RIS3 Assessment: Central Macedonia

A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus

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Contents

Figures

1. Executive summary: Overall conclusions and recommendations

Smart specialisation priorities and the innovation system

Central Macedonia has struggled to fulfil its potential to develop a more knowledge intensive business structure and to profit from it's position as a 'business and cultural' cross-roads in south-east Europe. Central Macedonia has been hard hit by the economic crisis with already below average GDP and above average unemployment being further worsened by a surge in unemployment since 2008. This weak performance is due largely to the slow pace of restructuring from low to medium technology intensive towards higher-tech manufacturing. Although the regional economy is increasingly dominated by services the bulk of activity is in fields such as retail trade, tourism and transport services despite efforts to create or attract knowledge intensive services.

In terms of industrial specialisation, the manufacturing sector remains highly specialised in certain medium-to-low technology and labour-intensive sectors, such as the food industry, textiles & clothing, non-metallic mineral products and furniture, with lower productivity than the national average. However, there a number of new knowledge-intensive sectors like bio-agriculture, bio-medicine, and ICT that seem promising but still attract relatively limited investment. The region has certainly made efforts to support ICT based development, for instance through the Regional Innovation Pole.

The region has the best potential outside of Attiki to develop specialisation in more than one sector. The new programming period provides an opportunity to run and finance regionally more focused actions. However, this implies the development of stronger capacity to implement such policies and some hard choices in the short-term between various potential sub-sectors. It would be advisable to undertake a further study of specialisation potential, focusing notably on the needs for key enabling technologies to boost productivity and reduce the cost base of regional firms. A strong focus on eco-innovation would be relevant across both manufacturing, agricultural and service (green ICT and tourism) sectors. A specific regional programme could be considered with the aim to reduce energy and material use in businesses. Finally, the strong public sector base in the region could be the subject of specific innovation actions to improve efficiency through e-government, public-private partnerships for service delivery, etc.

Governance and stakeholder involvement

Central Macedonia has long experience in bottom-up innovation planning and stakeholder involvement, which started in 1994 with the Regional Technology Plan. A series of pilot projects were designed collaboratively and some of them scaled-up and funded by the Regional Operational Programme. The region concentrates a significant number of institutions and actors that can actively take part in the design and implementation of the smart specialisation strategy. We recommend the creation of a comprehensive decision and management structure for RIS3 and a 15-21 members Regional Innovation Council to steer the process of entrepreneurial discovery and the setting of priorities. Furthermore, to achieve synergies between policies and funding sources we suggest that RIS3 should prioritize systemic innovation and synergy between the public and private sector, PPPs as main implementation instrument of the Central Macedonia RIS3 and OP, and the selection of research and innovation projects on the basis of sustainable business models.

Innovation policy

The review of policy directions of ongoing and future research and innovation policies indicates that R&I policy is a permanent concern in the development programmes of C. Macedonia. Technology and innovation planning started in 1994 with the Regional Technology Plan and continued on with RIS+, Innovative Actions Programme, and the Regional Innovation Pole. However, a few actions of those programmes have been implemented, due to limited funds that were made available for R&I and the actual

centralization of R&I policy. Recently elaborated innovation strategy in Central Macedonia is "Thessaloniki Innovation Strategy", based on wide consultation and involvement of "3ple helix" stakeholders. We recommend that orientations, priorities, and projects of this strategy should be seriously considered for the RIS3 of C. Macedonia, mainly those focusing on the creation of institutions for innovation, innovation ecosystems, and open innovation platforms that support novel ventures.

Clusters policy

Our recommendations for the RIS3 setting are: (1) use recent cluster mapping data and techniques to identify regional competences and assets; (2) support and consult existing clusters to meet the objectives of smart specialisation; (3) replicate an effective industrial cluster development approach to facilitate the rapid spread of good practice and ideas; (4) seek and provide advice on what methodology to use to develop clusters, and consider the creation of a cluster secretariat; (5) strengthen the cooperation of existing clusters to make connections to local, national and global value chains; (6) facilitate cross-clustering and the identification of innovation opportunities at the interface between different clusters; (7) create specialised one-stop-shops for the regional specialisations and competences, preferably within existing structures to support mainly SMEs; (8) develop further, incubators and accelerators that provide wide range of services including training, business angel networks, etc, (9) ensure a qualitative upgrade of the tourism sector to develop the alternative types of tourism (eco-tourism). Specific funding measures and support should be developed aimed at tourism innovation and inter-linkages with other productive sectors (bio-agro-food, ICT, etc.); (10) seek to enhance the competitiveness of SMEs in the agricultural and fisheries sectors where aquaculture could be a key objective of the rural development policy; (11) deploy incentives for the fishing sector to restructure fishing organisations, producers' organisations and other stakeholders; (12) ensure that support in rural areas is directed to young people through support for business start-ups in the agro-food/forestry sector.

ICT policy, broadband, eServices

In addition to incorporating ICT as a core topic in the RIS3 strategy, the Region should strengthen support on ICT for the most crucial sectors of the regional economy i.e. agriculture, transportation, health services, manufacturing, tourism, food & beverages, and education. The Region should investigate viable policy tools to provide incentives for new IT-enhanced products and services from local enterprises, and also award funds for the fast transformation of traditional businesses using ICT tools.

Broadband expansion, gradually aiming at FttH, is a strategic step for improving the competitiveness of the whole economy and improving the quality of life. Education should be supported to both improve the average digital skills of the workforce and also direct the research community towards innovative products and services. ICT services can help transform Central Macedonia into a business-friendly region and an attractive hub for SE Europe. An emphasis should be given to the conditions for a substantial role for the private sector in assuming part of the risk of the planned ICT investments.

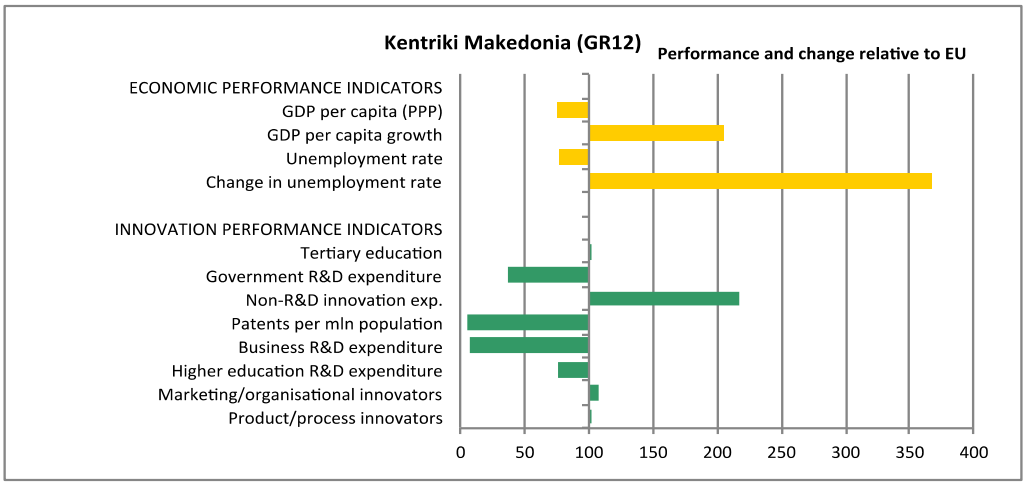
2. Regional Innovation Performance and potential

2.1 Regional profile and specialisation

Despite being the second largest Greek region (17% of the population in 2009[1]), Central Macedonia has struggled to fulfil its potential to develop a more knowledge intensive business structure and to profit from its position as a 'business and cultural' cross-roads in south-east Europe[2]. Indeed, after a first period of significant industrial decline in the 1990s, Central Macedonia has been hard hit by the economic crisis with already below average GDP and above average unemployment being further worsened by a surge in unemployment since 2008. Various reports and studies underline that this weak performance is due largely to the slow pace of restructuring from low to medium technology intensive towards higher-tech manufacturing (only 12% of firms are in the medium-high to high tech sectors). Equally, although the regional economy is increasingly dominated by services (accounting for 74.5% of the regional added value in 2009 while the contribution of the sector of industry and construction was of 21% and that of the agricultural sector of 4.5%, declining over the past decade (see detailed table in Appendix E)), the bulk of activity is in fields such as retail trade, tourism and transport services despite efforts to create or attract knowledge intensive services. As Georgiou et al (2012) note, "Thessaloniki appears to be a consumer rather than a producer of innovation'.

However, a number of other internal and external factors have also created a 'drag' on growth prospects, including competition from low labour cost neighbouring countries (Bulgaria) with Greek companies in textile, clothing and footwear sectors even shifting production to such countries, the sub-standard 'trans-Balkan' transport routes towards Austria and Hungary and delays in implementing major infrastructure projects (e.g. Thessaloniki metro).

Figure 1 Summary benchmark of regional innovation performance



Source: Regional Innovation Monitor, data used is 2011 or latest available year. Trend data is for the period since 2000.

The business specialisation pattern and industrial structure (dominance of smaller family run firms) is clearly a major explanatory factor for the, relatively, weak regional performance. In terms of innovation investments, public and higher education R&D expenditure are close to the national average, however, business R&D expenditure is low at only 0.2% of GDP or 25% of GERD. Slightly above Greek average, the share of Human Resources in Science and Technology (HRST) in the region increased from

[1] All data is sourced from Eurostat unless stated differently.

[2] Even after recent infrastructure upgrading such as the completion of the Egnatia road.

15% of the regional workforce (active population)[3] in 2000 to 23.7% in 2011, which represented 17.9% of the HRST in Greece.

The location of the Centre for Research & Technology Hellas (CERTH)[4] and several important universities, higher education institutes and (teaching) hospitals in the region clearly contributes to the relatively better position of public and higher education research performance. As Georgiou et al (2012) note, the region is faced by a paradox where despite an increasing concentration of research and innovation support activities, it continues to lag behind in terms of value added (productivity) and of structured links between research and entrepreneurs.

At the same time, as can be seen from the diagram above, there is a good level of non-R&D based innovation expenditure. Avranas & Nioras (2011) argue that this may reflect alternative strategies adopted by medium to low tech companies to confront competition, overcome the deficiencies of low skilled personnel and to circumvent their weakness/ inability to invest in R&D. However it also reflects the nature of the regional economy (heavily based on services, tourism, agro-food, etc.) with sectors that do not normally invest in technological R&D but innovate through design, organisational change and buying in of technologies and processes. Hence, there may be a 'hidden innovation' potential in the regional economy, although the crisis has probably weakened the capacity to invest.

In terms of scientific outputs, according to Thomson Reuters data[5], the Aristotle University of Thessaloniki ranked 2nd among Greek universities with 8,577 publications (21.1% of publications of Greek universities) over the period 2006-2010. With 32,469 citations over the same period, the university however achieved a rather low overall citation impact[6] of 0.81 (12th rank). The publications covered mainly the fields of natural sciences (52% of the publications, 53% of the citations, citation impact of 0.79), medical and health sciences (35% of the publications, 39% of the citations, citation impact of 0.75), engineering and technology (27% of publications, 24% of citations, citation impact of 0.87) and to a small extent agricultural sciences and social sciences. As regards the Technical Education Institute of Thessaloniki, it ranks 3rd among the Greek Technical Education Institutes (TEI) in terms of publications (331, ie. 14.6% of the total publications of the TEI) as well as in terms of citations (619) over the period 2006-2010. Its main field of science in order of number of publications are natural sciences (59% of publications) and engineering and technology (34%) followed by medical and health sciences and agricultural sciences. Noteworthy though is that the citation impacts of medical and health sciences and agricultural sciences are higher than for the two other main fields of scientific production.

This scientific specialisation is only partly reflected in the regional industrial specialisation. The analysis from the European Cluster Observatory of the relative regional industrial specialisation compared to other regions within Europe[7] shows that the region is indeed relatively specialised in the manufacture of other food products; other retail sale of new goods in specialized stores; maintenance and repair of motor vehicles and the manufacture of tobacco products. Nonetheless the region does not rank first in Europe for any of these industries. Similarly, Avranas & Nioras (2011) underline that the manufacturing sector remains highly specialised in certain medium-to-low technology and labour-intensive sectors, such as the food industry, textiles & clothing, non-metallic mineral products and furniture, with lower productivity than the national average. However, there a number of new knowledge-

[3] This indicator gives the percentage of the total labour force in the age group 15-74, that is classified as HRST, i.e. having either successfully completed an education at the third level or is employed in an occupation where such an education is normally required.

[4] http://www.certh.gr/root.en.aspx

[5] http://metrics.ekt.gr/en/report02/index

[6] The relative number of citations to publications of a university compared to the world average

[7] The minimum degree of specialisation is 1.5 (meaning that the region has 50% more employment in the industry than the size of the region), and the industry must have at least 500 employees in the region (in order to eliminate high specialisations in very narrow industries).

intensive sectors like bio-agriculture, bio-medicine, and ICT that seem promising but still attract relatively limited investment. The region has certainly made efforts to support ICT based development, for instance through the Regional Innovation Pole (see box below). This sector is also one where clustering activity appears to be strongest (see section 4.2).

Overall, the region has 'on paper' a potential to renew and reinvigorate the structure of its economy by focusing development around a number of existing strengths or potential emerging clusters. Avranas & Nioras (2011) point to three challenges/opportunites: to increase SMEs technology investments in agrobiotechnology and strong linkages vertically up the value chain and with public research organisations; 2) development of a globally competitive ICT sector 3) development of a dynamic and innovative health sector. Georgiou et al (2012) note broadly concur and identify seven areas for knowledge intensive growth: agriculture/nutrition; re-industrialization by boosting remaining manufacturing based on more knowledge-intensive industrial activity; both summer and winter tourism, ICT cluster; transport and logistics; education and health sectors.

Figure 2 : SWOT of regional innovation potential and specialisation

Strengths	Weaknesses
• Presence of certain sub-sectors industries with increased international competitiveness. • Significant mass of regionally based public and higher education research and technology organisations • Relatively unique, in Greece, private sector initiatives to develop 'innovation infrastructure' (incubators, clusters) • Pilot region at EU level with long-run history of planning and organising innovation policies, since 1994 Regional Technology Plan • Good degree of networking of regional institutions	• Research activity is concentrated in university laboratories, and it is fragmented among numerous small units without any specific clear industrial goal or connection • Innovation potential is highly concentrated spatially with a metropolitan, peri-urban and rural divide. • Limited self-financing capacity of regional SMEs for innovation activities • Fragmentation of innovation support activities and lack of co-ordination at regional and local levels
Opportunities	**Threats**
• Growing pressure to export may help to drive business innovation and an increased openness of the production system • Potential to promote Thessaloniki as an 'Open city' : Metropolitan character, connections with the Greek and Balkan hinterland and the Black Sea region, • Good potential for health and health service related innovation • Opportunities to develop a more vibrant creative industries sector building on base of specialised services, cultural, etc. resources • Potential to diversify tourism offer towards higher-value added and 365 days a year attractions	• Further erosion of employment in sectors based on low-wage competition • Bureaucratic nature public initiatives to support innovation and entrepreneurship. • Unclear and changing institutional framework (taxation, management of research results, etc.) • Significant reduction of financial capacity because of the economic crisis. • Brain drain

Recommendations

The Central Macedonian authorities and stakeholders have a significant history of strategy development and have already taken action to try to specialise the region (e.g. in ICT sectors, etc.). The region has probably the best potential outside of Attiki to develop a specialisation in more than one sector. The new programming period provides an opportunity to run and finance regionally more focused actions. However, this implies the development of stronger capacity to implement such policies and some hard choices in the short-term between various potential sub-sectors. It would be advisable to undertake a further study of specialisation potential, focusing notably on the needs for key enabling technologies to boost productivity and reduce the cost base of regional firms. A strong focus on eco-innovation would be relevant across both manufacturing, agricultural and service (green ICT and tourism) sectors. A specific regional programme could be considered with the aim to reduce energy and material

use in businesses. Finally, the strong public sector base in the region could be the subject of specific innovation actions to improve efficiency through e-government, public-private partnerships for service delivery, etc.

2.2 The strengths and weaknesses of the regional innovation system

After Attiki, the Central Macedonia region has clearly the richest 'innovation system' in Greece. **Error! Reference source not found.** in section 4.2 summarises the main players in the region. In overall terms, the innovation system is heavily dominated by the higher education sector. This dominance is due, notably, to the presence of the Aristotle University of Thessaloniki, the largest university in Greece; along with the Technological Educational Institutes of Thessaloniki and Serres, the University of Macedonia, the International Hellenic University and CERTH. Avranas & Nioras (2011) argue that these organisations "constitute a strong pole of education and knowledge production, but have limited links to the regional economy".

Figure 3: the Regional Innovation Pole of Central Macedonia

Under the OP Competitiveness, a number of regional innovation pole projects were selected after a competitive tender in 2007. Such poles provide a potential model for the future focusing of innovation policies in Greek regions. Compared to a wider regional innovation system, the pole concept is focused on a small number of sectors of industry or services, technologically focused on major importance technologies, with a clear cooperation of the organisations for research, technology transfer and entrepreneurship, which participate in the partnership of the pole.

The Regional Innovation Pole of Central Macedonia (RIPCM) is focus on a single technological area, namely Information and Communication Technologies (ICT). However, the focus on a single technological fields is complemented by an emphasis of the RIPCM placed on the innovative application of the ICTs in as many as possible manufacturing and services as possible. Given the option to focus on a group of ICT based industry and services sectors the activities concentrate on three main sectors: manufacture of radio, television, and communication equipment; telecommunications services; and Computer-based and other similar services.

The RICPM initiative led to the launch of technological platforms (where diverse stakeholders agree on a common vision for the development of technologies that concern them. Three technological platforms were chosen, in line with the priority areas of a technology foresight study for Central Macedonia', that was performed in the context of the ARISTIA Innovative Actions Programme (ERDF co-financed 2000-2006). These areas are: Broadband networks and Internet services; Digital systems and telecommunication systems and software technologies and knowledge software

Fourteen Research and technological development consortia were also chosen (the target was 19) in areas such as: Open platform for digital cities, broadband weather imaging service; development of position identification system and supply of telematic services and telematic system to manage dispatch calls for fleets of vehicles; Green house integrated management or electronic platform for quality and tractability in the dairy industry. The R&TD consortia were expected to concentrate on the development of innovative products in cutting edge technology sectors, but also in conventional sectors (e.g., food, chemicals, metal, plastics etc.) based on informatics technologies.

Source: Regional Innovation Pole of Central Macedonia, http://www.innopole.gr

In order to boost the share of higher-tech industry and knowledge-intensive service, a number of initiatives have been launched, including incubators such as THERMI A.E, which hosts over 31 high-technology firms, and the Thessaloniki Innovation Zone (TIZ). However, Avranas & Nioras (2011 note that the development of TIZ has stagnated due to the failure of the stakeholders (including public administration) to embrace the project, mobilise the necessary resources and create the necessary regulatory environment for the concept to become functional.

While trying to improve the effectiveness of such initiatives, there is a need to rebalance innovation support from new business creation to improving the innovation potential (absorption capacity) of the broader base of existing firms.

Recommendation

In general, the innovation system as currently structured is over complex, fragmented and almost certainly financially unsustainable. All recent reports on the region point to the lack of effectiveness of the innovation intermediaries and continuing weak links. The Commission should impose as a pre-condition for future financial support a significant rationalisation of the range and scale of organisations, notably in terms of intermediary structures. Ideally, this rationalisation should take place after an independent, external evaluation to ensure an objective assessment is made.

3. Stakeholder involvement and governance of research and innovation policies

3.1. Stakeholder involvement in strategy design and implementation

Central Macedonia has a long history in bottom-up and collaborative innovation policy planning with stakeholders involvement, starting in 1994 with the Regional Technology Plan (RTP). The RTP steering committee of this plan was composed of stakeholders from the private sector (FING, SEVE, KEPA, Food and Textile industries), academia (AUTH, Univ. of Macedonia, CERTH), and the public administration. The same stakeholders were involved in RIS+ (1999-2001), Excellence in Central Macedonia (2002-2003), and the Regional Innovation Pole of CM (2006-2009) through which a formal Regional Innovation Board was set. A series of pilot projects were designed and some of them scaled-up and funded by the Regional Operational Programme.

Despite this long-term experience and acquaintance of stakeholders with participatory programming, in the current programming period (2007-2013) regional innovation planning is centralised, designed and managed by the GSRT in Athens. Indeed, the regional authorities are not systematically informed about the projects implemented in the region through the national OP.

However, under the law 3852/2010 (Kallikratis reform), the Greek regions via elected regional councils have new responsibilities (for economic development, industry, energy, tourism, and productive restructuring) and will endorse the future 2014-20 period regional operational programmes. In addition, given that the preparation of a smart specialisation strategy is an 'ex-ante conditionality' under the new Cohesion Policy, the regions will need to design such a strategy prior to adopting a ROP.

Central Macedonia has a significant concentration of institutions and actors that could actively take part in the design and implementation of a smart specialisation strategy. This was evident at the RIS3 meeting organised by the Intermediate Managing Authority of the Region of Central Macedonia on 12 September 2012. 34 organisations were invited and about 60 representatives were present in this meeting. All participants expressed their strong interest, support, and intention to be involved in RIS3 participatory governance. The following decisions were taken:

- Coordination of the smart specialisation strategy with the overall planning of the 2014-20 and the design of the regional OP.
- Four out of 11 thematic axes (1, 2, 3, and 10) will be covered by the smart specialisation strategy.
- Creation of a Regional Innovation Council (15-20 persons) with the participation of regional stakeholders (quadruple helix) to act as a permanent steering committee of RIS3.
- Creation of five working groups on clusters, digital agenda, SMEs and agro-food, education, and entrepreneurial discovery.
- Creation of a Management Unit (five coordinators of working groups) that will work closely with the IMA programming team.
- Coordination of regional planning process with national milestones.

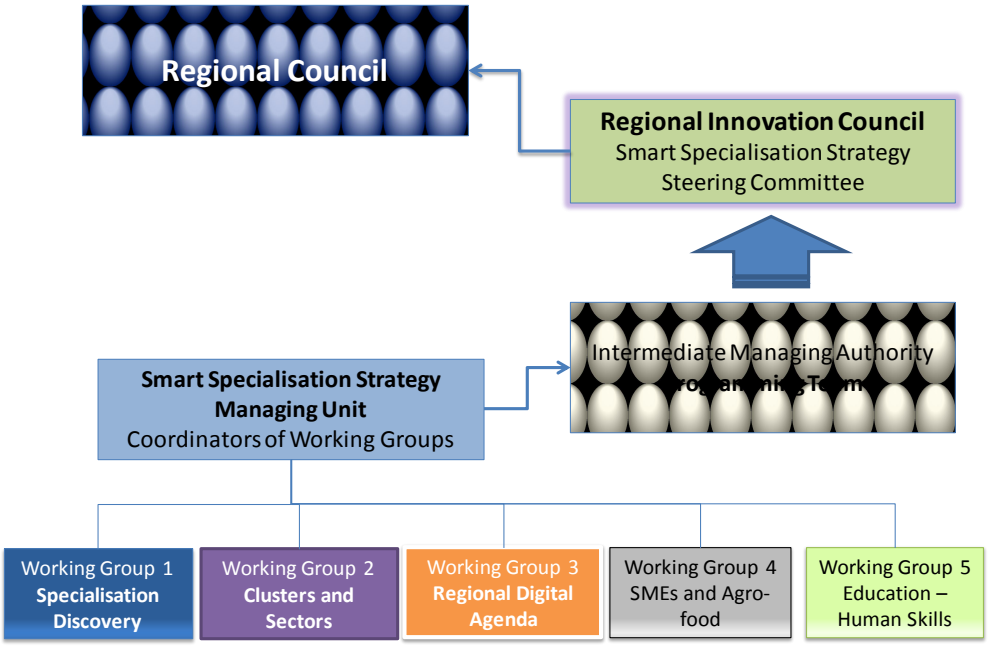
Moreover, the meeting participants underlined the need to take account of successful examples from other European regions and the importance of measuring the impact of previous policies which have been implemented in the region.

Finally, what is particularly important is the willingness to evaluate strategies with measurable outcomes in different stages of implementation, a fact that increases/elevates the responsibility of the stakeholders involved in strategy design. IMA is willing to set-up monitoring and evaluation on behalf of the Regional Council.

Recommendation

Given the above-mentioned planning framework, the stakeholders should collaborate closely in order to define clear strategic objectives for the region over the next programming period. If needed, technical assistance budgets should be used to mobilise experts that would support specific working groups of stakeholders. Rules, roles and responsibilities of collaborative governance should be clearly defined at the beginning of the process as a matter of urgency. It is proposed that the region should adopt the following planning structure.

Figure 4 RIS3 decision and management structure



Furthermore, the following stakeholders might form the Regional Innovation Council and RIS3 Steering Committee.

Composition of Regional Innovation Council (RIS3 Steering Committee)	
Private sector stakeholders (7-8 members)	• Association of Industries of Northern Greece • Association of ICT companies • Chambers of Commerce and Industry of C. Macedonia Prefectures • Successful large companies (Olympia Elect. Alumil, Mevgal, etc.)
Academia and Research (3-5 members)	• Aristotle University of Thessaloniki • University of Macedonia • CERTH • National Agricultural Research Institution • Educational Institute of Serres
Public administration (3-5 members)	• Regional Council of C. Macedonia • Intermediary Management Unit • Industry and Development Directions of CM • Regional Development Agencies of CM
Technology intermediary organisations (2-3 members)	• Thessaloniki Innovation Zone • Private sector incubators (Technopolis, i4G, Thermi)

3.2 Multi-level governance and synergies between policies and funds

RIS3 implementation should be based on all available funds (ERDF, ESF, EAFRD). Research funding from the Horizon Programme should also complement funding for research infrastructure that will be made available from the regional Operational Programme. However, most crucial is the use of public funding to mobilise private

investments, achieving a high leverage ratio. This implies a radical rejection of previous innovation schemes and initiatives that were focused on the creation of technology and innovation intermediaries from public sector organisations. This technology transfer driven policy has been proven of limited effectiveness and sustainability. Most innovation intermediaries (industrial change offices, university technology transfer offices, sectoral industrial companies, centres for technological development, etc.) have ceased operation after the public support period.

The issue of how the future RIS3 will foster synergies between different policies and strategies cannot be addressed definitively at the present stage. However, to maximise the chance of synergies between policies and funding sources we suggest the following:

Recommendation 1:

Promote a culture of **systemic innovation** and synergy between the public and private sector. Systemic innovation at the regional level may include: (1) a regional financial competence, both private and public, and financing institutions for innovation in the form of venture capital and business angels; (2) a cooperative culture, associative disposition, quest for consensus would be expected to be stronger in a regions displaying systemic innovation, whereas a competitive culture, individualism, 'not invented here' mentality would be typically non-systemic and weakly interactive; (3) trustful labour relations at the company level, shop floor cooperation, mentoring, open transactions and knowledge exchange; and (4) monitoring, consultation, delegation and networking propensities among policy makers.

Recommendation 2:

Promote Public-Private-Partnerships as central implementation instrument of the RIS3 and regional OP. PPPs should be understood in creative ways, as cooperation between public organisations and companies in which the public domain sets out the terms of collaboration and provides funding for framework conditions, while the private sector takes on management and assures long term operation of the initiative.

Recommendation 3:

Select innovation initiatives and projects on the basis of sustainable business models. Viability should be the most important factor for selecting innovation projects and soft research and innovation infrastructures.

3.3 Vision for the Region

For the 2014-2020programming period, the Greek regions were asked to draw up a development programme taking into account the strategic visions and goals of "Europe 2020", the National Reform Programme, and the Memoranda of Economic Policy (Mnimonia). Regions are invited to promote the knowledge society and upgrade their education system, improve their competitiveness by accelerating the integration the global economic environment, strengthen research, technological development and innovation, improve access and use of information and communication technologies, halt and then reverse the indicators of unemployment, develop the productive sectors, endogenous capacities for investment financing and attraction of foreign direct investment.

At the regional level, the Innovation Strategy of Thessaloniki 2012-2020, which is endorsed approved by a large number of stakeholders, may offer a basis for defining vision and objectives. Central Macedonia should aspire and promote an open and innovative region, characterised by:

- Excellence and extroversion: the pursuit of excellence and targeting exports of products and services are the cornerstones of any initiative and investment.
- Exploitation of comparative advantages though specialisation: moving from horizontal initiatives and investments towards initiatives and investments that support selected technologies and developmental options.

- Exploiting the capabilities of human resources and the high concentration of research and technology in academic and research centres.
- Open city: the Metropolitan character of the Thessaloniki as central regional hub, its connections with the Greek and Balkan hinterland and the Black Sea region, indicates the way for the opening of the city at all levels (cultural, business, social).

4. The regional innovation and smart specialisation strategy

4.1 Current priorities of the regional research and innovation policy

There is long tradition of innovation planning in C. Macedonia over the last 20 years, starting with the Regional Technology Plan in 1994. Available documents of regional research and innovation policy (2007-2013), and strategic orientations for the programming period 2014-2020 outline the landscape of R&I policy in the region.

Figure 5 : Current regional R&I priorities

Policy Documents	Priorities and objectives
Operational Programme 'Macedonia – Thrace' 2007-2013, Athens 2007. **Επιχειρησιακό Πρόγραμμα Μακεδονίας – Θράκης 2007-2013, Αθήνα 2007**	In the SWOT analysis two priorities related to innovation are identified: (1) the establishment of the region into a knowledge and technology hub within the SE Europe area, and (2) its continuous technological development in terms of digital means. The development vision for the region of Central Macedonia is encapsulated in the phrase: a 'Region of Innovation and Equitable, Sustainable Development, a Key Hub in South East Europe'. The innovation priorities included in the Priority Axis 4: "Digital Convergence and Entrepreneurship in the Central Macedonia Region" are related to: • (1) reinforcement of the business exporting activities, which lead to the production of innovative, sustainable and knowledge inclusive products and services of high added value • (2) development of a strategy for R&D towards the direction of facing challenges in seizing opportunities within the framework of knowledge economy • (3) the diffusion of ICT both in enterprises for the improvement of the productivity and people for the improvement of their quality of life Sectoral priorities include energy, tourism and ICT.

During the current period, approximately 19.4% (or €615m) of the regional operational programme funding is allocated to digital convergence and entrepreneurship in Central Macedonia. The objective was to strengthen entrepreneurship and promote environmentally friendly energy sources in an effort to produce high added-value products and services in sectors that integrate knowledge, innovation and environmental concern (notably in the health, education, trade, tourism sector as well as other activities in the tertiary sector). Funding should also boost the contribution made by ICT to the regional economy and inhabitants of the region. Details are not available on the specific nature of the projects, although given the volume it can be assumed that a significant share was for infrastructure (business parks, broadband, etc.).

According to data received from the GSRT on the regional allocation of funding for RTDI projects via the national OP, Central Macedonia has been awarded 306 projects out of 15550 for a total budget of €35,856,746[8]. Businesses accounted for 204 awards totalling €20,502,574; while research organisations were awarded 99 projects with a total budget of €13,396,038. However, no data is available on actual progress and budget consumption for these projects, nor on results.

[8] In comparison, Attiki region received €111,891,916 from 619 projects

Figure 6: Preparatory documents for the 2014-2020 programming period

Policy Documents	Priorities and objectives
1st Directive for Setting the Development Programme 2014-2020 **Υπουργείο Ανάπτυξης, Ανταγωνιστικότητας και Ναυτιλίας (2012) 1η Εγκύκλιος Σχεδιασμού και Κατάρτισης Αναπτυξιακού Προγραμματισμού 2014-2020**	• Reinforcement of the knowledge society and upgrading the education system, with emphasis on skills and lifelong learning, • Improving the competitiveness at all scales, national, regional, local • Strengthening research, technological development and innovation • Increase access and use of information and communication technologies, • Development of the productive sectors of the country, with emphasis on strengthening the competitiveness of SMEs, • Development of endogenous potential for investment financing and the wide attraction of foreign direct investment • Emphasis on spatial approach (place-based), community-led local development, integrated local development strategies.
Proposal of GSRT for Defining Directions of Development Strategy 2014-2020 **ΓΓΕΤ (2012) Πρόταση ΓΓΕΤ για τη Διαμόρφωση Κατευθύνσεων Αναπτυξιακής Στρατηγικής 2014-2020**	Five priorities and policy axis 2007-13; proposed also for 2014-2020 1. Research Excellence, focusing on support of human resources and research infrastructures 2. Connection of research and production, focusing on PPPs among academic and business organisations; strong incentives for spectacular turn of the private sector to research and innovation; support to dissemination and exploitation of Key Enabling Technologies; support to creation of innovative companies, competence centres and risk sharing financing 3. Outward looking and synergies to Horizon 2000 and international research organisations 4. EScience and society, dissemination of research results, research models for media, and business culture 5. Support to research of technological development and innovation policy
Innovation Strategy of Thessaloniki 2012-2020, Regional Development Agency Anatoliki 2012 **Στρατηγική Καινοτομίας για τη Θεσσαλονίκη 2012-2020, Αναπτυξιακή Εταιρεία Ανατολική 2012**	The "Thessaloniki Innovation Strategy" for the decade 2011-2020 was developed under Asviloc +, a SEE project by The Regional Development Agency Anatoliki and was endorsed by 40 organisations composing the Innovation Forum of Thessaloniki. Priorities focus on • Excellence and exports: the pursuit of excellence and targeting exports of products and services are the cornerstones of any initiative and investment. • Exploitation of comparative advantages (smart specialization): moving from horizontal initiatives and investments towards initiatives and investments that support selected developmental options. • Open city: the Metropolitan character of the city, its connections with the Greek and Balkan hinterland and the Black Sea region, indicates the way for the opening of the city at all levels (cultural, business, social) • Exploiting the capabilities of human resources and the high concentration of research and technology in academic and research centres. Proposed innovation actions include: • Innovation forum • Regional Innovation council • Regional network 'business angels' • Regional Innovation Development Fund • Mechanism of evaluation of the effectiveness of the innovation measures on innovation and local development • Targeted technological platforms • Networking universities and research institutes with the local businesses • Platform of start up companies • Platform for the promotion of innovative products in the international market • Training in managing innovation • Brand name 'Thessaloniki Innovation

The review of policy directions of ongoing and future research and innovation policies, which is partly summarised in Figure 5 indicates that:

- R&I policy is a permanent concern in the development of C. Macedonia. Technology and innovation planning started in 1994 with the Regional Technology Plan and went on with RIS+, Innovative Actions (Excellence in C. Macedonia), and the Regional Innovation Pole. Steering Committees and management structures created within the above initiatives were dissolved after the public support period.
- There is a successive effort for the enforcement of R&I in C. Macedonia and Thessaloniki, with relatively consistent priorities through the years. However, a few projects only have been implemented. This is due to two reasons: first regional operational programmes before 2006 had extremely small spending for R&D and innovation; second, during 2007-13 R&I policy was centralized and managed by the GSRT. Even the Thessaloniki Innovation Zone, a public organization created in 2007, received zero funding for innovation activities over this period.
- Private sector interest for R&D and innovation is high. The association of ICT companies created and funded the Technopolis Business Park dedicated to hosting innovative activities in the ICT and related sectors.
- All policy documents mention the critical mass of HEIs and research institutions in the area as comparative advantage. Despite measures targeting these institutions, linkages with enterprises have not been substantially improved.
- The internationalisation of the region is a permanent priority, however, there is a need to balance this with an increased resilience of the local system of innovation.

Recommendations

The "Innovation Strategy of Thessaloniki 2012-2020" is the most up-to-date innovation strategy in the region of Central Macedonia, and is based on a wide consultation with stakeholders and three innovation forums. The orientations, priorities, and projects suggested this strategy should be considered seriously for inclusion in the RIS3 of C. Macedonia, in particular:

Institutional setting for innovation

- *Permanent Innovation Forum:* establishment of a permanent forum for innovation will provide a solid basis for discussion, consultation, collective decision of the basic directions of innovation strategy and will collectively address regional problems of development and innovation in the region.
- *Regional Innovation Council with the participation of innovation stakeholders:* a key activity of the proposed Council will be to participate at a strategic level to the development of the regional programming for ERDF funds to be streamlined to RTD and Innovation.
- *Regional innovation funding:* creation of a regional seed capital fund to support spin-offs and innovative small businesses; other types of funding mechanisms can be created with the cooperation of regional authorities and entrepreneurship support institutions.
- *Measuring the impact of innovation on development:* measurement and evaluation of impact of innovation initiatives through periodic surveys and a set of innovation performance indicators.

Actions for creating ecosystems and open innovation platforms

- *Brand name: Thessaloniki Innovation:* Both the regional economic system and the central government share the vision to transform Thessaloniki to "City of Innovation" for the last 20 years.
- *Clusters of innovation:* Six potentially viable manufacturing clusters are proposed for further investigation: (1) food, (2) clothing and fashion, (3) chemical and energy, (4) building materials and household equipment, (5) metallurgy, metal products, machinery and equipment, (6) electronics, electrical appliances and ICT.

- *Targeted technology platforms:* collaborative approach at the regional level, which examines and suggests pathways for the development and implementation of selected technologies. Proposed technological platforms include (a) broadband networks, (b) energy, (c) materials, (d) food technology, and (e) logistics.
- *Networking of universities and research institutes with local businesses:* The need for bringing together supply and demand of research results and innovation in Thessaloniki has led to a re-assessment of interactions and links between the productive sector and academic/research institutions.
- *Platform for start-ups: creation of new knowledge-intensive firms:* A mechanism for transferring research results from academic research centres to the market by creating start-ups. The existing incubators, the Technology Park, the "open coffee" initiative and 'business angels' can be utilised for this purpose.
- *Promotion of innovation in global markets:* boost support for more complex forms of export cooperation and niche markets identification, notably for companies that are 'technology modifiers' and 'technology adopters', with some experience of new products development for international markets

Although the strategy sets out clear goals, there is a need for a more rigorous measurement and assessment mechanism. In particular, quantitative objectives have not yet been defined. During the 2007-14 period, the specific measures available to stimulate private R&D and innovation investments were managed centrally by the GSRT. Data provided by the GSRT, see Appendix D, suggests that Central Macedonian firms have received over €20m in grant funding for RTDI projects under the centrally managed OP Competitiveness. This is 15% of the total allocated to enterprises, which suggests that the region is under-performing given its weight in the national economy.

There have been no specific actions to support eco-innovation or the improvement of demand-side conditions and especially public procurement as a driver for innovation. These should be areas considered for regionally support initiatives during 2014-20.

4.2 Cluster policies

In Central Macedonia, the more traditional sectors (see Figure 7) are loosely connected to the regional innovation system and with a few exception there are no collaboration schemes or facilitators or associations active; in more high-tech sectors connections to the regional innovation system are improving.

Figure 7 : Cluster – Size, Specialisation and Focus in Central Macedonia

Size[9], Specialisation[10] and Focus[11] in Central Macedonia is mainly around *Farming and Animal Husbandry* with 3 stars in the Cluster Observatory star system, and *Agricultural Products, Tobacco and Apparel*, with 2 stars. *Processed Food* and

[9] The 'size' measure shows whether a cluster is in the top 10% of all clusters in Europe within the same cluster category in terms of the number of employees. If employment reaches a sufficient share of total European employment, it is more likely that meaningful economic effects of clusters will be present. Those in the top 10% receive one star.

[10] The 'specialisation' measure compares the proportion of employment in a cluster category in a region over the total employment in the same region, to the proportion of total European employment in that cluster category over total European employment. If a region is more specialised in a specific cluster category than the overall economy across all regions, this is likely to be an indication that the economic effects of the regional cluster have been strong enough to attract related economic activity from other regions to this location, and that spill-overs and linkages will be stronger. If a cluster category in a region has a specialisation quotient of 2 or more it receives a star. If a cluster category in a region has a specialisation quotient of 2 or more it receives a star.

[11] The 'focus' measure shows the extent to which the regional economy is focused upon the industries comprising the cluster category. This measure relates employment in the cluster to total employment in the region. If a cluster accounts for a larger share of a region's overall employment, it is more likely that spill-over effects and linkages will actually occur instead of being drowned in the economic interaction of other parts of the regional economy. The top 10% of clusters which account for the largest proportion of their region's total employment receive a star.

Construction are also sectors with significant activity and 1 star in the Cluster Observatory start system. The city of Thessaloniki, in contrast to the rest of the region, has some extraordinary characteristics and sectors of specialisation like Chemicals, Metal industry, Food & Beverage, Textile & Clothing and ICT.

Overall, **sector-specific support services/measures** have being only partially deployed in Central Macedonia, notably via the Regional Innovation Pole of Central Macedonia, and with limited impact. Policies and support for the formation of agglomerations, sectoral associations, etc, have not being implemented whatsoever in any sector including traditional.

Appendix C summarises the main organisations in the regional innovation sysrem. Entrepreneurial and Innovation Support Services (kind of **one-stop-shops**) have been developed through numerous projects. Despite the efforts of such intermediaries their effectiveness is questionable since structured collaboration between innovation actors remains limited. The four **incubators** have a reasonable critical mass of high-tech innovative firms. All of them operate in more than one sector and offer incubator and one-stop-shop services to start-ups, SMEs, investors and other actors. Funding for their development has being mainly designed and allocated centrally and not by the regional authorities. There are also three i**ndustrial areas**, a larger and three smaller industrial park; some have achieved good critical mass but are not sector specific.

In contrast to most other Greek Regions, several equity funders are operating Central Macedonia but they are mostly risk averse. Seed capital is almost inexistent and the venture capital focus is on later stages of business development. Banks mainly offer traditional loans but even those are now scarce due to the financial crisis. The commercial banks are limited to providing standard business traditional loans but access for these are now scarce due to the financial crisis.

A mature innovation **cluster** is present in Central Macedonia and two emerging clusters have being formed and are coordinated by three Cluster Facilitators/Initiatives (Corallia Clusters Initiative, Centre for Research and Technology Hellas, and Aristotle University of Thessaloniki respectively). Cluster policies have not being designed regionally and the establishment of regional clusters occurred via nationally designed programmes.

Figure 8: clusters in Central Macedonia

The mi-Cluster has 12 members concentrated in Central Macedonia: Olympia Electronics, Elvityl, Sboing, Brite, Ilpra, Novocaptis, Globetech, m.technology, whitetowermedia, AUTH/ELABPOL, AUTH/ELAB, AUTH/LTFN. More at **http://www.mi-cluster.gr**

Emerging Clusters: Chorus Cluster for Green Energy, Innovation Cluster for the Development of Organic Electronics Industry in Greece.

Other Proposed Clusters: ICT, Bio-agro-food, Building Materials and Household Equipment, Textile & Clothing, Chemicals, Metal Industry, Green Technologies.

The Nano/Microelectronics based Systems and Applications Cluster (mi-Cluster), is the first innovation cluster in Greece. Since its establishment in 2006, it demonstrates continuous growth. Today, the mi-Cluster consists of more than 130 members including innovative start-ups, small, medium and large companies, academic labs and research institutes, science parks, networks, associations, suppliers of services, financial institutions, media of different kinds, national ministries and regional agencies involved in industry, regional, science and technology development and policy. The Corallia Clusters Initiative as a coordinator in collaboration with GSRT, the Region of Central Macedonia and other organisations that enhance innovation, have been instrumental in the mi-Cluster's development.

Looking ahead, at the meeting organised on 12 September 2012, the IMA of Central Macedonia stated their intention to implement cluster policies and programmes for the sectors where a competitive advantage exists. It is proposed to support seven additional clusters based on various mappings that have been completed very recently.

Recommendations:

Our recommendations for the RIS3 are: (1) use recent cluster mapping data and techniques to identify regional competences and assets; (2) support and consult existing clusters to meet the objectives of smart specialisation; (3) replicate an effective industrial cluster development approach to facilitate the rapid spread of good practice and ideas; (4) seek and provide advice on what methodology to use to develop clusters, and consider the creation of a cluster secretariat; (5) strengthen the cooperation of existing clusters to make connections to local, national and global value chains; (6) facilitate cross-clustering and the identification of innovation opportunities at the interface between different clusters; (7) create specialised one-stop-shops for the regional specialisations and competences, preferably within existing structures to support mainly SMEs; (8) develop further, incubators and accelerators that provide wide range of services including training, business angel networks, etc, (9) ensure a qualitative upgrade of the tourism sector to develop the alternative types of tourism (eco-tourism). Specific funding measures and support should be developed aimed at tourism innovation and inter-linkages with other productive sectors (bio-agro-food, ICT, etc.); (10) seek to enhance the competitiveness of SMEs in the agricultural and fisheries sectors where aquaculture could be a key objective of the rural development policy; (11) deploy incentives for the fishing sector to restructure fishing organisations, producers' organisations and other stakeholders; (12) ensure that support in rural areas is directed to young people through support for business start-ups in the agro-food/forestry sector.

4.3 Digital economy and ICT policies

Indicators for education, productivity and specialisation are fairly low for the population of Central Macedonia as a whole, with the exception of the Prefecture of Thessaloniki. According to the "Internet Users in Greece" survey (March 2010)[12] of the Observatory for Digital Greece[13], the region is in fourth position for PC usage (42.4%), and in fifth position for the use of the Internet (41.3%). Moreover, it is encouraging that the use of the Internet over the period 2005-08 has almost doubled. At the household level, the percentage of home Internet connections is 36.8% (5th place).

The most notable ICT projects that have been implemented in the recent years were concerned with the deployment of metropolitan fibre access networks (MANs), the automation of the registry offices, the development of content for the disabled, the digitisation of cultural and historical monuments, and the networking of the higher education institutions and school units to the national research and education network and the Internet.

The region hosts a significant number of ICT companies, mainly focused on system integration and business software support. Although there are some pockets of innovation with significant potential, the overall ICT contribution to the economic activity of the region is still not satisfactory.

As noted above, the region hosts several universities and technological educational institutes, with a significant variety of ICT-related departments, most of which follow high-level standards in the education curriculum of young scientists and engineers. Moreover, the region is home to some notable public research institutes, with significant activities in EU-sponsored RTD projects. Their work, however, remains loosely connected with the other main production sectors (agriculture, tourism, food & beverages, transport & logistics, manufacturing, health & education).

The recent economic recession took a toll on ICT marketplace, forcing budget and job cuts and minimising R&D investments. On the other hand, the availability of talented ICT professionals is starting to attract some foreign ICT companies, who seek to take

[12] Ταυτότητα χρηστών internet στην Ελλάδα", Παρατηρητήριο για την ΚτΠ, Μάρτιος 2010. http://www.observatory.gr/files/meletes/A100526_%CE%A0%CF%81%CE%BF%CF%86%CE%AF%CE%BB%20%CF%87%CF%81%CE%B7%CF%83%CF%84%CF%8E%CE%BD%20internet%202010.pdf

[13] See: http://www.observatory.gr

advantage of the lower salaries prevalent in the region, via teleworking. This is a positive development, although we do not see significant synergies with the 'traditional' local industries.

According to the preliminary strategic directions of the Region[14], the following sectors are best suited to benefit from modern ICT tools and technologies:

Primary sector: it represents a significant portion of the regional economic activity, with remarkable growth potential if combined with modern ICT tools. Agriculture, fishing, aquaculture and mining enterprises are in urgent need to accommodate modern control, administration, monitoring, marketing, and logistics tools. Added value bio-agricultural and alternative agriculture producers can benefit from internet-based marketplace participation, to widen their distribution channels and optimise branding, procurement, packaging etc. Farmers and livestock unit owners could also be supported to optimise their production activity, by employing modern control and monitoring tools, especially in reducing the cost of energy by using alternative methods, like existing geothermal sources or biogas.

Transportation: the cost and time lost on transportation for citizens and enterprises is enormous. Modern smart transportation approaches, based on ICT, should be deployed, to minimise the cost of travelling, reduce the consumption of fossil fuels, and improve the efficiency of businesses.

Health: health services are beyond reach for several citizens, because of the rising costs and the limited capacity of the traditional public health system. This problem can be partially solved by using new cost-efficient telemedicine or home-care services. The Region should provide support to the private sector, to deploy affordable telemedicine or home-care platforms, for selected citizens. These services would be provided as public-private partnerships (PPPs), in cooperation with local state hospitals and health centres, under a proper sustainability model.

Manufacturing: this sector, suffering from reduced demand and low-cost imports, needs to be supported by ICT, in getting better automation, control and monitoring. Cost minimisation and quality assurance can help restrain job losses and bring about new investment.

Tourism: the Region hosts numerous world-renowned archaeological and religious sites, capable of attracting huge numbers of visitors. SMEs should be motivated to exploit modern technology and synergies to maximize the outreach of the Region, minimise management and advertising costs, and thus extend the tourist season and create more and better jobs.

Food & Beverages: SMEs in this sector can also improve their profit margins by better branding and advertising, using new-generation ERP and CRM tools, along with modern e-commerce and procurement platforms.

Education: the education system of the Region should be supported in a way to (a) improve the ICT skills level of the citizens and (b) enhance the ability of higher education institutions and research centres to carry out applied research for innovative products and services.

e-government and learning: the cost of dealing with the regional public services is significant for both citizens and regional and national government. Properly designed and interoperable e-government apps would be a major contribution towards efficiency and transparency. These services could be easily combined with proper initial training applications, to overcome the barriers for those with low IT skills.

Broadband Internet: the availability of affordable broadband connections for all the households is a major European target. The Region should complement all the related national- and EU-level actions, to further extend broadband in the Region. More

[14] Πρόταση Περιφέρειας Κεντρικής Μακεδονίας για τη διαμόρφωση των κατευθύνσεων εθνικής αναπτυξιακής στρατηγικής Προγραμματικής Περιόδου 2014-2020, Περιφέρεια Κεντρικής Μακεδονίας, Σεπτέμβριος 2012.

specifically, it should help making local Industrial Zones/Parks as "FttH-ready", i.e. bringing fibre to each hosted enterprise. The same can be done for selected neighbourhoods, by connecting the respective households with a passive "open-access" FttH local network. It is also crucial to facilitate additional actions like setting-up of public free-access hot-spots in public places, in ports, schools, sports/recreation areas, churches, etc.

Furthermore, the Region should seek to encourage a substantial private sector involvement in the full project cycle and risk sharing. This can be best carried out by flexible PPPs, or by ICT vouchers for selected households or SMEs. Regarding other specific RIS3 ICT-related requirements:

- There is currently no detailed regional ICT strategy per sector. In many cases, there may be a balanced allocation, in order to achieve better economies of scale.
- There is no master plan for e-government services. Most of them (cadastre, e-prescription, e-invoicing, etc) are administered by national authorities and, therefore, should be better addressed by a balanced allocation. Other possible e-services, like local taxation or regional permits, would be administered by the Region. All e-government services should adhere to well-defined interoperability standards, and be based on dependable cloud computing platforms[15].
- There is no reference to viable plans for the deployment of new, and the extension of next generation access networks.
- An operational inventory of ICT infrastructure should be created.
- Active involvement of the private sector in ICT activities has to be addressed by the Region, in a way to both leverage community funding and improve sustainability, especially for the delivery of products and services.

5. Monitoring and evaluation

Monitoring refers to the need of verifying the state of implementation of activities. Evaluation refers to assessing whether and how strategic goals are met. In order to perform evaluation, it is essential that objectives are clearly defined in a RIS3 in measurable terms. A central task during the design phase of the RIS3 is to identify a limited yet comprehensive set of output and results indicators and to establish target values for each of them.

The region of Central Macedonia has a much longer history than most Greek regions of analysing the potential of innovation and of monitoring innovation performance and programmes. A number of specialised consultancies and research teams (e.g. URENIO) are based in the region and the level of 'intelligence' on regional knowledge based development is good.

Recommendations – evaluation and monitoring

The past experience and capabilities for monitoring, evaluation and analysis of innovation programmes and performance should be further solidified and embedded in both the new regional government structures and the wider partnership. A specific budget line could be set aside for a partnership based regional innovation observatory that could fund studies and doctoral/post-graduate research into innovation practice in regional firms, etc.

Guidance on evaluation methodologies for innovation measures is already available for the 2014-20 period[16] and the IMA, regional authorities, etc. should make themselves aware of and use such materials to develop an evaluation plan. At a

[15] http://ec.europa.eu/information_society/activities/cloudcomputing/docs/com/com_cloud.pdf

[16] See: http://bit.ly/Igzx5T

minimum, one official should be specifically tasked with setting up an evaluation and monitoring system for innovation measures in the IMA.

Appendix A Participants of the RIS3 expert meeting

1. Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης
2. Πανεπιστήμιο Μακεδονίας
3. Διεθνές Πανεπιστήμιο της Ελλάδος
4. Εθνικό Κέντρο Έρευνας και Τεχνολογικής Ανάπτυξης (ΕΚΕΤΑ)
5. Αλεξάνδρεια Ζώνη Καινοτομίας Α.Ε.
6. Εθνικό Ίδρυμα Αγροτικής Έρευνας (ΕΘΙΑΓΕ)
7. Αλεξάνδρειο ΤΕΙ Θεσσαλονίκης
8. ΤΕΙ Σερρών
9. Τεχνικό Επιμελητήριο Ελλάδος / Τμήμα Κεντρικής Μακεδονίας
10. Οικονομικό Επιμελητήριο Θεσσαλονίκης
11. Γεωτεχνικό Επιμελητήριο Ελλάδος / Παράρτημα Κεντρικής Μακεδονίας
12. Εμπορικό και Βιομηχανικό Επιμελητήριο Θεσσαλονίκης
13. Επαγγελματικό Επιμελητήριο Θεσσαλονίκης
14. Βιοτεχνικό Επιμελητήριο Θεσσαλονίκης
15. Επιμελητήριο Ημαθίας
16. Επιμελητήριο Κιλκίς
17. Επιμελητήριο Πιερίας
18. Επιμελητήριο Πέλλας
19. Επιμελητήριο Σερρών
20. Επιμελητήριο Χαλκιδικής
21. Σύνδεσμος Βιομηχανιών Βορείου Ελλάδος
22. Σύνδεσμος Εξαγωγέων Βορείου Ελλάδος
23. Σύνδεσμος Επιχειρήσεων Πληροφορικής Βορείου Ελλάδος
24. Ένωση Ξενοδόχων Θεσσαλονίκης
25. Ένωση Ξενοδόχων Ημαθίας
26. Ένωση Ξενοδόχων Πιερίας
27. Ένωση Ξενοδόχων Χαλκιδικής
28. Κέντρο Επιχειρηματικής και Πολιτιστικής Ανάπτυξης (ΚΕΠΑ)
29. Θερμοκοιτίδα I4G Υπ' όψιν Εντεταλμένου Συμβούλου
30. TECHNOPOLIS – Thessaloniki ICT Business Center
31.THERMI A.E.
32. Εργαστήριο Λεπτών Υμενίων Νανοσυστημάτων και Νανομετρολογίας / ΤμήμαΦυσικής / Σχολή Θετικών Επιστημών / ΑΠΘ
33.CEDEFOP
34. Αμερικανική Γεωργική Σχολή

Appendix B List of key documents and reference materials

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Appendix C Key actors in the regional innovation system

Leading Businesses:

MLS, Raycap, Compucon, Olympia Electronics, Heliodomi, Porto Carras, Mevgal, Isomat, Kleemann, Pelopac, Dromeas, Agritex, Epsilon Net, Ioniki Sfoliata, Palaplast, Grecian Magnesite, SCA Packaging, Alumil, Titan, Hellenic Fabrics, Tsantalis, Kri-Kri, National Can Hellas, Karina, Mel, Hellenic Petroleum, Fibran, Agrino, etc and noteworthy spin-offs: Emisia. Tero, Exothermia, LIAISON Stem Cell Banking, Entranet, Brite, 3Π, Telelog, Veltio, and noteworthy Spin-offs: Pheron, etc.

Key Research Actors:

The research fabric is mainly composed of three public Universities (Aristotle University of Thessaloniki (campuses: Thessaloniki, Veria, Serres), International Hellenic University (campus: Thessaloniki), University of Macedonia (campuses: Thessaloniki, Edessa, Naoussa), two Technological Educational Institutes (Alexander Technological Educational Institute of Thessaloniki (campuses: Sindos, Katerini, Kilkis, Nea Moudania), Technological Educational Institute of Serres), two research centres (Centre for Research and Technology Hellas (CERTH), National Agricultural Research Foundation (NAGREF)) and the South-eastern Europe Telecommunications and Informatics Research Institute (INA), the American Farm School, the American College of Thessaloniki and the City College, etc.

Innovation Financing:

I4G, Thermi Ventures

Incubators, Industrial Areas/Zones

Alexandria Innovation Zone, Thessaloniki Technology Park, Technopolis Thessaloniki ICT Business Park, i4G Innovation for Growth Incubator, Thermi Business Incubator, Industrial Zones of Sindos, Kilkis, Serres, Kato Gefira, Koufalia, Zervochoria and Litochoro.

Principal Intermediaries:

Federation of Industries of Northern Greece (FING), Greek International Business Association (SEVE), Association of Information Technology Companies of Northern Greece (SEPVE), Technical Chamber of Commerce, Business and Cultural Development Centre (KEPA), Thessaloniki Chamber of Commerce and Industry, Chamber of Small and Medium Sized Industries of Thessaloniki, Thessaloniki Professional Chamber, Chamber of Serres, Center of Entrepreneurial and Technological Development of Central Macedonia, Investor Reception Centers of Thessaloniki, Serres, Kilkis, Halkidiki, Pella, Imathia, Pieria, Development Agency of Eastern Thessaloniki, etc.

Appendix D Regional RTDI funding under the OP Competitiveness and Innovation

Allocation by region of GSRT grants for RTDI projects (State Aid) under the OP Competitiveness and Innovation

Region	Enterprises	Research organisations	Other entities	Not assigned	Grand Total	% share
Attiki	€ 69,046,452	€ 32,813,955	€ 225,911	€ 9,805,598	€ 111,891,916	**47.4%**
Central Macedonia	€ 20,502,574	€ 13,396,039	€ 38,300	€ 1,919,833	€ 35,856,746	**15.2%**
Western Greece	€ 13,630,421	€ 8,492,421	€ 7,000	€ 9,600,195	€ 31,730,037	**13.4%**
Crete	€ 3,522,124	€ 13,122,614		€ 453,600	€ 17,098,338	**7.2%**
Sterea Ellada	€ 9,388,903	€ 1,397,119			€ 10,786,022	**4.6%**
East Macedonia & Thrace	€ 5,886,928	€ 1,864,884	€ 25,090		€ 7,776,902	**3.3%**
Thessaly	€ 4,648,471	€ 2,099,643	€ 253,000		€ 7,001,114	**3.0%**
Epirus	€ 2,403,100	€ 1,867,252			€ 4,270,352	**1.8%**
Peloponnese	€ 3,382,986	€ 545,200			€ 3,928,186	**1.7%**
Βορείου Αιγαίου	€ 1,813,280	€ 425,506			€ 2,238,786	**0.9%**
West Macedonia	€ 1,355,665	€ 524,695			€ 1,880,360	**0.8%**
Ionian Islands	€ 388,000			€ 120,000	€ 508,000	**0.2%**
Νοτίου Αιγαίου	€ 476,000		€ 18,750		€ 494,750	**0.2%**
Not assigned		€ 577,000			€ 577,000	**0.2%**
Grand Total	**€ 136,444,903**	**€ 77,126,328**	**€ 568,051**	**€ 21,899,227**	**€ 236,038,509**	**100%**

Source: data received from the GRST on 10 October 2012. Calculations authors. Original data file did not assign all funding by region or entity (the GSRT has promised to provide a totally clean data set whenever possible)

Appendix E Total Gross value added at basic prices – Central Macedonia

% of Total Gross value added at basic prices	2005	2006	2007	2008	2009
A - Agriculture, forestry and fishing	7.25	5.11	5.07	4.51	4.54
B-E - Industry (except construction)	13.26	15.11	14.76	14.09	14.61
C - Manufacturing	11.70	12.76	12.28	11.53	12.72
F - Construction	8.08	9.30	8.13	6.92	6.33
G-I - Wholesale and retail trade, transport, accommodation and food service activities	27.29	26.51	28.57	30.11	27.52
J - Information and communication	2.16	2.38	2.11	2.20	2.56
K - Financial and insurance activities	3.51	3.48	3.20	2.97	2.94
L - Real estate activities	8.60	8.36	8.83	9.46	9.86
M_N - Professional, scientific and technical activities; administrative and support service activities	4.43	4.73	4.75	4.38	4.27
O-Q - Public administration, defence, education, human health and social work activities	20.53	19.62	19.70	20.34	21.58
R-U - Arts, entertainment and recreation; other service activities; activities of household & extra-territorial organisations and bodies	4.88	5.39	4.86	5.02	5.79
TOTAL - All NACE activities - in Millions of Euros	**23,883.1**	**25,486.6**	**27,387.8**	**28,761.7**	**28,795.7**

Source: Eurostat

Appendix F Relative regional specialisation in 20 industries – Central Macedonia

	Industry	Rank in Europe	Specialisation	Employment
1	Manufacture of other food products	4	2.21	18 671
2	Other retail sale of new goods in specialized stores	4	1.80	52 702
3	Maintenance and repair of motor vehicles	5	1.91	13 570
4	Manufacture of tobacco products	6	11.57	2 271
5	Finishing of textiles	8	4.43	2 177
6	Retail sale of automotive fuel	12	2.18	4 512
7	Renting of personal and household goods n.e.c.	14	2.17	1 307
8	Adult and other education	15	2.38	12 378
9	Fishing, fish farming and related service activities	17	4.54	2 797
10	Manufacture of ceramic tiles and flags	17	1.69	725
11	Growing of crops; market gardening; horticulture	19	5.35	64 559
12	Manufacture of other wearing apparel and accessories	19	3.06	20 215
13	Manufacture of jewellery and related articles	19	2.09	976
14	Activities of households as employers of domestic staff	19	2.79	10 485
15	Sale of motor vehicle parts and accessories	21	1.61	3 585
16	Restaurants	21	1.54	25 551
17	Processing and preserving of fruit and vegetables	22	3.75	4 180
18	Preparation and spinning of textile fibres	27	2.45	1 374
19	Bars	27	2.33	17 947
20	Repair of personal and household goods	27	1.90	1 885

Source: Smart specialisation in Europe: European specialisation data by region Centre for Strategy and Competitiveness, Stockholm School of Economics, April 2011