Entrepreneurship, Innovation and Regional Development: A Southern European Perspective

George Petrakos, Pantoleon Skayannis, Apostolos Papadoulis, and George Anastasiou

1 Introduction

Knowledge, innovation and entrepreneurship are considered to be of utmost importance for regional growth, employment and social cohesion in the EU (Asheim et al. 2006). Most regions are meant to adjust their development policies or design new ones in order to incorporate the basic guidelines of the European Lisbon Strategy. The critical question arising is whether the institutional environment and the characteristics of the productive base in the European periphery of the South are suitable for the effective implementation of such policies.

This paper examines the potential of structurally weak regions in the southern European periphery to take advantage of the new policy environment, based on knowledge and innovation, in order to grow and converge. The analysis is based on the examination of the policy context for R&D and innovation in Greece, both at a national and regional level, using as a reference example the region of Thessaly.

It mainly focuses on the key characteristics of the manufacturing industry productive environment in the region of Thessaly, in Greece where a business survey was conducted. Thessaly is by and large a traditional agricultural economy having lately developed the tertiary sector (esp. in tourism and administration). Nevertheless, it always used to have a certain level of manufacturing industry production (initially linked to the primary sector) which over the last years has shown a decreasing trend. Hence, the necessity to secure the level of manufacturing industry was made obvious. In contemporary world, this inevitably had to follow the path of innovation and entrepreneurship. The Lisbon strategy, aiming to activate

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innovative policy selections seems from a first glance to be a useful strategy for manufacturing industry in regions such as Thessaly.

In this sense, the survey inquired into the patterns of change in the innovative activity of manufacturing industry firms. It focused on the role of both the internal and the external environment, specialisation, human resources and inter-firm relations. It also focused on the ability of firms to innovate and compete in an increasingly open and demanding environment.

This survey, focusing on endogenous entrepreneurial activity does not deal with Multi National Corporations which in any case are not very much present in Thessalian manufacturing industry. In any case, the recent economic crisis has revealed that activating endogenous capacity is a crucial development factor.

The paper is organised as follows: Sect. 2 presents a brief literature review on entrepreneurship, innovation and regional development. Section 3 analyses to experience of Greece, putting emphasis on the evolution and the structural characteristics of industry, the regional structure of the economy and the national and regional innovation systems. Section 4 focuses on the region of Thessaly and presents the main findings of the business survey. Finally, Sect. 5 reports the main findings and the conclusions of the paper.

2 Entrepreneurship, Innovation and Regional Development: A Review of the Literature

During the last few years, the regions have been the focus of attention for literature on innovation policy (Koschatzky 2006). Although in the works of Lundvall (1992) and Nelson (1993) about "National Innovation Systems (NIS)", the regional dimension was absent, this shortcoming was soon overcome, once the importance of spatial and relational proximity in innovation processes was recognised.

The regional dimension was explicitly considered later on, in the approaches of "Regional Innovation Systems (RIS)" (Cooke et al. 2004). The notion of RIS has emerged as a territorially focused perspective of analysis, derived from the broader concept of NIS (Iammarino 2005). Whilst not denying that the national (as well as the international) dimension are important, it assigns to the national level the subsidiary role of assisting the regions to overcome their deficiencies. Innovation and technological progress are the result of a series of complex relationships that exist between private enterprises, universities and public research institutes and the people within them. There are knowledge flows among these actors through channels of interaction, diffusion and personnel mobility (OECD 1997). The European Commission (CEC 2007a), seems to adopt the notion that innovation is most effectively addressed at the regional level, as physical proximity fosters partnerships between actors in both the public and private sectors. The formation of regional clusters is often the key to the successful promotion of research, technological development and innovation. The capacity of regional decision

makers and entrepreneurs to turn knowledge, skills and competencies into sustainable competitive advantage is crucial to regions' economic performance.

However, European regions vary considerably in their capacity to absorb and develop knowledge and technology. This impedes their growth prospects and is likely to reinforce the considerable disparities in prosperity across the EU. As Fritsch and Stephan (2005) point out, innovation processes are not spread evenly across space. In the EU context, regional differences exist, regarding the amount and share of innovation between the core regions and those located in the periphery. Overall, peripherality, apart from the geographical distance, can be attributed to rather weak financial capabilities of firms and their dependence on important knowledge sources from outside the region, through non-localized forms of interaction (Lagendijk and Lorentzen 2007). The main problems peripheral regions face, especially those of the European South, are polarisation, insufficient infrastructure, inadequate human and social capital, a low level of R&D and innovation due to a predominance of SMEs in traditional industries, weakly-developed firm clusters, few knowledge providers and a weak endowment of innovation support institutions.

The low level of R&D does not only hamper the internal innovation activity in the region, it also leads to a low absorption capacity on the part of the regional firms. As a consequence, interregional knowledge spillovers as well as public innovation funds cannot be absorbed to a sufficient extent in such regions (Tödtling and Trippl 2005). This is also referred as the "Regional Innovation Paradox".[1] Furthermore, a supply-oriented approach in technology transfer can often be found, which reaches larger firms better than the smaller ones. The demand of SMEs is often not well met and interactive learning is rarely achieved (Asheim and Isaksen 2003). Iammarino (2005) adds that the need for technology in lagging regions is "satisfied mainly by mere adaptation of imported innovation". Additionally they have limited or no capacity to recombine and integrate old and new pieces of knowledge. Another condition that may explain why an RIS does not develop easily in peripheral regions is the absence of innovation and cluster dynamics, because there is neither a critical mass of actors nor the support infrastructure necessary for the emergence of technological innovation (Doloreux and Dionne 2008). The role of historical evolution is also important because it often acts as a filter for assessing new growth opportunities and policy options (Iammarino 2005; Asheim et al. 2006). This applies especially in the Southern European productive system, which is a distinct model of growth based on traditional economic activities throughout the post-war period, small family-owned firms and substantial informal economic activity (Zambarloukou 2007).

According to Tödtling and Trippl (2005), the main policy agenda for peripheral regions is the strengthening and upgrading of the regional economy, giving

[1]The regional innovation paradox refers to the apparent contradiction between the comparatively greater need to spend on innovation in lagging regions and their relatively lower capacity to absorb public funds earmarked for the promotion of innovation and to invest in innovation related activities compared to more advanced regions (Oughton et al. 2002).

priority to organisational and technological "catching-up learning", targeting firms (especially SMEs) and their innovation weaknesses, attracting new firms to the region and strengthening potential clusters. This should be accompanied by behavioural changes, improving the attitude of firms towards innovation and cooperation (Asheim et al. 2006). Of equal importance is the linking of firms to knowledge sources inside and outside the region, encouraging collaboration with the research base and enabling them to benefit from major technological developments, and R&D cost sharing (Garcia-Aracil and Fernandez De Lucio 2008). Uyarra (2007) argues that instead of the prevalent attitude to favour high-tech industries, increased attention should also be given to the "traditional sectors". Hospers (2005) finally adds that when supporting traditional sectors does not seem a viable solution maybe a recombination of the "old" with the "new" could create a more appropriate direction for policies.

3 Innovation, Competitiveness and Development in the European South: The Case of Greece

The less advanced and peripheral EU countries and regions often have a limited ability to adjust to the conditions and demands of the newly emerging European economic space (Davis and Weinstein 1999; Overman et al. 2001). As a result, spatial imbalances continue to exist and in many cases they become wider (Brülhart et al. 2004; Petrakos et al. 2004; Petrakos 2008).

When Greece joined the EU, in 1981, it was the tenth and least-developed member of the Union. Membership was initially received as a shock by the unprepared to join a competitive market Greek economy. Indeed, membership was followed by a divergence of Greece from the EU average in terms of GDP per capita in the period 1981–1994 (Petrakos and Pitelis 2001). Although convergence resumed after 1995 and has continued uninterrupted until the present time, this should be conceived more as the outcome of European cohesion policies rather than the competitiveness of the economy in the integrated market. It should also be kept in mind that, despite convergence in terms of income, the country has maintained its structural deficiencies, especially the ones related to its industrial sector (Petrakos and Kallioras 2006; Petrakos et al. 2008).

3.1 The Industrial Structure of Greece

The evolution and structure of Greek industry is characterised by a number of deficiencies and shortcomings that do not encourage innovative activity. The first one is related to the size of the industrial sector, which, as a share of GDP, is the smallest in the EU-15, and has been continuously declining. In 2005, the share of industry as part of the GDP in Greece was 20.7%, while the share of manufacturing

was 9.5%. Over half of the industrial activity in Greece is accounted for by construction. These figures are well below those for the EU-15 as a whole (26.5 and 18.1%, respectively) and indicate limited competitiveness in the integrated EU market (World Bank 2008).

The second unfavourable characteristic of Greek industry is structural in nature and is related to its sectoral composition. Actually, one of the factors behind the weak performance of industry is considered to be its sectoral orientation, which is characterised by the dominance of labour-intensive or low-tech sectors and the limited presence of capital-intensive or high-tech sectors[2,3] in employment terms (Table 1). Note that almost half (48%) of Greek industrial employment in the year 2005 was in low-tech sectors (see footnote 3), while the high-tech sectors account for a very low share (14%). This structure differs significantly from the structure of EU industry as a whole, and remained virtually unchanged throughout the 1995–2005 period. The strong presence of low-tech sectors is an indication that Greek manufacturing industry is traditionally dependent on domestic demand, while the limited presence of capital-intensive sectors is a long-term structural weakness that does not allow for significant innovative activity to take place (Petrakos et al. 2008).

The third unfavourable characteristic of the Greek manufacturing industry is also structural and it is related to the size of firms. As Table 2 shows, the average Greek industrial firm is very small compared to the average size of EU-27 countries. With five employees on average, Greek firms have little room to benefit from internal economies of scale or to develop R&D activities.

Overall, Greek manufacturing industry is relatively small in size and declining over time, concentrated in low-tech sectors and small firms. These characteristics are partly the outcome of historical processes and the geographic coordinates of the country, and partly the outcome of the recent integration experience of the European South (Petrakos et al. 2008). They are at variance with the characteristics of the average EU industry and do not seem to encourage innovation and entrepreneurship.

Table 1 Sectoral composition of industrial employment of the EU-15 and Greece, 1995 and 2005

	EU-15		Greece	
	1995	2005	1995	2005
Low-tech sectors	23	25	48	45
Resource or scale intensive sectors	43	43	39	41
High-tech sectors	34	32	14	14
Total	100	100	100	100

Source: Authors' estimation from Eurostat (2008b)

[2]According to Eurostat (2008a), "high-technology or 'high-tech' sectors are key drivers of economic growth, productivity and social protection, and are generally a source of high value added and well-paid employment".

[3]High Tech and Low Tech sector definitions according to NACE Rev 1.1 and NACE Rev 2. Available at: http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/Annexes/htec_esms_an2.pdf and http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/Annexes/htec_esms_an3.pdf

3.2 The Regional Structure of Greece

The structural difficulties faced by the Greek economy are even greater in most regions outside Attiki (the Athens region). Greece has traditionally been a polarised economy where a significant share of population and activities are concentrated primarily in the metropolitan region of Attiki. As Table 3 shows, Athens has a concentration of nearly 40% of the population and 50% of the GDP of the country. It is also by far the most advanced region of Greece, with a GDP per capita higher that the EU-27 average and more than double the level of the least advanced Greek region. Athens contains nearly 50% of the industrial activity of the country, the majority of academic and research institutes and the great majority of the most advanced human resources. Thessaloniki, the second major urban agglomeration

Table 2 The average size of industrial enterprises in the EU-27 countries, 2003

Countries		Countries	
Ireland	64	Finland	16
Slovakia	60	Belgium	16
Luxembourg	38	France	15
Germany	35	Netherlands	15
Romania	34	Sweden	13
Lithuania	29	Spain	11
Latvia	27	Portugal	11
Estonia	26	Hungary	8
UK	21	Poland	7
Bulgaria	20	Italy	7
Austria	20	Czech	7
Denmark	20	Greece	5
		Slovenia	4

Source: UNIDO (2007)

Table 3 The regional structure of the Greek economy at the NUTS II level in 2005

	Population		GDP		GDP/cap
	Share	Change (%) 1981–2005	Share	Change (%) 1981–2005	EU-27 = 100
Attiki	35.85	17.92	48.84	126	109
Kentriki Makedonia	17.25	19.25	13.95	48	65
Thessaly	6.66	6.03	5.09	24	61
Dytiki Ellada	6.61	11.76	4.05	12	49
A. Makedonia, Thraki	5.48	5.67	3.60	17	53
Kriti	5.43	19.73	4.62	75	68
Peloponnisos	5.40	3.66	4.71	24	70
Sterea Ellada	5.04	3.81	5.34	23	85
Ipeiros	3.08	5.33	2.20	42	57
Notio Aigaio	2.74	29.80	2.68	98	78
Dytiki Makedonia	2.66	1.88	2.12	29	64
Ionia Nisia	1.99	20.67	1.55	58	62
Voreio Aigaio	1.83	3.79	1.25	48	55
Greece	100	13.78	100	69	80

Source: ESYE (2008) and Eurostat (2008b)

is behind Athens in most indices but still ahead of the rest of the country. It is estimated that nearly 71% of university graduates holding a Ph.D. degree live in Athens and Thessaloniki (GSRT 2008).

With the exception of the Kentriki Makedonia Region (Thessaloniki), that has a critical scale of population and activities, most other Greek regions are sparsely populated with small urban centres unable to generate significant agglomeration economies and act as poles of attraction. Some island regions are relatively advanced by national standards (Kriti, Notio Aigaio), but their economies (especially of the smaller islands) are solely based on tourism. Most other regions have weak economic bases, depend on traditional agriculture, the public sector, or traditional industry and face serious difficulties in modernising their economies. In addition, the latest evidence seems to indicate that since the mid-1990s, regional inequalities have been increasing in Greece (Petrakos and Psycharis 2004).

Overall, the concentration of activities, uneven development levels, weak human resources and the lack of support mechanisms do not encourage the development of innovative activities outside the major metropolitan areas.

3.3 The National and Regional Innovation System

The structure of the Greek innovation system is highly centralised, dominated by the predominant role of the national government, and following the structure of the political system that has been much the same since the establishment of the modern Greek state (Andreou 2006). Greece looked to external influence in the development of its innovation system (Collins and Pontikakis 2006), following a "top-down" approach (Prastacos et al. 2003). However, despite the increased awareness of the importance of innovation policies, the national system remains structurally immature and dependant on EU funding.

According to Skayannis (2002), the weakness of a production structure means (a) less information- and knowledge-intensive industries, (b) branches remotely relevant to high technology, (c) industries in declining branches (d) weaknesses in taking advantage of comparative advantages, (e) weak development of human capital, (f) low technical and social infrastructure endowment, and (g) weak or non-existent financial mechanisms. In addition, institutional lagging behind is very important. This leads less developed regions, among them Greek regions, to an innovation capacity handicap and to weak regional innovation systems.

The performance of Greece is systematically and considerably below the EU average regarding research and innovation, as demonstrated by the main benchmarking indices. In the European Innovation Scoreboard, 2006b, (SII index), Greece occupies the last position among the EU-25 countries (Fig. 1).

The share of the Greek Community Support Framework (2000–2006) that was spent on innovation measures was very low and corresponded to 2.3% of the total funding (EC 2006a, b, c). The low spending on R&D was also evident in recent Eurostat data. In 2006, Greece spent only 0.57% of its GDP on R&D, translating

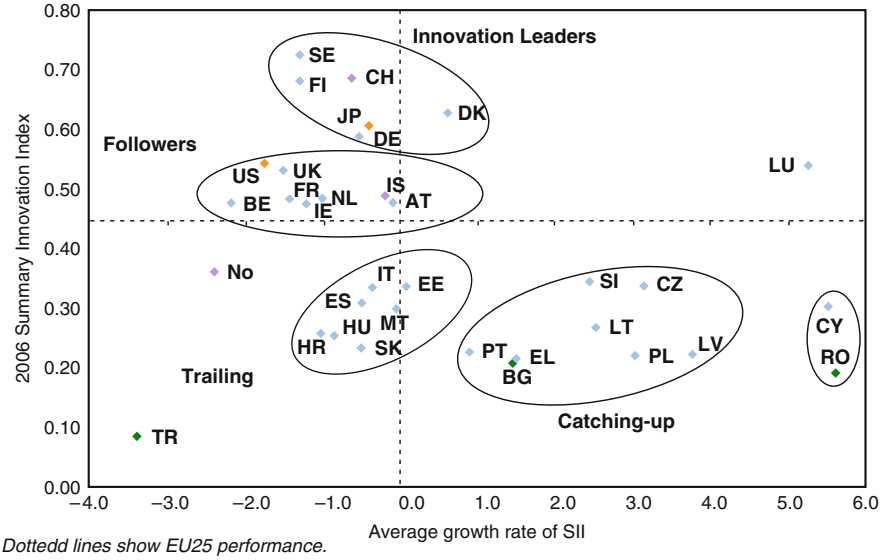

Fig. 1 Summary innovation index of the EU-25 countries, 2006 (*Source*: EC 2006b)

as less than 1/3 of the respective figure for the EU-27 (1.84%), placing them in 21st place (Eurostat 2008c).

Skayannis (1990) has shown that Greece after World War II was rehabilitated and developed under an infrastructure (primarily of the public sector) biased regime of accumulation that practically put manufacturing industry at a second place. Similarly, Collins and Pontikakis (2006) argue that Greece made an early choice favouring public investment in infrastructure in order to reduce regional disparities and enhance growth and competitiveness. Innovation was mostly considered as a risky, high-tech based activity and not a profitable venture.

This mentality has affected spending on education, basic research and life-long learning. The Greek figure on spending per student in higher education is 4,605 euros compared to an average of 5,627 euros in the EU-27 and 6,203 euros in the EU-15 (Eurostat 2008b). The latter ranks Greece in the last place among EU-15 countries on all counts. It seems that education was perceived mostly as welfare expenditure, not as a rewarding investment in human capital with social as well as private returns (Collins and Pontikakis 2006). Indicative of this mentality is the fact that no formal mechanisms have been established for linking tertiary education to industrial needs.

Low levels of innovation and research activities are also explained by the low participation (less than 30%) of the private sector in the Gross Expenditure on Research and Development (GERD) (EC 2006c). Large domestic enterprises that are mainly in low-tech and traditional sectors, have not been at the forefront of investment in new technologies, whereas the fledgling knowledge-based companies

in sectors such as health care, software, and communications are typically too small to make a difference in terms of overall R&D investment (Sofouli and Vonortas 2006). Hatzikian (2007) indicates that research activity gives support to the assimilation and the adaptation of existing technology and not to the creation of new knowledge.

At the national, but also the regional level, the deficiency of the innovation governance system is considered to be a serious problem, affecting the quality and effectiveness of innovation policies. According to Andreou (2006), the present spatial setting is characterised by vagueness, uncertainty and asymmetry in the allocation of roles and responsibilities among the administrative levels and the various stakeholders that eventually maintain the centralised character of the system. Instead of empowering local actors and encouraging region-based approaches to economic problems, innovation policy and funds remain under the control of central government. This centralised, complicated and highly bureaucratic administration system reached its limits in the former programming period, increasing delays and difficulties in the implementation of the EU programmes (EC 2006c).

At regional level, the innovation systems are found to be in an embryonic state, especially regarding the elements of production and exploitation of knowledge. The regional innovation base is highly polarised and characterised by serious and increasing disparities in the innovation indices and the R&D infrastructure. Universities, Research Institutions and research employment are concentrated in the metropolitan areas (Alexiadis and Tsagdis 2006; GSRT 2007). In the European Regional Innovation Scoreboard 2006 (RRSII index), the Greek regions account for the last positions. The only notable exception is that of Athens, which has an RRSII index that is close to the EU average.

Table 4 provides a summary account of the performance of the 13 NUTS II regions in the RRSII index in the 2002–2006 period. Attiki (the region of Athens) has the highest score in the innovation index, with a value 53% higher than the national average and 10% lower than the EU-25 average. Second is the region of Kentriki Makedonia (the region of Thessaloniki), with an RRSII value equal to 91% of the national and 53% of the European score. In the next three positions are found regions that combine a relatively large (by Greek standards) peripheral city (Patras, Iraklio, Ioannina) and a relatively old and established university. These three regions (Dytiki Ellada, Kriti, and Ipeiros) maintain an RRSII value that is close to 80% of the national and 45% of the EU-25 score. Then, the RRSII index drops significantly as we move to regions that are either agricultural or peripheral, lack major urban centres, have relatively new universities or lack industrial activities and have an economy which specialises in tourism. In this group of regions, the RRSII index drops to values lower than 50% of the national and 30% of the EU-25 average figures. As can be seen, in the tourist island regions of Notio Aigaio and Ionia Nisia, innovative activity is either very low or completely absent. Overall, innovative activity in the Greek regions is very low by European standards and it is primarily concentrated in the metropolitan region of Athens, which is also the industrial, academic and administrative centre of the country.

Table 4 Revealed Regional Summary Innovation Index (RRSII) in the Greek regions, 2002–2006

Region	Average 2002–2006	GR = 100	EU-25 = 100
Attiki	0.46	153.72	89.70
Kentriki Makedonia	0.27	91.60	53.42
Dytiki Ellada	0.24	78.48	45.81
Kriti	0.23	78.15	45.61
Ipeiros	0.23	76.44	44.55
An.Makedonia-Thraki	0.14	46.67	27.27
Thessaly	0.14	45.12	26.26
Sterea Ellada	0.13	44.07	25.68
Peloponnisos	0.10	31.75	18.49
Dytiki Makedonia	0.08	26.76	15.58
Voreio Aigaio	0.06	21.45	12.50
Notio Aigaio	0.01	1.70	0.99
Ionia Nisia	–	–	–
Greece	0.30	100.00	58.35
EU-25	0.51	171.57	100.00

Source: Authors' estimation from 2006 ERIS (Hollanders 2007)

As argued in this section, the main innovation policy deficiencies found at national level are present and more prominent at regional level. Regional administrations exhibit the same vague attitude towards innovation and the allocation of funds. Despite rhetoric, innovation and knowledge development are not considered a priority and as a result they receive a low share of the Regional Operational Programmes' budget (EC 2006c). The funds allocated to R&D activities in the 2000–2006 period range from 4.4 to 0.7% of the regional budgets. This low budget is often the outcome of pressure from regional lobbies or constituencies, in favour of more tangible projects such as transport or environmental infrastructure. In addition to limited budgets, most regions are also characterised by low operational capacity at the administrative level for R&D and innovation programmes.

In addition to limited demand for R&D, many Greek regions are also faced with a limited supply. This is due to the spatially concentrated character of the research base of the country. More than 70% of research activity in Greece takes place in universities, with the rest taking place in independent research centres or institutes. The great majority of both universities and centres are located in the two metropolitan areas of the country (Athens and Thessaloniki). In most other regions the research base is usually new or very thin.

This is part of the reason why Skayannis (2003, 2005) challenges the Greek infrastructure biased development trajectory stating that innovation and entrepreneurship, especially in the technology sectors (whereby R&D is crucial), should take the lead. Drawing from the Technology Foresight exercise in Greece, he predicts that the prevalent scenarios are not that encouraging for the country and its regions if a major policy change does not happen.

4 Entrepreneurship and Innovation in the Region of Thessaly: A Survey

4.1 The Economic and Innovative Characteristics of Thessaly

Thessaly is a region in central Greece accounting for 6.7% of the population (0.7 million) and 5.1% of the GDP of Greece. Its GDP per capita is below the national average and was equal to 61% of the EU-27 in PPS in 2005. Both population and GDP increased at a slower rate than the national average in the 1981–2005 period (Table 3). Compared to the national average, the region has a higher share of GDP and employment in agriculture (13.7%) and a lower share in services (4.3%) (AllMedia 2007).

The research base of the region primarily consists of the University of Thessaly, the Technological Institute of Larissa and some smaller Institutes. Funded research takes place primarily at the University of Thessaly, which was established in 1988 and currently provides 16 undergraduate and 22 graduate programmes, with 6,500 undergraduate and 1,200 graduate students. The university hosts a tenured or tenure-track faculty of 360 members and a similar number of adjunct or visiting teaching stuff. Like most universities in Greece, the University of Thessaly suffers from serious underfunding in personnel, academic staff and infrastructure. Despite that, it shows a relative dynamism in published academic research and has improved its performance in competitive project funding. Based on Thomson Scientific data, Bontozoglou (2008) has estimated that in 2007 the faculty of the University of Thessaly published nearly 400 papers in refereed journals and had its work cited in nearly 2,400 papers. Also, according to the official report of the University of Thessaly Research Committee, the research budget of the University for the period 2005–2007 exceeded €40 million. Although significant progress has been made in basic and applied research, the interaction of the academic staff with the local economy is still limited.

4.2 The Aim and Methodology of the Survey

In order to examine the innovative characteristics of enterprises in the region, their responses to change and the appropriate policy mix, an industrial business survey was conducted in 2008 by the Regional Innovation Pole of Thessaly (RIP Thessaly 2008). The survey involved 115 industrial firms that responded to a detailed questionnaire of 50 questions divided into six groups. The firms that participated in the survey were not selected randomly from the industrial base of the region. Given that the average industrial firm size in Thessaly is about five employees per firm, it was not meaningful to analyse the behaviour of the representative firm, because this would be too small to be significantly concerned with R&D and innovation. As a result, the firms selected in the survey were in the upper part of the regional

distribution, that is, the largest and more established industrial firms in Thessaly. The 115 firms of the survey are very important for the regional industrial base, as they have a total employment size that is equal to 12% (7,326 employees) of the total industrial employment in Thessaly. In terms of employment number, Eurostat and the CIS use a classification of micro-enterprises (<10), small enterprises (10–49), medium-sized (50–250), and large enterprises (>250). However, in the case of Thessaly, these classes would not facilitate useful results, as the (comparatively) very large number of micro firms would not let us draw conclusions for the relatively larger ones for which innovation and the inquiries of this research are more meaningful. It was therefore decided to use a different classification dividing the sample into three size classes (1–20, 21–50, 50+) based on employment (Table 5) in order to detect differences in the performance and behaviour of firms. This classification model, using the terms "small", "medium" and "large" is based on the Greek experience and was derived form the need to differentiate firms so that meaningful results can be yielded. The primary concern in this classification is employment and not its concurrence with economic performance of firms that would lead to a more complex index and to less "legible" results.

As shown in the Table 5, there are significant differences among the three groups. Taking employment as a measure, small firms have an average size of 14 employees, medium-sized firms have an average size of 35 employees and large firms have an average size of 166 employees. Differences are also found in the performance of the three groups. As Fig. 2 shows, average labour productivity

Table 5 Average sales, assets, employment and investment of the sample firms by size group

2008	Total sample	(1–20) 32.7% of total	(21–50) 37.5% of total	(>50) 29.8% of total
Sales (m)	12.8	1.0	5.2	39.1
Assets (m)	17.3	1.8	5.7	51.9
Employees	65	14	35	166
Investment (m)	0.7	0.3	0.2	2.0

Source: RIP Thessaly (2008)

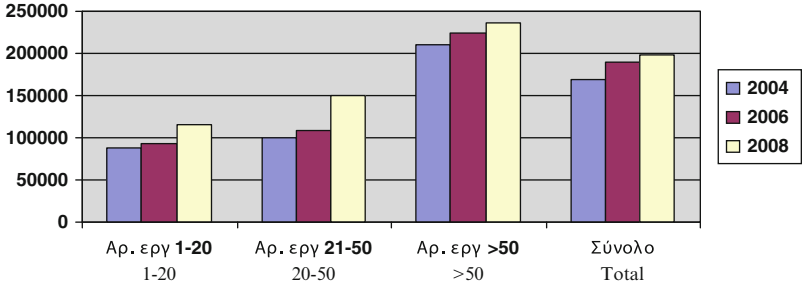

Fig. 2 Labour productivity by size group (current prices) (*Source*: RIP Thessaly 2008)

increases with size, as large firms appear with an average productivity that is twice the level of the small firms.

The analysis below focuses on a selected number of questions, which are important for the aim of this paper. More specifically, the next sections use the results of the survey to analyse the perception of the firms regarding the locational advantages of Thessaly, their competitiveness, their cooperation practices, their R&D and innovative activities, as well as the demand for entrepreneurial development and innovation policies.

4.3 The Locational Advantages of Firms

The location of firms affects their competitiveness through a series of advantages and disadvantages accruing from the characteristics of the host region. In this respect, Table 6 shows the perception of the firms in relation to the strong and weak points of Thessaly as an industrial location.

It indicates that larger firms tend to have a more favourable view of their location than the small ones. It is impressive that this sequence is found in all criteria. In general, however, industrial firms in Thessaly are not satisfied with their location and they give a modest-low overall score (6.65). It seems that the main advantage of the region is its geographic position in the middle of the country (scoring 7.83) and its potential access to national markets. The firms seem to be seriously concerned about the quality of the infrastructure and human resources in the region and the level of financial support for investment. The lowest score is given to business support services that are still in their embryonic stages in the region.

Table 6 The attractiveness of Thessaly for entrepreneurial activity

	Grading in the scale 0–10			
	Total sample	Small firms with 1–20 employees	Medium firms with 21–50 employees	Large firms with more than 50 employees
Geographic position	7.83	7.23	7.87	8.25
Financial services	6.96	6.50	6.71	7.50
Quality of human resources (knowledge, specialisation, experience)	6.34	5.81	6.51	6.65
Transport infrastructure (all modes)	6.28	6.11	6.33	6.32
Level of investment incentives	6.16	5.86	6.03	6.53
Entrepreneurial infrastructure (Industrial areas, technology park)	6.03	5.78	5.68	6.66
Availability of providers and sufficiency of raw material	5.94	5.75	5.83	6.10
Entrepreneurial services (consultancies, marketing, etc.)	5.81	5.44	5.68	6.13
Total grading of Thessaly's attractiveness	6.65	6.29	6.68	6.90

Source: RIP Thessaly (2008)

Table 6 reveals the fundamental problems of peripheral regions that affect negatively entrepreneurship and development. Scores near the middle of the scale suggest a marginally sustainable environment where basic conditions with respect to infrastructure, human resources and support mechanisms are not met. Although large firms seem to be better prepared to deal with these conditions, this is not so with smaller firms. Given that the sample is selected among regional leaders, one can imagine what the opinion of the representative firm in Thessaly with less than five employees would be.

4.4 Markets, Geography and Competitiveness

Table 7 depicts one of the major problems of Greek industry, which is the low level of exporting activity. Overall, 80% of total sales are directed to the regional or the national market and only 11% is exported to the EU. The 28-year long process of integration has not helped Greek firms to expand their market to other EU countries. Moreover, the Thessalian firms have very limited access to the Balkan markets, which are nearby and have lower standards than the advanced European ones. These figures reveal the introvert character and the low level of international competitiveness of the firms. As with the previous Table, size matters. Larger firms seem to be more open, more competitive and less dependent on local demand. On the other hand, the smaller ones depend, almost entirely, on regional and national demand.

4.5 Interactions and Networking in the Local Productive Base

The literature indicates that in regional productive bases dominated by small firms, a successful growth strategy is to develop inter-firm relations and networks at the regional level that will generate external economies of scale and increase the efficiency of the firms. The next two tables provide information for the relations that the firms in Thessaly have developed with each other and the research and support base of the region.

Table 7 The geographical distribution of sales

	Average sales by destination (%)			
	All firms	Small firms	Medium firms	Large firms
Sales to Thessaly	31.08	39.23	30.93	18.31
Sales to rest of Greece	49.38	51.13	51.95	45.47
Sales to the Balkans	3.43	3.26	2.56	4.94
Sales to rest of Europe	11.55	4.87	11.00	21.31
Sales to rest of the world	4.50	1.51	3.56	9.94
Total sales	100.00	100.00	100.00	100.00

Source: RIP Thessaly (2008)

Table 8 depicts the attitude of firms towards cooperation in a number of fields, including production, promotion, design, distribution, supplies, etc., with competing firms (co-operation in competition) or with up-stream and down-stream firms. The first column indicates that the majority of the firms consider that there is no room for cooperation in most fields. This is a shocking position, if one considers the small size of the firms and the multiple problems that reduce their competitiveness. The only areas in which the majority of the firms expect benefits from cooperation are the areas of joint research for new product development and acquisition of know-how.

Despite this negative overall attitude, there is a significant minority of firms that expects benefits from cooperation. On average 9–19% of firms are in favour of cooperation with local competitors, while a smaller group (3–13%) is in favour of cooperation with local upstream and downstream firms. A similar proportion of firms would favour cooperation with firms in other regions, either competing (5–17%), or in related business (4–16%). Cooperation with local competitors is more popular in the fields of product promotion (19.0%), distribution (16.2%) and supplies (14.3%), while cooperation with distant competitors is more popular in the fields of know-how acquisition (17.9%) and production (15.8%).

In general, the spirit of cooperation among the industrial firms in Thessaly is low. The majority of the firms are introvert in character and reluctant to adopt cooperation practices. The analysis by size shows that small firms are less willing to cooperate than large firms (RIP Thessaly 2008). The extent to which this "atomistic turn" to entrepreneurship is the outcome of institutional, cultural, social or other

Table 8 Co-operation between firms in the same or in related activities

Field of co-operation	No (%)	Yes, with competing firms		Yes, with firms related with forward and backward linkages	
		Yes with local firms (%)	Yes, but not with local firms (%)	Yes with local firms %	Yes, but not with local firms %
Co-operation in production	51.8	12.3	15.8	9.6	10.5
Co-operation in promotion	53.3	19.0	8.6	12.4	6.7
Co-operation in product design	57.4	12.0	9.3	9.3	12.0
Co-operation in product distribution	64.8	16.2	4.8	9.5	4.8
Co-operation in supplies	61.1	14.3	9.5	10.5	8.6
Joint research for the development of new products	46.4	13.6	12.7	13.6	13.6
Common use or common purchasing of equipment	79.0	9.5	4.8	2.9	3.8
Co-operation in know-how acquisition	42.5	14.2	17.9	9.4	16.0

Source: RIP Thessaly (2008)

factors is a critical question[4] that needs to be addressed by industrial organisation and perhaps sociological studies. It is interesting to observe that the minority of the firms that are willing to engage in cooperation prefer, on average, to cooperate with competitors rather than upstream or downstream related business. They also have a slight preference for cooperating with local rather than distant partners. These two elements may be an encouraging starting point for the (careful) design of cluster policies in peripheral regions.

The firms in our selected sample were also asked to indicate whether or not they cooperate with the science base of Thessaly, the regional and local administration and the business support organisations. Table 9 reports their responses. In general, cooperation does not seem to be a priority for most firms. At the top of the cooperation list are the local Chambers of Industry and the Regional Industrial Association, with 61 and 53% of the respondents. This is expected, yet is surprisingly low, given that firms are members of these institutional bodies.

Administrative bodies, like the Region of Thessaly, a public business support organisation, the Prefectures and the local Development Agencies come next with shares in the range of 32–45% of the respondents. About 1/3 of the firms declare that they have some sort of cooperation with the University of Thessaly, about 1/4 with the Technical Institute and 1/5 with the Research Centres of the Region. Keeping in mind that the firms in the sample are local leaders and that some of them participate in the Regional Innovation Pole of Thessaly project (RIP Thessaly 2008), the share of firms cooperating with the research and support base of the region is very low.

Table 9 Cooperation of firms with the science and business support base

			If no, intention to co-operate in the future	
	Yes	No	Yes	No
Chambers of industry	60.95	39.05	21.90	6.67
Regional industrial association	53.77	46.23	27.36	8.49
Region of Thessaly	45.19	54.81	26.92	15.38
Centre for entrepreneurship and technology development	36.89	63.11	36.89	11.65
Prefecture	36.54	63.46	31.73	16.35
Development agencies	32.32	67.68	41.41	11.11
Universities	32.08	67.92	35.85	13.21
Centre for professional training	29.81	70.19	33.65	23.08
Technological educational institute	23.81	76.19	48.57	14.29
Research centres	22.00	78.00	50.00	13.00
Municipal enterprises	21.78	78.22	32.67	25.74
Technical chamber of Greece	15.15	84.85	42.42	22.22
Social enterprises	6.32	93.68	33.68	37.89

Source: RIP Thessaly (2008)

[4]The reader should be warned that these are self-reporting answers, so the smaller firms may be biased towards non-cooperation. This is because their conception of clustering makes them perceive it rather as a threat than as an opportunity.

Despite the low shares of cooperation, Table 9 has a positive message for the future. As can be seen in the last two columns, the majority of the firms that have not yet cooperated with the regional research base and support mechanisms are willing to do so in the future. About 35% (50%) of the firms declare that they would like to cooperate in the future with the University (the Research Centres) of the region. Clearly, the firms understand that there are unexplored opportunities associated with their practice and are willing to change.

4.6 R&D and Innovation in the Local Industrial Base

Given the low levels of cooperation with each other and the research and business support base of the region, a critical question is: To what extent are industrial firms internally active in R&D and innovative activities which would allow them to improve their competitiveness? Tables 10 and 11 provide information for the R&D activity and the changes in processes and products initiated by the firms in our sample.

Table 10 indicates that firms which occupy personnel in R&D activity on a steady basis represent a small percentage of the total (24%). Small firms have a lower share (13%) and large firms a higher one (40%). Despite the obvious lack of permanent R&D functions (or because of it), a significant share of firms has a part-time or sporadic engagement, indicating that many firms do actually realise the importance of R&D functions and innovation for their performance. Although the sectoral specialisation of local industry certainly affects the reported figures, we can claim that in general R&D activity is low, even among the leading firms of our sample. Formal R&D activity is mainly concentrated in the larger firms, while the smaller ones are characterised by non-systematic patterns of engagement.

During the last 2 years, the firms in our sample have undertaken some changes in a number of aspects of their activity in order to improve their competitiveness. As Table 11 shows, these changes are modest overall and are characterised by significant variation among different areas of entrepreneurial activity. The most significant major changes (35% of firms) are in equipment, presumably because of the investment subsidies provided. Also, a significant share of the firms have

Table 10 Department or personnel engaged in research activity (R&D activities)

	All firms	Small firms	Medium firms	Large firms
Yes	23.89	13.51	19.51	40.63
No, but some personnel are engaged part time	16.81	21.62	12.20	15.63
No, but some personnel are engaged occasionally, if required	27.43	29.73	29.27	25.00
Nobody	20.35	16.22	26.83	15.63
Nobody in-house, but we cooperate with external laboratories	11.50	18.92	12.20	3.13
Total	100.00	100.00	100.00	100.00

Source: RIP Thessaly (2008)

Table 11 Changes during the last 2 years

	Major changes	Minor changes	No changes
Production equipment	35.85	36.79	27.36
Quality control	26.17	37.38	36.45
Design of product	25.71	41.90	32.38
Range of products	24.77	48.62	26.61
Hygiene and security policy	21.90	38.10	40.00
Packaging	20.19	28.85	50.96
Kind of products	19.09	38.18	42.73
Marketing	11.11	30.30	58.59
Administration	10.68	33.01	56.31
Advertisement	10.20	23.47	66.33
Export policy	9.71	28.16	62.14
Distribution	7.92	14.85	77.23
Stock management	7.14	30.61	62.24
Personnel training	6.80	40.78	52.43
Finance	5.94	19.80	74.26
Supplies policy	5.77	47.12	47.12
Relations with workforce	4.95	30.69	64.36

Source: RIP Thessaly (2008)

introduced major changes in quality control and hygiene policy (a requirement of the law), in product design and in the introduction of new products. Very few firms have introduced major changes in marketing, administration, export policy, personnel training or labour force relations. The great majority of firms that introduced major changes report that these changes have had a positive impact in their business. Also, large firms tend to introduce major changes more often than small ones, although the firms that resist changes the most are those of a medium size (RIP Thessaly 2008).

A significant share of firms, ranging from 30 to 50% of our sample, has introduced minor changes in the areas of entrepreneurial activity of Table 11 during the last 2 years. These changes mostly took place in the domain of production rather that in the softer domains which are, however, the faster changing markets.

Despite significant positive signs of change, it should not escape our attention that in our selected sample of firms comprising many regional leaders, the majority of them have not undertaken any change in most domains. For example, despite their limited competitiveness and poor export performance, the industrial firms of Thessaly have not introduced any change at all in the domains of marketing (58%), administration (56%), advertisement (66%) and exports policy (62%). Overall, in nine out of seventeen domains of entrepreneurial activity, the majority of firms have made no changes during the last 2 years.

4.7 Innovation Policies

The last question of the survey asks the firms of the sample to make their suggestions for an effective innovation policy in Thessaly from a list of available measures. Their answers are reported in Table 12. The three most popular policy

Table 12 Suggested innovation policies in Thessaly

	All firms	Small firms	Medium firms	Large firms
Provision of useful information	63.48	66.67	60.98	68.75
Cooperation with the Research base of the Region (UTH, TEI, and RCs)	59.13	66.67	51.22	65.63
Investment subsidies that support clusters	56.52	56.41	48.78	59.38
Best practice transfers from abroad	47.83	53.85	46.34	50.00
Subsidies for innovative activity	46.09	48.72	43.90	50.00
Consultancy services	45.22	35.90	41.46	46.88
Tax incentives that support clusters	44.35	46.15	43.90	50.00
Establishment of an Institute of Entrepreneurship and Innovation in Thessaly	39.13	35.90	41.46	34.38
Forum of knowledge exchange and knowledge diffusion	38.26	33.33	39.02	34.38
Possibility for cooperation with market leaders	22.61	28.21	21.95	25.00
Brainstorming with specialists	21.74	28.21	14.63	18.75
Issuing of a certificate for innovative enterprises	19.13	25.64	12.20	18.75

Source: RIP Thessaly (2008)

measures supported by the majority of the firms are: the provision of useful information (63%), cooperation with universities and research centres (59%) and investment incentives for clusters (56%). Clearly, this table indicates that the firms recognise their weaknesses, which are limited specific knowledge, lack of cooperation with the research base of the region and lack of inter-firm cooperation, and they request regionally based policies that will deal with these factors.

Other policies with significant support from the firms include best practices transfer from abroad (47%), subsidies for innovative activities (46%), better local support mechanisms (45%) and the provision of tax incentives for the development of clusters (44%). It is interesting that all classes of firms rank the requested policies with the same order, regardless of size.

5 Conclusions and Policy Implications

Since the launch of the "Lisbon Strategy" in the year 2000, and especially after the reform of the policy agenda in 2005, boosting regional innovation capacity has been given top priority in National Reform Programmes and the new Cohesion policy (CEC 2007b). However, most of the Southern European regions score below average in the Regional Innovation Scoreboard (Hollanders 2007; CEC 2007b) and still have limited innovative activity. This has raised questions about the ability of the Lisbon strategy to be implemented in all regions, the effectiveness of the funds and the ability of policies to generate convergence among the EU regions (Esposti and Bussoletti 2008). In this respect, studies analysing the innovation environment in Southern Europe can make important contributions towards the alignment of innovation policies.

The findings of this paper suggest that there are a series of conditions that affect the innovative performance of peripheral regions and do not allow them to effectively converge with their more advanced counterparts on the innovation scoreboard.

Firstly, the characteristics of the Greek productive base indicate that many peripheral countries and regions maintain a weak industrial base dominated by traditional, labour- or resource-intensive sectors and small-in-size firms. These two conditions unfortunately imply low levels of entrepreneurial R&D activity. Secondly, the national and regional innovation systems are characterised by low levels of public spending for R&D and a highly centralised and bureaucratic innovation system that further reduces the effectiveness of limited funds. Thirdly, the analysis of entrepreneurial behaviour has revealed low levels of cooperation between firms and low levels of cooperation with the (often promising) research base.

In general, the survey in Thessaly indicates that there are multiple financial, structural, institutional and cultural constraints that generate an unfavourable environment for innovation policies in lagging regions. As a result, the implementation of the Lisbon Strategy in the European regions cannot follow a more or less uniform pattern, but it will be characterised by a great variety in means and results.

Despite difficulties and multiple barriers, there is room for policies that will improve the innovative capacity and performance in lagging regions. First of all, the Greek experience shows that some countries and regions need to re-organise and decentralise their innovation systems, giving more power to regional stakeholders, and to drastically reduce bureaucracy. Nevertheless the decentralisation processes should be exercised with caution, since regions are competing with each other and the fight for resources might lead to sub-optimization from a national perspective.

Secondly, they have to significantly increase R&D funding to levels that overtime come to approach the EU-average figures. Given the budget difficulties that many less advanced countries and regions face, this is a more difficult step. National governments and regional administrations have to convince their constituencies that R&D funding and innovation policies are not a luxury, but a necessary ingredient of a successful growth strategy.

Thirdly, the analysis of entrepreneurial behaviour in Thessaly shows that industrial firms have serious difficulties in cooperating, either because they are competing with each other, or because they think they have deviant interests, or because of cultural reasons. Given the small size of these firms, this practice needs to change where possible, in the spirit of "cooperation in competition". Targeted policies, carefully structured investment incentives, tax breaks and campaigns will be required in order to challenge this deeply embedded entrepreneurial culture of autarky. In this sense, firms, especially the small ones, need incentives and guidance to cooperate, finding common grounds of mutual interest. In the absence of internal economies of scale, they need to seek benefits from external economies of scale in order to improve their collective efficiency. They also need to improve their cooperation with their regional research base, as a potential source of solutions for a wide range of technical or operational problems.

The analysis suggests that a number of characteristics of the productive base and the prevailing institutional environment in lagging regions often require tailor-made policies of innovation. At the same time, it is a tempting "learning from others" practice to look at "success stories" in advanced regions and try to draw

policy-related lessons. This exercise needs some caution. Policy makers in less developed regions need to critically assess the EU experience and resist calls to unconditionally adopt and implement policies successfully applied in advanced regions, as those regions have a totally different productive, structural, technological and institutional environment. They are faced with the difficult task of distinguishing truly "successful policies" from policies in "successful regions".

The innovation strategies of the less advanced regions need to be utilising the ingredients of their productive base. To the extent that they have a sectoral focus, this should include traditional or new sectors that have an important participation in local employment. Competing with leading European regions in high-tech sectors that are not available locally may be a strategy of high risk and a possible waste of limited resources. Innovation policies need to provide solutions to pressing problems of the productive base and do not always need to have a high-tech character. Dynamic new sectors in the European South, such as services and tourism can benefit from innovative actions that are not high-tech solutions, but organisational advances that improve efficiency and competitiveness.

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