book, Regional Advantage (1996), describes Silicon

Valley as a network system, a decentralized industrial system in which production is organized by networks of specialized firms that compete intensely while also collaborating in both formal and informal ways with each other and with local institutions like universities. This network system is based in relationships as social, technical and productive relationships in a region foster entrepreneurship, experimentation, and collective learning. As a result, the region's social, technical and productive infrastructure is as critical to the successes of local firms as their own individual activities. An ecosystem that compete in the world, thank you to have companies that provide global value propositions, and that are fed from science and technology that are global. The innovative milieu must be connected. Global Networks will be necessary.

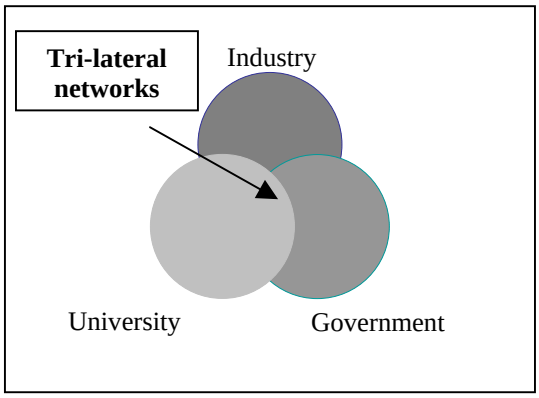

Figure 1. The Triple Helix Model of University-Industry-Government relations

4.2. INCUBATION OF INNOVATION: WORLD INNOVATION NETWORK (WIN)

The future incubator will not be an individual entity but an integral part of networks of expertise and capitals: financial, social and intellectual. Bringing together the national incubator associations in summit is a worthy objective but the long-term goal should be to encourage firms from different incubators to collaborate on mutual projects such as marketing agreements, moving their products from one country to another. After all, isn't that the ultimate objective of what we are trying to incubate: new firms with products that have an international reach? WIN should be a business opportunity that links to the incubator movement, sponsored and supported by the national incubator associations and international SUMMIT. They should have stakeholder participation as well.

The state of the art of incubator firm interaction is characterized by individual bilateral informal cooperation supported by incubator associations and their directors. Collaborations come about because someone knows someone else in a particular place and is able to establish that link through a personal relationship. Coming to the U.S. National Business Incubation Association (NBIA) or similar conferences can help establish that connection.What if you haven't gone to those meetings or don't have those informal ties. How do you make those connections?

If we look at the strong model of international business connections, it is through the multinational corporation which has the ability to transfer an innovation created in one of its units to others around the world. The social capital gap for start-ups is that we only have only informal and loose linking mechanisms at the international level. However, if we look at the Brazilian networked incubator model, there is an emergent organizational linkage model coming out of the incubator movement (Etzkowitz et al. ,2004).

We have thought of the incubator primarily as a stand-alone entity, yet networked in its region, a member of an association in its country, or even linked through associations cross-nationally. But what about the firms in the incubator; how can they be linked? How can they be introduced to each other? The need for international linkage was expressed in visits to incubators such as Symbion in Copenhagen, with software firms looking for markets in New York. Similarly, SOFTEC, a Brazilian initiative has established offices in several US cities to

play an introductory linking role for software start-ups and growth firms. Such efforts, to date, are typically occasional and bi-lateral rather than systematic and multilateral, although SOFTEC points the way to a more intensive format.

Indeed, a broader framework can be derived from the model of Brazilian incubators as members of networks, sharing projects among firms from different incubators. A model of networked incubators and incubator firms could be generalized from the national to the international level. What is needed is a very small organization to operate a "dating service" taking the information about what is going on in firms in different incubators around the world, not every firm and not every incubator, but those with firms that have technologies with international potential. Currently these interactions take place individually and idiosyncratically.

The WIN thesis is that we need to develop a more systematic way to network start-up firms, internationally. The incubator has traditionally been a support structure for the creation of firms. If we look throughout the innovation field, there are other mechanisms that have been created and applied to this problem of linkage. For example, the technology transfer office is as a search mechanism, on the one hand, looking for research with the potential to be commercialized, within the university, and looking for a market externally. Thus, we have experience with technology transfer offices, and how they work as a linkage mechanism, that can be applied to incubators and their firms.

Can some of that technology transfer capacity be created and put it into the space between incubators to link their firms? It requires persons that are knowledgeable about a technology area and the incubator firms to make those introductions. That is also the basis of building trust, if there is someone in the middle that people on both sides feel is knowledgeable and someone they can talk to. That person can then make those introductions and follow up to address issues in an emerging relationship.

Incubator cooperation can also be enhanced through social technologies such as video-conferencing, dating service software and data mining formats that can be creatively applied to this problem. We have to think in terms of upgrading the capacities of incubators. It used to be that phone and fax were the common services offered. The Internet has moved us from thinking of the computer as a stand-alone entity. We now think of the Internet as a linking mechanism among computers and people. We should also be thinking of how to create new kinds of linking mechanisms for firms incubator to incubator. That is the future selling point of common incubator services.

5. ROLES IN THE INCUBATION PROCESS ARE DISTRIBUTED BETWEEN TRIPLE HELIX AGENTS.

5.1. AGENTS, ROLES AND RESOURCES.

There are different Agents within an Innovation Ecosystem. Those agents develop different roles and interrelations (Table 1) in order to manage resources and contribute to the development of the Ecosystem.

Every agent can provide one o more resources, and also can manage the resources. The Ecosystem has a dynamic constraint as the industrial cycle, the economy and the legal framework. In every area the agents can provide or manage different resources.

The creation of new technology-based companies within the Innovation Ecosystem depends on the articulation of the role of the agents (Table 2).

Table 1.- Agents and Resources

Agents	- University (Science Parks, Research and Technology Centers) - Government (National, Regional and Local) Companies (Large, SME and New)
Resources	- Persons with capabilities and networks - Science and Technology - Knowledge (How to) - Experience(We know) and Vision - Network - Space - Technology Infrastructure. - Professional Services - Market (inside market) - Money - Meeting Points Customers (like a Golden References)

Table 2.- Role of the Agents.

University	- Persons with capabilities and networks - Science (Research Centers) - Technology (Technological Centers and licensing) - Knowledge about entrepreneurship (How to) - Experience (We know) and Vision - Network - Space - Technology Infrastructure - Meeting Points - Costumers (like Golden References) - University Angels - Fostering entrepreneurship. The competitions.
Government	- Role of Legal Framework. - It could act like a demand source, providing a sophisticate market for high-tech products and solutions. - Finance the Science and Technology through public programmes. - Invest in the Education in the Universities. -

Industry	- The Large Firm: Invest in new companies in order to manage its strategic innovation. Corporate Venturing. - The Small and Medium: Network and cluster. The new companies, as the way to put science and technology like a value proposition.

5.2. INCUBATION PROCESS

Based on the interviews, entrepreneurial initiatives can be analyzed as follows (Pique et al. 2004): origin and motivation, technological base used, state of development, profile of entrepreneurs, financial backing and location.

1. Origin and Motivation of the enterprise initiatives.

Enterprise initiatives are analyzed according to their origin and motivation. Those originating from Spin-Off Universities, Spin-Off Enterprises, Entrepreneurship Academic Programs and Prizes and Competitions for Entrepreneurs are emphasized.

2. Technological Basis used.

If the market is to benefit from knowledge transfer, there must be a stock of scientific knowledge. Universities and research centers play a key part in providing this scientific stock.

The measures taken to protect intellectual property are prime examples of the transfer of knowledge to the market. It cannot be denied that this is an advance in the evolution of knowledge. However, not very much value can be placed on this until a company buys or licenses this knowledge.

It is interesting to point out that Barcelona has been classified as one of the 20 Poles of Science and Technology by the EU. Marta Riba (2001) recognized that the correlation in Catalonia between scientific productivity and technological activity (in the form of patents) was not reflected in the dynamics of an Integrated Regional System. According to Marta Riba, the system of Innovation in Catalonia is not a significant factor. Riba further states that the chain of values Science (scientific productivity) – Technology (Patents) is not effective. It should be pointed out that in the case that concerns us here, the creation of technology-based companies, the patent is a form of protection that should be taken into account when negotiating venture capital funds. From the data obtained, it can be inferred that new technology-based companies are aware of the importance of some forms of protection and that they exercise these mechanisms.

3. The state of development of the initiative.

The development of the initiatives is analyzed, in relation to their legal status, selling and number of workers.

4. The profile of the Entrepreneurs.

The profile of the entrepreneurs, their qualifications, their professional experience and itineraries.

5. The financial itineraries and Incubator Agents.

Financial itineraries of the initiatives are analyzed, starting from the public and private funds: Concept Capital, Business Angels, Seed Capital, Venture Capital, Corporate Venturing and IPO.

The Spanish Ministry of Industry has given financial support to new technology-based companies through its CDTI- NEOTEC facility. It has been seen that there is a systematic relationship between the Regional and National Governments. The Capital Market identifies Concept Capital Funding as the first step in obtaining further funding.

In the study carried out by Scott Wallsten (2004) on the Role of Government in Regional Technology Development thanks to the effect of Public Venture Capital and Science Parks in the USA, it is made clear that neither said funding or said parks have had a significant impact

on regional technology indicators. He also established that Science Parks are placing greater emphasis on company incubators, but in spite of this he is unable to find a correlation between Science Parks, job creation or venture capital.

In the case of Catalonia, it can be stated that the creation of companies is higher in all the universities that have adopted technology-based incubators, and that also have a Science Park available.

6. Location and Incubator Agents.

Analysis of the location itineraries of the enterprise initiatives and the role of the Incubator Agents (Universities, Science and Technology Parks, Local Government Incubators, etc...)

Location itineraries of enterprise initiatives are distributed among incubators in Science Parks, Science Cities, Technology Parks and Local Government Incubators.

6. INCUBATION SYSTEM OF BORN GLOBAL COMPANIES

Based on the Triple helix Model (the role of Universities, Governments and Companies) the dynamic system for the creation of New Technology-based Global Companies emerged (Figure 2). This system takes in several concurrent itineraries that an entrepreneurial initiative develops during its maturing period; this includes the early stages and motive for the initiative, the training and experience of the team of entrepreneurs, the technological basis and development, the development and maturing process of the company, the location of the company and its funding itinerary, and the access to global markets.

This system allows us to define various roles the incubation process:

1. Competitions and prizes for new companies that recognize the entrepreneurial spirit and are a source of motivation for the creation of new global initiatives: Universities, Government and Private Sponsors.

2. Valorization of Technological Basis for the development of Company on the Global Market: Universities and Science Cities.

3. From the legal Constitution of the company to the global development: Government, Large and Medium Companies (Merge and Acquisitions) and Science Cities (Clustering).

4. World Class Talent (local and global) and Entrepreneurial Teams. Entrepreneurship and Management University Programs: Universities.

5. Financial Itineraries that satisfy the evolution in the company's financial needs: Governments (Local, Regional and National), Science Cities, and Public/Private Venture Capital (Venture Capital, Business Angels and Corporate Venturing).

6. Physical Itineraries that fulfil the evolution of the need for technological and space platforms(from local to global). Universities and Science Cities.

In addition to the role played by the Administration, Universities and Companies, as illustrated by the Triple Helix model, one must take into account the mixed structures that contribute to increasing the value of the innovation chain. Science Parks and Science Cities that adopt incubation models are a clear example of this.

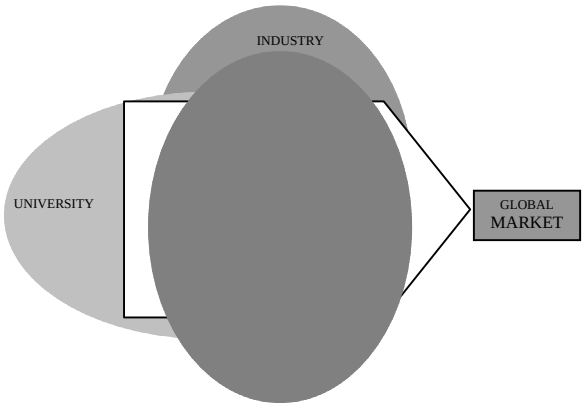

Figure 2. Model for the Incubation System of Born Global Companies.

7. CONCLUSIONS

San Francisco Bay Area and Barcelona Area share the same goal, but they develop the challenge in different ways, the first one as an innovation ecosystem and the second one as an innovation system.

The creation of Born Global Companies is the result of the contribution of the various agents. The Entrepreneurial University is the first link in a chain that will ensure that companies form a bond with capital markets to fund initiatives.

There are several ways to transfer scientific knowledge to the market. The Creation of Technology-based Companies brings into play a new model in which Universities, Science and Technology Parks, Incubators, Public Administration and Financial Systems contribute to the maturing of entrepreneurial initiatives.

Knowledge sources play a key role, along with capital markets and companies that encourage partnerships with new initiatives.

Both areas have the same Triple Helix agents, but develop their roles in different ways:

1. Universities as a source of technology-based knowledge.

The Universities in the San Francisco Bay Area started before the role of source of knowledge-base economy. Barcelona Area Universities after the first and second function (education and research) are developing the third function (technology transfer).

2. Science Cities, innovative milieu as an intermediary structure.

Stanford Research Park started the model and the reference. Barcelona Science Park started the way for all the universities in Barcelona, Catalonia and Spain.

3. Global Talent, trained entrepreneurs, with solid academic and professional backgrounds who decide to set up their own technology-based companies.

The Universities in the Bay Area play the role of attraction and retention of Global Talent. Students are the source Human Capital of the Bay Area. The Barcelona Universities receive so many international students (most of them come from Latin-American) but do not have any retention plan.

4. Technology-based ideas that bring about innovation by developing new concepts, new manufacturing and/or commercial processes, which are taken from university knowledge and applied to the needs of the global market.

The New Firms from San Francisco Bay Area born global because they want to grow, and the best way is to attend global markets. Their global talent is ready to develop a bridge between the Bay Area and the countries of origin of their founders or employees. The Barcelona Area is starting to promote Landing Programs and Growth programs. There is not enough Entrepreneurial Global Talent.

5. Funding of the different stages. From the earliest to the most advanced stage of funding, including the role of public, public-private and private funding.

San Francisco Bay Area has an Industry of Growth. Private markets are ready to receive, coach and mentor the new companies. Barcelona Area has a public model for financing the early stage of the new companies, recently became the private capital in the finance itinerary.

6. The Physical and Logical incubation of entrepreneurial initiatives carried out by University Incubators and Science and Technology Parks.

The markets in San Francisco Bay Area solve the needs. The role of the university is in fostering entrepreneurship. There is some help from local governments in Physical incubation. Barcelona Area has a system for the incubation of technology based companies. Physical and Logical facilities are provided by universities and government.

7. The Administration, which creates the appropriate legal conditions, acts as a

promoter and catalyst for the various agents and provides funding in the early stages. It creates tax incentives and promotes the protection of intellectual property.

The Federal Government acts in San Francisco Bay Area at the origin in funding the (sources of knowledge) and in providing a sophisticated demand for many of its products. The Regional Government in Barcelona Area acts financing the early stage of new companies and developing incubators in the universities.

8. Consolidated companies that offer Partnerships, or on occasions are the sources of spin-off companies.

The Big Companies in the Bay Area are part of the Industry of Growth. Corporate Venturing is the way to manage the innovation and the goal of the new technology-base companies and its early investors. Spin Ins and Spin Offs are another way to capture value in the ecosystem.

Barcelona Area does not have big companies with the role of Corporate Venturing and lacks the culture of spin off Companies. One reason high-tech firms have to be "born global" in Barcelona in order to succeed is that there is a lack of local markets for advanced technology from start-ups. Thus, these firms have to be able to sell, for example, to Nokia, their former employer. In order to survive, such firms must directly reach global markets due to the relative lack of local opportunities. In addition to developing the local capacities to reach global markets, the policy lesson for Catalonia/Spain is the need to develop local demand, especially from regional and national government by creating a level playing field for start-ups and large multi-national firms. Stringent regulations currently give the advantage to large players in reaching the government market. Thus, innovation policy and anti-corruption policy are in contradiction. A better balance is required.

The Creation of Technology-based Companies can be considered to be a major factor in the creation of wealth in society. Regions that know how to capitalize on the entrepreneurial spirit are able to come to terms with economic globalization by becoming market leaders. In order to achieve this, the role of the administration, with its funding and innovation management instruments, is essential. Likewise, entrepreneurs and local businessmen and Science Cities provide the milieu to initiate, mature, consolidate and support Born Global Companies.

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