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Conference Paper

Innovation Hot Spots: the Case of the Computer Services Sector in the Region of Attica, Greece

46th Congress of the European Regional Science Association: "Enlargement, Southern Europe and the Mediterranean", August 30th - September 3rd, 2006, Volos, Greece

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Katsikis, Ioannis; Soderquist, Klas Eric; Prastacos, Gregory (2006) : Innovation Hot Spots: the Case of the Computer Services Sector in the Region of Attica, Greece, 46th Congress of the European Regional Science Association: "Enlargement, Southern Europe and the Mediterranean", August 30th - September 3rd, 2006, Volos, Greece, European Regional Science Association (ERSA), Louvain-la-Neuve

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Innovation Hot Spots: The Case of the Computer Services Sector in the Region of Attica, Greece

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Abstract

Innovation hot spots are formed by fast-growing, geographically and industrially clustered firms and they are becoming an increasingly important factor for innovation and for urban or regional development. Innovation hot spots enjoy rapid growth, leading to job creation, knowledge expansion and, in the best cases, sustainable development. We examine the case of the computer services sector in the Region of Attica, Greece, which recently has been identified as most innovative in Europe, in view of identifying the conditions under which this innovation leadership has emerged and come to flourish. Using the innovation hotspots framework, we argue that growth of the Computer Services Sector in the Region of Attica has been boosted by the Information Society Program, the Olympic Games and the necessity for modernizing Greek firms, which leads them to favor investments in new technologies. Moreover, the region presents a favorable macroeconomic environment, characterized by high rates of development, increase of consumption and investments, while the sector itself operates with modern management models supporting clustering and the formation of alliances. We also propose a framework for maintaining the dynamics in the region -and in innovation hot spots in general - as there is a significant risk of rise and fall patterns occurring, leading to former hot spots transforming into “blind spots”, and core competencies developed turning into core rigidities and cultural lock-in.

Key words: innovation hot spots, computer services sector, Region of Attica, Greece

Introduction

Fast-growing, geographically and industrially clustered firms are becoming an increasingly important factor for innovation and urban or regional development. This is because innovation hot spots enjoy rapid growth, leading to job creation, knowledge development and, in the best cases, sustainable urban expansion. The European Trend Chart Reports (2004 and 2005) present Greece as innovation leader in the Computer Services – CS sector. The computer services sector enjoys high knowledge creation and knowledge diffusion intensity meaning that the hot spots exploiting such services position high on an innovation intensity scale. Consulting, Implementation, Operations Management and Support services will all enjoy similar growth since they are complementary industries forming the Attica IT innovation hot spot. The objective of this paper is to analyze the Attica region as a Computer Services innovation hot spot, identifying and explaining decisive factors in the emergence and for the sustainability of the hot spot.

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We use the conceptual model proposed by Pouder and St. John (1996) (figure 1) in order to examine the factors affecting the evolution of the hot spot. In the first section of this paper we discuss and develop the innovation hot spot theory. The second section is dedicated in identifying the resource conditions, institutional processes and management's mental models – sectoral contexts in the case of the computer services sector in the Region of Attica. We argue that growth in the Region of Attica has been boosted by certain institutional processes, such as the Information Society Program, the Olympic Games and the necessity for modernizing Hellenic firms, which leads to favor investments in new technologies. Moreover, the Region presents favorable resource conditions, such as a macroeconomic environment, characterized by high rates of development and increase of consumption and investments. At the same time the sector itself operates with modern management models supporting clustering, the formation of inter-firm alliances and R&D joint ventures. In the third section of the paper we analyze and propose a framework for maintaining the dynamics in the region - and in innovation hot spots in general - as there is a significant risk of rise-and-fall patterns occurring, leading to former hot spots transforming into “blind spots”, and core competencies developed turning into core rigidities and cultural lock-in. The paper closes with concluding remarks and further discussion on the innovation hot spot theory.

1. Innovation Hot Spots Theory

Coined by Pouder and St. John (1996), the notion of “Innovation Hot Spots” is today employed by policy makers, regional and local authorities searching to promote growth and development in a region, as well as by business leaders searching to identify attractive locations for their businesses. Pouder and St. John define innovation hot spots as regional clusters of firms that: (a) compete in the same industry, (b) begin as one or several start-up firms that, as a group, grow more rapidly than other industry participants (sales and employment levels), and: (c) have the same or very similar immobile physical resource requirements in the long run. Thus, an innovation hot spot:

- Concentrates competence and innovation capability in a specific product or service business;
- Consist of a cluster of firms in complementary industries serving that product or service business;
- Maintains high competition between an important number of firms within each of the complementary industries;
- Presents a high rate of new venture creation (start ups and spin-offs);
- Presents favorable dynamics of co-evolution, or, more simply speaking, integrated development and reciprocal support between firms, industries, institutions, universities, public policies and political initiatives;
- Provides an environment with superior quality of life attracting and maintaining highly qualified workforce in the region.

As a result of the above conditions, innovation hot spots enjoy rapid growth, leading to job creation, knowledge development and, in the best cases, sustainable urban expansion. Table 1 summarizes some well-known innovation hot spots over the world. Today, for examples, such clusters exist in the Silicon Valley with information technology and information systems, the Dublin region in Ireland for electronic components and business services, the Milan region in Italy with industrial design, the Geneva – Zurich axis in Switzerland for biotechnology, the Amsterdam region in Holland with cut flowers, the Linköping region in Sweden with aviation industry, and the Basque region in Spain with automotive components (Pouder and St. John, 1996). New innovation hot spots also emerge rapidly in India, China and Russia, and some of the most attractive in IT and Telecom related products and service already exist in Taiwan, Singapore and South Korea (e.g., Business Week, 2004).

Table 1: Innovation Hot Spots around the world.

| <i>Spatial Position</i> | <i>Country</i> | <i>Sector</i> |
|-------------------------|--------------------|--|
| Silicon Valley | USA | Information Technology and Information Systems |
| Dublin Region | Ireland | Electronic Components and Business Services |
| Cambridge Region | United Kingdom | Biotechnology |
| Sophia Antipolis | France | Pharmaceuticals |
| Milan Region | Italy | Industrial Design |
| Amsterdam | Holland | Cut Flowers |
| Linköping Region | Sweden | Aviation Industry |
| Basque Region | The Basque Country | Automotive Components |
| Attica Region | Greece | Information Technologies |

As Scott (1992) noted, it is difficult to identify the emergence of a cluster before it occurs. Interest in identifying the precursor conditions has led researchers to study the location factors that might catalyze the emergence of industry clusters, including the existence of military bases, research and knowledge intensive firms, universities, science parks, international airports, venture capital firms, and recreational facilities (Markusen et al., 1986). Results about the role these factors play in the emergence of clusters have been inconclusive, however (Haug, 1991).

In this context, the concept of innovation hot spots (Pouder and St. John, 1996) represents a leap forward in the understanding of the formation and development of innovative and rapidly growing industrial and spatial clusters by advancing that a clustered subgroup of competitors within an industry will likely move through three evolutionary phases that pattern the punctuated equilibrium model (Tushman and Romanelli, 1985): (a) origination of the cluster and emergence of the hot spot identity, (2) convergence of clustered firms, and (3) firm reorientation, which includes a decline in the performance of the cluster or hot spot. For each phase, the role that resource economies, institutional forces and cognitive frameworks play in influencing competitive behavior and levels of innovation is discussed.

1.1 Characteristics and Factors affecting the Evolution of Hot Spots

The focus on hot spots of clustered firms and organizations provides a new and more dynamic perspective on business growth compared to the traditional focus on branches or sectors. Further, in terms of innovation systems, the innovation hot spot is situated in the intersection between national, regional and industrial innovation systems (Carlsson et al, 2002; Chung, 2002; Moyalert, 2003; Porter and Stern, 2001). Hence, it can combine the best of:

- National support for basic research and venture funding,
- Regional development incentives, transport and communication infrastructure, access to qualified workforce and access to a local market, and
- Privately funded and driven R&D within established industry structures.

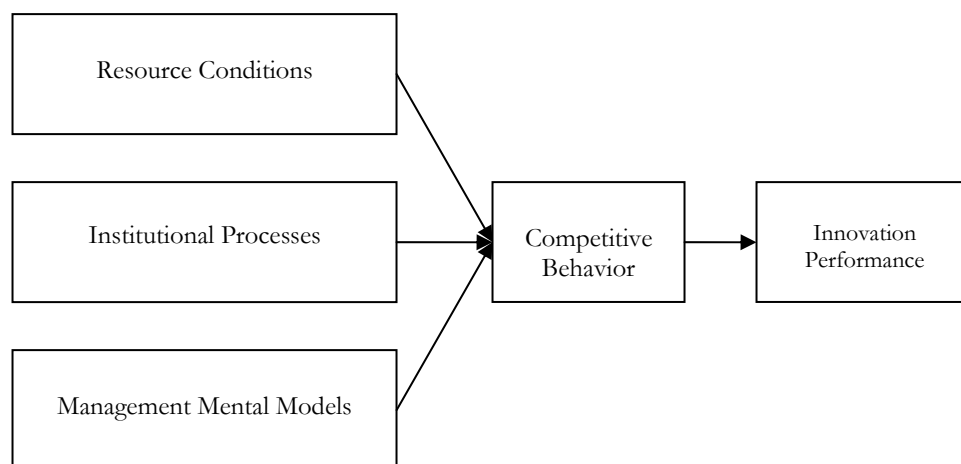
In view of the socio-economic importance of innovation hot spots, it is in the interest of countries and regions in particular, to promote the development of such clusters of dynamically evolving businesses and institutions. The European Trend Chart on Innovation reflects this concern (European Commission, 2004; 2005). The objective of this initiative is to identify the European Union's most innovative firms, sectors and regions in order to better understand how favorable conditions for innovation hot spots can be developed.

In studies of innovation from an industry perspective, the social system constituting an industry is seen as emerging over time through a process of accumulation of knowledge and path-dependent change processes (Van de Ven and Garud, 1989). This social system governs, integrates, and performs all of the functions required to transform technological innovations into commercially viable products. In the innovation hot spot framework, Pouder and St. John (1996) chose the punctuated equilibrium model as organizing framework because it highlights the interaction between a firm's behavior and an industry's behavior, unlike organizational life-cycle and teleological process theories of organizational development and change (Van de Ven and Poole, 1995) that are focused primarily on organizational factors. The pattern of hot spot evolution captured by the punctuated equilibrium model is cast against a background of overall industry evolution. The hot spot initially grows faster than the industry, but then it experiences declines not felt by the competitors outside of the hot spot.

The thesis of the model developed by Pouder and St. John (1996) is that geographical clustering can lead to resource arrangements and costs, mental models, and patterns of competitive behavior that create a deep structure within the cluster (p.1195). The deep structure causes competitors within the cluster to behave differently from competitors outside the cluster, to assess competitor and market trends differently and, ultimately, to become vulnerable to naive industry assumptions and imitative behavior that leads to unproductive innovative efforts. The result is two separate evolutionary paths for clustered and nonclustered competitors. Initially, clustered firms experience resource cost and access advantages, heightened competitor awareness, and enhanced legitimacy, which allow the cluster to dominate industry growth and innovation, leading to the hot spot identity. Over time, however, the clustered firms begin to experience resource diseconomies, insular competitive practices, less frequent innovation, and lost dominance in the industry.

The pattern of hot spot evolution captured by the punctuated equilibrium model is cast against a background of overall industry evolution. The hot spot initially grows faster than the industry, but then it experiences declines not felt by the competitors outside of the hot spot. Within the punctuated equilibrium framework, a macroview of the dynamic processes of innovation is culled from the following research streams: (a) population ecology, (b) industrial organization (particularly within a regional or geographic context), (c) institutions, and (d) managerial cognition. The major theoretical elements used in the model are shown with their relationships in figure 1.

Figure 1: Forces affecting the evolution of Hot Spots (Pouder and St. John, 1996).



The identification of precursor conditions has led researchers to study location factors that would seem to catalyze the emergence of industry clusters: military bases, research universities, science parks, international airports, venture capital firms, and recreational facilities (Markusen et al., 1986). Results about the role these factors play in the emergence of clusters have been inconclusive (Haug, 1991). That is why two other factors should be considered. Groups of proximal rivals stimulate creation of a local infrastructure and expanded supply of skilled labor and resources (Porter, 1990). As groups of local competitors work quickly to create an industry's infrastructure and credibility, they derive cost and time savings through their affiliation and proximity (Porter, 1990; Scott, 1989). As the emerging industry subpopulation gains legitimacy within the region, access to capital and markets improves (Aldrich and Fiol, 1994; Suchman, 1995). Thus, with an increased number of organizations comes increased legitimacy (Hannan and Freeman, 1989). In addition to the cost and access characteristics of the industry cluster, there is a cognitive dimension as well. Within an emerging cluster, several factors create a propensity for managers and key technical employees to have similar cognitive frameworks or mental models.³ Building on research in top management cognition, we believe that the fact that managers and employees are all participating in the same industry suggests they have similar industry experiences and technical training (Huff, 1982; Prahalad and Bettis, 1986; Spender, 1989).

As Feldman and Martin (2005) a consensus is developing that compact geographic areas, such as those presented on table 1, typically centered in cities, are more important than countries or sub-national regions when considering economic growth and prosperity (Krugman 1998; Fujita and Trisse, 1996). Organization ecologists have indicated that firms sometimes cluster in an area after an initial start-up to seize a niche, a particular combination of resources required to support a given type of organizational population (Hannan and Freeman, 1989). Lomi (1995) observed that "the recurrence of patterns of organizational concentration in space across different industries and in a number of national contexts provides indirect evidence that location may be a general factor shaping the evolution of organizations" (Lomi, 1995, p.111). If location provided an evolutionary advantage, then organizational populations would not be homogeneous, geographical proximity would play a role in competitive behavior, and birth and death rates for firms would vary systematically across locations (Baum and Mezias, 1992; Lomi, 1995). Firms clustered in one location would define a subpopulation within the total industry population, face different resource availability and competitive practices, and could evolve independently of other industry participants (Hannan and Carroll, 1992). The organizational ecology literature, therefore, supports the notion that geographically clustered firms may differ from firms outside the cluster regarding cost structures, competitive behavior, and performance over time.

1.2 The Stages of the Hot Spot Evolution

During the early stage of hot spot formation, conditions are ripe for high levels of innovation. Three forces work to center industry innovation activity within the hot spot: (a) the increasing number of competitors within the hot spot, many of which are created as spin-offs; (b) the proximity and shared resources among competing firms within the hot spot; and (c) the mental models that emphasize the resources and capabilities of hot spot competitors.

Because new spin-offs are often created in response to an unfilled market need (Haug, 1991), spin-offs are likely to maintain similar supplier and resource arrangements within the cluster to take advantage of agglomeration economies, but they will compete through a strategy that emphasizes differentiation from other hot spot competitors (Baum and Mezias, 1992). When created through spin-off, the clustered firms are predisposed to a higher level of knowledge about the capabilities and strategic intent of local competitors (Carroll, 1993), which, in turn, serves as a form of competitive intelligence that focuses the differentiation and innovation efforts of those firms.

Proximity, shared resource arrangements, and an emerging hot spot identity would also contribute to a heightened innovative environment. Clusters are able to harness local pride as a motivating force that energizes firm behavior (Porter, 1990). The entrepreneurial spirit fostered by the large number of spin-off s and start-up firms will fuel a culture of innovation and fast change. Also, the emerging network of alliances among the labor pool, suppliers, idea generators, and competitors stimulate an environment of creativity and idea exchange (Saxenian, 1994). Finally, formal and informal information exchange among competitors, suppliers, and other related businesses would leak information about competitors and their innovation practices (Baum and Mezias, 1992; Saxenian, 1994), contributing to firms' well-developed competitive intelligence within the cluster.

According to the punctuated equilibrium model, convergent periods consist of "long time spans of incremental change and adaptation which elaborate structure, systems, controls, and resources toward increased coalignment (during which) inertia increases and competitive vigilance decreases" (Tushman and Romanelli (1985, p.215). As Gersick (1991) noted, organizations will make adjustments that preserve their deep structures against internal and external sources of influence. However, many of the assumptions that underlie the deep structure change with growth and success. Although a clustered group of competitors may continue in convergence indefinitely, its role as a hot spot with faster-than-average growth and disproportionate innovative capacity is likely to decline. As time passes, the agglomeration economies and access advantages may erode, and the simplified cognitive frameworks managers used to analyze competitors may no longer represent the most essential phenomena.

The next section is dedicated in identifying the resource conditions, institutional processes and management's mental models – sectoral contexts in the case of the computer services sector in the Region of Attica.

2. The Attica Region as a Computer Service Innovation Hot Spot

The most recent European Trend Chart Reports (2004, 2005) presents Greece, followed by Belgium and Finland, as innovation leader in the computer services sector. Computer services enjoy a high knowledge creation and knowledge diffusion intensity meaning that the hot spots exploiting such services position high on an innovation intensity scale (European Commission, 2004). More specifically, the number one position of Greece in the computer related service activities is translated through the country's lead, compared to the other EU countries, in:

- Number of SMEs cooperating,
- Innovation expenditures,
- Share of firms that receive public innovation support,
- Gross investment in machinery and equipment,
- R&D expenditures, and
- Growth rate of employment.

Below, we examine the case of the computer services sector in the Attica Region by studying the three factors affecting the flourish of the innovation hot spot; namely the resource conditions, that is the regional incentives, transport and communication infrastructure, access to qualified workforce and access to a local market, the institutional processes such as national support for basic research and venture funding; and the management mental models meaning the operational structure of the sector, the privately funded and driven R&D within established industry structures.

2.1 The Resource Conditions in the Region of Attica

The infrastructures for the Region of Attica offer ideal resource conditions for the urban development of the region. The Region, which includes the greater Athens area, is about 1,470 square miles (3.808km²) and represents about 4 million people (3.841.400 in 2005) or about 35 percent of the Greek population. The Attica basin is the urban conglomeration of the Cities of Athens, Piraeus and the suburban municipalities (48 in number). The mass majority of the public administration institutions of the country are located here since the public administration of the Hellenic Republic operates in a very centralized structure. Furthermore, the Attica Region counts for the dominating part of national financial and commercial activities (e.g., 55% of the banking activity, 80% of the heavy industry, 80% of the sea-borne commerce, etc).

The urban population of the Region of Attica covers the 51,35% of the total urban population of the country. 64,6% of the working population is occupied in the tertiary, the 33,8% in the secondary and only the 1,6% the primary sector. The contribution of each sector in the formulation of the Gross Regional Product (GRP) is 70%, 28% and 2% respectively. Moreover, the Attica region presents a favorable macroeconomic environment, characterized by high rates of development, increase of consumption and investments. The growth in population, 36% between the years 1961-1971, 20% between 1971-1981, and 4.5% between 1981-1991, support a gestation period providing impetus for this economic, technological and market development.

As far as the human resources are concerned, there are 11 stated operated higher educational institutions within the region, covering all scientific and engineering topics, and offering well-educated human capital and supporting research activities. In Attica reside 55% of the scientific personnel of the country and 65% of the university graduates. 41% of the working population are scientists, self-employed, management seniors or white collar employees. The Region concentrates the 35% of the working population and it offers the 40% of the country's public incomes.

2.2 The Institutional Processes in the Attica Hot Spot

As emphasized in the Federation of Hellenic Information Technology and Telecommunication Enterprises reports, growth has been boosted by both the Information Society Program sponsored by the EU and the Hellenic State and the Athens 2004 Olympic Games, in which the contribution of technology was of great importance (SEPE, 2004). The IT and Telecom sectors are expected to keep up their high growth momentum.

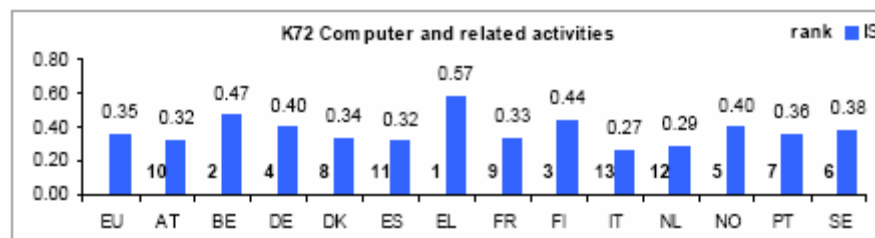
Moreover, the necessity for the modernization of the Greek firms is a strong driving force that leads them to favor investments in new technologies. European Union's Grants, through the 3rd Community Support Framework (2000-2006) and the Information Society Program in particular, result in the dissemination of the "Information Society" concept in Greece - in public administration, firms and in the population itself. The "Information Society Program" in Greece was launched by the government for the development of the IT profile of the Hellenic society. It reserves 27% of the total community financing (through the 3rd CSF) for IT investments in a country, that represents only 3% of the European population. It supports activities in education and training, culture, e-governance, transportation, e-business, infrastructures, etc. This direct financing scheme has led to the creation of an important primary demand for computer services, which maintains high competition between the important numbers of firms within each of the complementary industries in the Attica computer services cluster.

2.3 The Management Mental Models in the Computer Services and Related Activities Sector

The computer services sector in the region of Attica concentrates competence and innovation capability in both products and services, creating at the same time new business opportunities and contributing significantly to employment growth. Consulting, Implementation, Operations Management and Support services will all enjoy similar growth since they are the complementary industries forming the Attica Computer services innovation hot spot. This gearing-up of a wide range of players in the Computer services cluster is a key characteristic of sustainable growth. These firms often work together, form both vertical and horizontal alliances in the production procedures while implement state of the art management practices. As a growing industry, it attracts better and better human capital. It is estimated that over 100,000 people are already employed in more than the 400 ICT firms.

The Sectoral Innovation Scoreboard - SIS, the sector specific part of the European Trend Chart of Innovation identifies as the leading country in “Computer Services and Related Activities” Greece for both years 2004 and 2005. Moreover, the sector itself was the first for the year 2004 and the third most innovative sector in Europe for the year 2005. Greece is leading in share of SMEs co-operating, innovation expenditures, share of firms that receive public subsidies to innovate, gross investment in machinery and equipment, R&D expenditures and growth rate of employment (see performance on Table 3). Belgium is leading in share of firms innovating in-house and sales share of both new-to-market and new-to-firm products.

Figure 2: The Computer and related services sector (European Commission, 2004)



Computer and related activities is the most innovative sector of the services sectors. In six CIS indicators the sector performs at least twice as good as total services. The SIS characterizes the CS sector as being a knowledge-diffusion, rather than as a knowledge-creator. Below we present a table with a detailed definition of NACE K72 code used by the sectoral innovation scoreboard in its analysis.

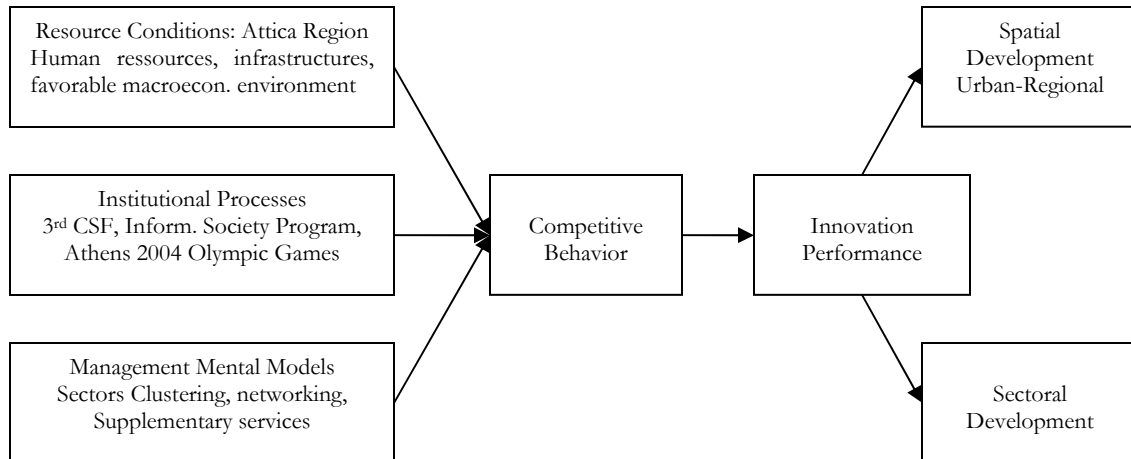
Table 1: Detailed Definition of NACE K72 for the Sectoral Innovation Scoreboard

| <i>NACE</i> | <i>Detailed definition</i> |
|-------------|--|
| NACE 72 | Computer and related activities |
| NACE 72.1 | Hardware consultancy |
| NACE 72.2 | Software consultancy and supply |
| NACE 72.3 | Data processing |
| NACE 72.4 | Database activities |
| NACE 72.5 | Maintenance and repair of office, accounting and computing machinery |
| NACE 72.6 | Other computer related activities |

Source: European Commission, (2004)

In figure 3 we summarize the three factors discussed and analyzed above. This is a hermeneutical figure aiming at identifying the specific context for each factor in the case for the case of the computer services sector in the Region of Attica. It unifies reasons in the three respective categories following the Pouder and St. John (1996) conceptual framework.

Figure 3: Forces affecting the emergence of the Attica Innovation Hot Spot



As our analysis suggests factors affecting the emergence of the Attica Innovation Hot Spot are in terms of resource conditions: the availability of well educated human capital, the existence of infrastructures and the favorable macroeconomic environment. The institutional processes encouraging the development of the hot spot were the funds of the 3rd Community Support Framework and more specifically the “Information Society Program” and the Athens 2004 Olympic Games which were both important driving forces for the modernization of the Hellenic firms’ IT infrastructure. The third factor, concerning the management mental models of the sector were the clustering and networking activities fostered by the fact the structure of the firms forming the hot spot provide supplementary services.

Building on the framework of Pouder and St. John (1996), illustrated in figure 1, we suggest that the innovation performance of the hot spot resulted from the competitive behavior of the firms involved in the cluster, because of the factors described may produce both sectoral and spatial development schemes in terms of urban and/or regional development (see figure 3). Thus, research based on the notion of hot spots may provide interesting input for policy makers to develop informed both regional or sectoral innovation and developmental policies.

3. Maintaining the Dynamics in the Hot Spot

After the Athens 2004 Olympic Games, the Attica innovation hot spot has to face a critical challenge in maintaining its dynamism and growth. The sustainable development of the hot spot and its related sectors has to prove itself by increasing its contribution to employment through more job creation, the geographical expansion, the financial growth and through the formation of partnerships with diversified external organizations. The ultimate goal is to sustain its openness by coevolving in relation to both market trends and consumers needs.

The major field for the Attica innovation hot spot development remains the software industry. The most important markets for future development still include the public sector, manufacturing, banking services, food and beverages, pharmaceuticals, health and insurance services; while major

products include ERP and web applications, data bases and CRM, internet and security applications. One of the major opportunities for the future development of the hot spot can be the enlargement of the European Union, where Greece enjoys a strategic positioning as a trampoline for Balkan business expansion and the dissemination of IT in sectors of the economy where the need for developing technology is large, such as in agriculture and tourism.

There is a significant risk of rise-and-fall patterns occurring for innovation hot spots, leading to former hot spots transforming into “blind spots”, and core competencies developed turn into core rigidities and cultural lock in (Pouder and St. John, 1996; Leonard-Barton, 1992; Christensen, 1997). When this happens, firms fail to renew their resource base, strategies and structure leading to a failure to adapt to environmental changes. Several academics and practitioners (e.g., Nelson, 1995; Edquist et al., 1998; Woolthuis et al., 2005) argue that declining hot spots might be revived by local economic development policies designed to stimulate R&D, skills training for the local labor force, business support services to guide reorientation and restructuring efforts, public sponsorship to encourage new joint ventures and alliances, and effective management of the local infrastructure, through land-use planning, tax policies, and development of science parks, so that the economies of agglomeration can be restored.

Nevertheless, institutional support interventions may turn into artificial breathing, which only prolongs the pain of an uncompetitive business infrastructure. As highlighted by many researchers (e.g., Scott, 1992; Pouder and St. John, 1996; Carlsson and Jacobsson, 1997) collective efforts by policy makers and communities to guide hot spot behavior may represent yet another source of institutional pressure, designed to isolate the hot spot from real competitive forces and to encourage sameness among hot spot competitors. In order to remedy this kind of paradox, important factors for sustaining an innovation hot spot include:

1. The development of entrepreneurial spirit within organizations in any spatial scale, industries, regions or countries.
2. The integration of local knowledge and local resources in the innovation processes,
3. The co-evolution of innovation dynamics between firms, industries, institutions, universities, public policies and political initiatives.
4. The ability of firms to switch partners and reduce dependence on certain dominant organizations (not only at the country level but also at the global market).
5. The capability to respond to market trends and consumers needs.
6. The development of capabilities (not only technical but also organizational) lying outside the existing structure of firms' skills.

As Feldman and Martin (2005) highlight, the literature on corporate strategy finds that observed differences in firm performance are due to organizations capabilities which are unique and not easily imitated (Barney, 1991; Dosi et al., 2000; Nelson, 1991; Rumelt, 1984; Wernerfelt, 1984). Penrose suggests that while similar resources may be available to all firms, the ability to deploy these resources productively is not uniformly distributed and depends on the firms' capabilities, such as the ones proposed above. The capabilities described above develop over time as the result of historically determined endogenous learning processes (Nelson and Winter, 1982). As a result of this path dependency, firm capabilities are unique and not easily replicated. The result, Feldman and Martin (2005), argue, is that specialized resources used by a firm are embedded in an organizational context and their effective use is contingent on other complementary assets, (Rumelt, 1987). The mechanism through which a company produces advantage is an activity system which is unique, not easily replicated and therefore sustainable.

Conclusion and Discussion

In this paper we used the notion of “innovation hot spots” in order to examine as a case study the Computer Services Sector in the Region of Attica. Both qualitative and quantitative data were used in order to examine the sectoral structure and the innovation dynamics of the Region. The notion of “hot spots” can be used in identifying clusters of entrepreneurial activities that emerge and usually follow the typology presented in the conceptual framework first proposed by Pouder and St. John, (1996) and developed above. Following the above framework, in this paper we argued that they are three important explaining the flourish of the CS Sector in the Region of Attica. The first could be identified as the regional context of the Region of Attica, the second as the national institutional and the third the dynamic nature of the sector.

As far as the Attica Region is concerned, the innovation hot spot has probably originated as a cluster of firms and has already developed its hot spot identity. It is now the time to pass to the second phase of the hot spots life-cycle developed by Pounder and St. John (1996) to the convergence of the clustered firms. That is why factors presented above, due to which the hot spot came to flourish, do not guarantee the sustainable development of the region or the sector. Moreover, it is truth that the hot spot emerged in the Region of Attica as a result of region’s previous infrastructure and activities and it not produce or generate any regional but urban development for the Region. As Pouder and St. John argue, “once a super nova for state-of-the-art innovation, the hot spot quickly becomes an industry black hole” (p. 1221). An apparent trade-off is that some of the factors drawing firms to hot spots are often the same factors that ultimately cause their demise. Because of their potential growth in numbers, hot spots are likely to become increasingly important policy issues. At the heart of these issues, policy makers will seek prescriptive strategies that attempt to reduce the susceptibility of hot spots and prevent dysfunctional responses to environmental jolts.

The central question in this context is whether policy intervention can avert economic losses and return firms to high levels of innovative activity following an environmental jolt. As Pouder and St. John, (1996) suggest when researchers identify regions as hot spots, policy makers may be motivated to mitigate potential economic devastation by developing policies that attract new industries to the region. Research based on the hot spots theory may assist policy makers in developing informed regional economic policy and suggest management practices or even administrative directives that will result in sustainable development of the innovation hot spot and thus offer a positive impact on both the region that provides the spatial dimension and the sector that creates the competitive advantage.

References

- Aldrich H.E. and Fiol C.M., (1994), Fools rush in? The Institutional Context of Industry Creation, *Academy of Management Review*, Vol.19, pp.645-670
- Barney, (1991), Firm Resources and Sustained Competitive Advantage, *Journal of Management*, Vol.17, No.1, pp.99-120
- Baum J.A. and Mezias S.J., (1992), Localized Competition and Organizational Failure in the Manhattan Hotel Industry, *Administrative Science Quarterly*, Vol.37, pp.580-604.
- Business Week, (2004), Sourcing the Planet for Brainiacs – Worldwide Innovation Networks are the New Keys to R&D Vitality and Competitiveness, Issue 11.10.2004
- Carlsson B. and Jacobsson S., (1997), In Search of Useful Public Policies: Key Lessons and Issues for Policy makers, in Carlsson., B (ed.), *Technological Systems and Industrial Dynamics*, Kluwer Academic Publishers, Dordrecht.
- Carlsson B., Jacobsson S., Holmén M. and Rickne A., (2002), Innovation Systems: Analytical and Methodological Issues, *Research Policy* Vol.31, pp.233–245.
- Carroll G., (1993), A Sociological View on Why Firms Differ, *Strategic Management Journal*, Vol.14, No.4, pp.237-249.
- Christensen C.M., (1997), *The Innovators Dilemma*, Harvard Business Scholl Press.
- Chung S., (2002), Building a National Innovation System through Regional Innovation Systems, *Technovation*, Vol.22, pp.485–491.
- Dosi G., Nelson RR. and Winter S.G., (2000), Introduction, in Dosi G., Nelson RR. and Winter S.G., (eds.), *The Nature and Dynamics of Organizational Capabilities*, Oxford University Press, New York, pp.1-22
- Edquist C., Hommen L., Johnson B., Lemola T., Malerba F., Reiss T. and Smith K., (1998), The ISE Policy Statement – the Innovation Policy Implications of the “Innovations Systems and European Integration”. Research Projects funded by the TSER Program (DG XII), Linköping University, Linköping
- European Commission, (2004), *Exploring Innovation Performances by Sectors*, European Trend Chart Report on Innovation – ETCR 2004, December, 2004
- European Commission, (2005), *Exploring Innovation Performances by Sectors*, European Trend Chart Report on Innovation – ETCR 2005, December, 2005
- Feldman M. and Martin R., (2005), Constructing Jurisdictional Advantage, *Research Policy*, Vol.34, pp.1235-1249
- Fujita M. and Trisse J.-F., (1996), Economics of Agglomeration, in Proceedings of the 10th *Japanese International Economy*, Vol.339, p.341
- Gersick C.J., (1991), Revolutionary Change Theories: A Multilevel Exploration of the Punctuated Equilibrium Paradigm, *Academy of Management Review*, Vol.16, pp.10-37.
- Hannan M. and Freeman G., (1989), *Organizational Ecology*, Harvard University Press, Cambridge, MA.
- Hannan M., and Carroll G., (1992), *Dynamics of Organizational Populations: Density Legitimation and Competition*. New York: Oxford University Press.
- Hannan M., and Freeman G., (1988), The Population Ecology of Organizations, *American Journal of Sociology*, Vol.5, pp.929-940.
- Haug P., (1991), Regional Formation of High-Technology Service Industries: The Software in Washington State. *Environment and Planning*, Vol.23, pp.869-884.
- Huff A.S., (1982), Industry Influences on Strategy Reformulation, *Strategic Management Journal*, Vol.3, pp.119-131
- Krugman P., (1998), *Geography and Trade*, MIT Press, Cambridge MA.
- Leonard-Barton D., (1992), Core Capabilities and Core Rigidities, *Strategic Management Journal*, Vol.13, Vol. 13, Special Issue: Strategy Process: Managing Corporate Self-Renewal, pp.111-125
- Lomi A., (1995), The Population Ecology of Organizational Founding: Location Dependence and Unobserved Heterogeneity. *Administrative Science Quarterly*, Vol.40, pp.111-144.

- Markusen A., Hall P., and Glasmeier A., (1986), *High-Tech America: The What, How, and Why of the Sunrise Industries*. Boston: Allen & Irwin.
- Moulaert, F. and Sekia, F., (2003), Territorial Innovation Models: A Critical Survey, *Regional Studies*, Vol.37, No.3, pp.289-302.
- Nelson R.R., (1991), Why do Firms Differ, and How does it Matter? *Strategic Management Journal*, Vol.12, pp.61-74
- Nelson R.R., (1995), Recent Evolutionary Theorizing about Economic Change, *Journal of Economic Literature*, Vol.33, pp.48-90.
- Nelson R.R., and Winter S.G., (1982), *An Evolutionary Theory of Economic Change*. Cambridge, MA: Harvard University Press.
- Pavitt K., (1984), Sectoral Patterns of Technical Change: Towards a Taxonomy and a Theory, *Research Policy*, 13, pp.343-373
- Porter M.E. and Stern S., (2001), Innovation: Location Matters, *Sloan Management Review*, Vol.42, No.4, pp.28-36.
- Porter M.E., (1990), *The Competitive Advantage of Nations*, New York: Free Press.
- Pouder R. and St. John C.H., (1996), Hot Spots and Blind Spots: Geographical Clusters of Firms and Innovation, *Academy of Management Review* Vol.21, No.4, pp.1192-1225.
- Prahalad and Bettis, 1986
- Rumelt R.P., (1984), Toward a Strategic Theory of the Firm, in Lamb R.B., (ed.), *Competitive Strategic Management*, Prentice-Hall, Englewood Cliffs, NJ., pp.556-570
- Rumelt R.P., (1987), Theory, Strategy and Entrepreneurship, in Teece D., (ed.), *The Competitive Challenge*, Ballinger, Cambridge, MA., pp.137-158
- Saxenian A., (1994), *Culture and competition in Silicon Valley and Route 128*, Cambridge, MA: Harvard University Press.
- Scott A.J., (1989), *New Industrial Spaces: Flexible Production Organization and Regional Development in North America and Western Europe*, London: Pion.
- Scott A.J., (1992), The Roekpke Lecture in Economic Geography: The Collective Order of Flexible Production Agglomerations: Lessons for Local Economic Development Policy and Strategic Choice, *Economic Geography*, Vol.68, No.3, pp.219-233
- SEPE, (2004), *The Greek ICT Sector-Outlook for Growth*, *SEPE News*, English Edition, Athens.
- Spender J.C., (1989), *Industry Recipes: The Nature and Source of Managerial Judgements*, Blackwell, Oxford, UK.
- Suchman M.C., (1995), Managing Legitimacy: Strategic and Institutional Approaches, *Academy of Management Review*, Vol.20, pp.571-610
- Tushman M.L., and Romanelli E., (1985), Organizational Evolution: A Metamorphosis Model of Convergence and Reorientation, in Cummings L.L. and Staw B.M., (eds.), *Research in Organizational Behavior*, Vol. 7: 171-222. Greenwich, CT: JAI Press.
- Van de Ven A.H. and Garud H., (1989), A Framework For Understanding The Emergence of New Industries, in Rosenbloom H.S. and Burgelman H. (eds.), *Research on Technological Innovation Management And Policy*, Vol.4, pp.195-225. Greenwich, CT: JAI Press.
- Van de Ven A.H. and Poole M., (1995), Explaining Development and Change in Organizations. *Academy of Management Review*, Vol.20, pp.510-540.
- Van de Ven A.H., (2005), Running in Packs to Develop Knowledge-Intensive Technologies, *MIS Quarterly*, Vol.29, No.2, pp.365-378
- Wernerfelt B., (1984), The Resource-based View of the Firm, *Strategic Management Journal*, Vol.5, pp.171-180
- Woolthuis R.K., Lankhuizen M. and Gilsing V., (2005), A System Failure Framework for Innovation Policy Design, *Technovation*, Vol.25, pp.609-619