



Setting up the innovation support mechanisms and increasing awareness on the potential of Food Innovation and RTD in the South- East Europe area

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WORK PACKAGE 3: ANALYSIS OF POLICIES AND STRATEGIES FOR FOOD INNOVATION

D3.1- Map, analysis and benchmarking of policies, plans and initiatives relevant to Food innovation

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Contents:

D3.1- Map, analysis and benchmarking of policies, plans and initiatives relevant to Food innovation

Annexes:

Abstract:

The report maps, analyses and benchmarks the existing policies, plans and initiatives relevant to Food innovation at a regional and/or national level in the participating countries. Benchmarking is done against selected successful and peer reviewed policies especially from countries such as The Netherlands, UK, France and Denmark. The analysis will be used as a basis for further project activities.

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List of Acronyms and Abbreviations

Acronym/abbreviation	Resolution

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EXECUTIVE SUMMARY

This study presents the map, analysis and benchmark of the existing policies, plans and initiatives relevant to food innovation at an Apulian and/or Italian level. The analysis has been performed in the framework of the activity 3.1 of WP3- “Analysis of policies and strategies for food innovation”. The document has been elaborated according to the methodological guidelines elaborated by WP3 leader of Inno- Food SEE project.

The first part of the document focuses on a general presentation of Apulia Region from an economic point of view, presenting the main data about social and economic situation and describing successively the Agrofood sector, with its breakdown in Agriculture and Food Industry.

In the second part of the study the focus is deployed on the Research and innovation, starting from the Italian national system to the regional one. The main players, as well as priorities, initiatives and measures are presented, highlighting a system that is being improved and strengthened by Italian Government, as a pillar of economic scenario and a necessary choice to enforce the overall Italian system in this period of crisis.

Research and innovation are considered as the main priorities to sustain the economic growth or recovery by SMEs, representing more than 90% of industrial players in our country. According to this policy, a strong intervention is being given in favour of industries and research actors, pushing the research system and the SMEs one to link together towards a sustainable process of innovation. Main projects have been funded by National and European funds in the Agrofood sector, addressing the priorities for the innovation set at National level.

A key role in this process is played by Regional Authority, who is in charge of EU funds management by issuing Operational Program and implementing it through appropriate measures for the local growth. Measures, projects and initiatives are sustaining the regional agrofood, which represents one of the strategic economic sectors defined by Apulia Region.

The overview includes also a short view on future policies, strategies and plans, that follow the European guideline and approach, and finally a preliminary Assessment of National and Regional Innovation policies and plans and a comparison against international food clusters.

1. INTRODUCTION, SCOPE AND METHODOLOGY

Under the activity 3.1 of WP3- “Analysis of policies and strategies for food innovation” this document has been realized, with the aim to map, analysis and benchmark of the existing policies, plans and initiatives relevant to food innovation at a Apulian and/or Italian level has been realized. Benchmarking is executed against selected successful and peer reviewed policies especially from countries such as The Netherlands, UK, France and Denmark.

According to the project guidelines, the analysis has been addressed to the regional level, moving up to a national level when necessary, considering a long- term time horizon and using sources for information and data such as:

- Policies, plans, information and data originating from national and regional public authorities (Italian Government, Ministry of Economic Development, Ministry of Agriculture, Ministry of Education, University and Research, regional public authorities and agencies, Arti Puglia, etc.)
- Studies developed by industry associations, chambers of commerce and industry (Federalimentare, Confindustria Puglia, Dare District, Unioncamere), etc.
- Information and data from the European Inventory of Research and Innovation Policy Measures, <http://www.proinno-europe.eu/inno-policy-trendchart/page/inventory-research-and-innovation-policy-measures>
- Information and data from the Innovation Union Scoreboard, <http://www.proinno-europe.eu/inno-metrics/page/innovation-union-scoreboard-2010>
- Data from Eurostat, <http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes>
- Studies and results developed by previous relevant projects and initiatives (Studio Ambrosetti, IPRES, Svimez)
- Other relevant sources.

2. REGION OF APULIA, ITALY

2.1 GENERAL CHARACTERISTICS OF THE REGION

2.1.1 INTRODUCTION

The region of Apulia is the Italian south-eastern most region, with a territorial extension of 19.366 km², bordered by both the Adriatic and Ionian Seas, giving it one of the longest coastlines of any region in Italy. Infact its coastal regional development is wide and extends for about 800 km. The Harbour infrastructures - hinged on the big parts of Bari, Brindisi and Taranto and on those of minor dimension as Manfredonia, Barletta, Molfetta, Monopoli, Otranto and Gallipoli- make the region accessible by the sea and allow to perceive Apulia Region as a natural equipped wharf of the European community stretching over the Mediterranean that from centuries is in fruitful geographical economic cultural and religious relations with the Balkan area, the Middle-East, Northern Africa and East Europe.

Graph 1- Map of Apulia



It is bordered by the other Italian regions of Molise to the north, Campania to the west, and Basilicata to the southwest. It neighbours Greece and Albania, across the Ionian and Adriatic Seas, respectively. Apulia is interested to develop the international Corridor n°8 that will join other big European corridors actually in progress.

Apulia is a crossroad between countries and different continents. Due to its geographic position and its natural resources Puglia has encouraged individual economic operators, small to medium sized Italian and overseas enterprises manufacturing, trading, tourist and scientific industries and has also fostered settlements of different scale in the various territorial contexts that are also densely populated and as such able to raise a remarkable internal demand of immediate and durable consumer goods as well as capital goods.

Apulia is one of the twenty Regions of Italy and its administration is divided into 8 main Departments for the coordination of integrated policies, each being responsible for a specific branch of the administration's activities. The principal authority in charge of economic

development and innovation policies is the “Area Politiche per lo sviluppo economico, lavoro e innovazione” – Department of Economic Development, Employment and Innovation. This Department aims at sustaining the conditions for growth, competitiveness, innovation and international development of regional businesses, whilst enhancing and promoting the distinctive strengths and factors of attraction of the local economy.

Apulia is divided into six provinces: Foggia, Bari – the largest as for population with the regional capital – Brindisi, Taranto, Lecce and the - Bat - Barletta - Andria -Trani a new institution that includes seven Municipalities previously part of Bari province and three of Foggia province.

Graph 2 – Provinces of Apulia



2.1.2 KEY STATISTICS

In the recent period, while the Gross Domestic Product in the South over the previous year grew by 0.2% (in north-central than 1.7%), in Apulia it decreased in 2010 of 0,2% to **16,932** euros per capita. The situation is not good even if one looks at annual average 2000-2010: Apulia, which was to be the motor production of southern mainland, has recorded a minus 0.3%.

For the second consecutive year, therefore, the Apulian economy has performed the best performance in the South. In 2009 the GDP of Apulia fell by 2.3% compared to 4.6% of South Italy (SVIMEZ Annual report 2010).

The per capita GDP is about the 66% of the national average and represents about 72% of the EU27 average. Apulia is a Convergence region and manages for the period 2007-2013 about 2,7 M€ of the FESR programme and 640 K€ of the FSE programme plus other funds coming from interregional and national programmes.

Table 1- Key statistics for the Region of APULIA (Eurostat)

Area	19.363 km ²
Population	4.090.402 = 7% Italy pop
GDP	68.9 million (in 2009) - 4,5% of Italian GDP
GDP per capita	€ 16932 -
Share of primary sector in regional GDP	3.5% (Istat, 2009), national average 1.8%
Share of secondary sector in regional GDP	21,3% (Istat, 2009), national average 25.1%
Share of tertiary sector in regional GDP	75.2% (Istat, 2009), national average 73.1%
Share of primary sector in regional employment	8,5% (Eurostat, 2009), national average 3.8%
Share of secondary sector in regional employment	25,4% (Eurostat, 2009), national average 21.3%
Share of tertiary sector in regional employment	66,1% (Eurostat, 2009), national average 66.5%
Average GDP growth rate 2000- 2007	0,7% (Italy = 1,1%)
Regional exports	2,2% of Italy exports (2011) = 8.159 mln €
Regional exports variation rate 2010-2011	17,9%
Rate of unemployment	13.1% (Eurostat, 2011). Unemployment figures are expected to have considerably increased since then but they are not officially available).
Rate of youngs unemployment	34.6% (Confindustria 2010)
Share of manpower in regional population	53%, Italy 63% (Istat 2009)
R&D regional expenditure on GDP	0.79 , Italy 1.29 (Istat 2009)
Employees in R&D	1.7 per 1000 inhabitants, Italy 3.8 (Istat 2009)
Investments in innovation	44% innovating SMEs on total manufacturing SMEs

25.8% innovative investments on total investments

2.1.3 ECONOMIC ACTIVITY

The Apulia is a Region of Convergence, representing the most dynamic region in the South Italy, having a moderate ratio of development compared to other EU regions. The Apulia has a population of 4,076,546 inhabitants, generating a GDP of about 68.9 million (in 2009, - 2.3% compared to 2008, following the national decreasing trend). According to an official overview of Apulian economic system, the region, even if is growing in terms of investments by applying modernizing policies, presents the following characteristics:

- SMEs majority
- low inclination to innovation
- low level of internationalization
- weak infrastructure system
- low level of expenditure on R & D
- highly qualified workforce
- significant environmental resources
- main source of which university expenditure on R & D
- few links between research system and industry
- brain drain.

Among the strengths of the regional productive system is the relatively high productivity of the agricultural sector, a number of sectors (agro-food, sofas, chemicals, non-metallic minerals) which are oriented towards non-local markets, a strong local private entrepreneurial climate (97% of firms are privately owned), and the tourism sector.

On the other hand, the region also faces a number of challenges including poorly developed business services, a low rate of development of intermediate industry, the predominance of family-owned small enterprises (95% of firms have less than 20 employees), interesting rates of exporting firms, and a low level of integration of the agro-food chain.

Sectors experiencing difficulties include basic engineering, construction, steel, chemical and textiles.

In 2006 (ISTAT assessment) the GDP of the region amounted to 57.421,8 million euro that, after a three-year period of stagnation however occurred on national level, has started to grow again of 1,7%.

Among the regions located in South Italy, Apulian economy showed the best performance in recent years. Regional GDP growth scored a +1,8%, compared to +1,5% for Italy and +0,7% for South Italy, mainly because of the service sector growth (+2,9%) and industry growth (+0,7%), while agriculture showed a noticeable drop (-8,8%). GDP per capita at market prices showed a +3,9% growth, compared to +3,0% national and +2,6% South Italy.

The industrial GDP is equal to 23% and it is engendered by a conspicuous group of heavy industries such as iron and steel, petrochemicals, chemicals, engineering; in particular aviation and automotive industry, energy, cement, transshipment and IT, predominantly controlled by Northern and foreign capitals.

Flanked to them there is a net of small, medium-sized and sometimes big industries, belonging to local operators that are active in various sectors of the economy: food processing, textile clothing, shoe, furniture, precision engineering, plastics, plant engineering. To complete the industrial sector of the region there operates a considerable number of qualified medium-sized construction enterprises, led by regional businessmen, who successfully project themselves into the national market and into some international areas.

The primary sector, equal to 5%, produces considerable quantities of valuable produce as wheat, olives, grapes, fruit and vegetable, beets, milk, flowers, tobacco and, in some areas of the Salento, medicinal herbs that give rise to an intense activity of food processing and agroindustry one. These industries are distributed in various territorial points and often represent local branches of large industries from the North of Italy..

In this scenario, the Region Authority is determined to intensify its shares of territorial marketing as there are extremely favourable conditions for new investments in the following sectors:

- agroindustry
- precision engineering-automotive
- machine tools
- plastics manufacturing
- renewable energy sources and their technologies
- refuses cycle and recovery of secondary raw material
- water cycle
- biotechnology
- nanotechnology
- medical instrument technology
- hotellerie (hotel and catering)
- hospitality industry
- yachting navigation
- transshipment

The above mentioned sections operate in different parts of the region. It is in those areas then that there are favourable conditions for new investments, intensified by the presence of a local system of research that commands three Universities (Bari, Lecce, and Foggia) – and the only Polytechnic in the South of Italy, and prestigious research establishments, and technological transfer centres.

(Adapted from Confindustria Study Center, 2010).

Table 2- Economic units of industry and services by NACE 2007 and Year - 2007
Puglia

Sector	Unit no.
mining and quarrying	223
manufacturing	25,619
electricity, gas, steam and air conditioning supply	77
water supply sewerage, waste management and remediation activities	607
construction	31,079
wholesale and retail trade repair of motor vehicles and motorcycles	89,769
transportation and storage	7,243
accommodation and food service activities	15,119
information and communication	3,567
financial and insurance activities	3,443
real estate activities	3,712
professional, scientific and technical activities	37,363
administrative and support service activities	6,128
education	1,158
human health and social work activities	11,148
arts, entertainment and recreation	2,620
other service activities	11,389
total	250,264

(Source: Istat, 2007)

2.2 THE REGIONAL AGRICULTURAL SECTOR AND FOOD INDUSTRY

The Agrofood sector is particularly advanced in **Apulia**, both in terms of the primary agricultural production as well as the food and manufacturing industry.

The region's geography is quite diverse and this diversity determines many kinds of productions in the agro-food sector, strictly driven by agriculture. Three main areas develop in longitudinal way in respect of the sea, extending along the entire territory.

The first area has a variable deep including the sea costs areas, those of Adriatic and Ionian sea: it has a good level of irrigation and has been developing high quality agriculture, capital and labour intensive. In some areas also the fruit farming has been developed (i.e. grape for table).

The second area regards the internal part of the region, presenting more specialized productions in different territories. From the North to the South, the Tavoliere area extends for many kilometres, with prevalence of tomatoes, wheat and wine production, finally there are tree-cultivated grounds (arboriculture), especially olive and grape trees, while in the little sub-area of Murgia Sud-est (Bari and Taranto) the intensive cow livestock is affirmed.

The third area involves the more internal zones, in which we find forestry and a spread cereals based culture.

Due to this territory conformation, The Apulian agrofood vocation is characterized by a multi variety of products, including the fermented ones (i.e. bakery products, fermented cheese).

The main agro-food chains present in Apulia are:

- Dairy products;
- wheat and bakery;
- meat products;
- olive oil;
- grapes and wine;
- vegetable and fruits (olive, almonds, figs), and livestock (sheep, pigs, cattle and goats).

The agrofood sector represents one of the key economic sector of the region, presenting some weakness at competitiveness level. In particular, the most recent sector studies highlight a situation with several aspects: nevertheless some products classes have a significant sale rate (with a positive growing trend) many traditional Apulian productions are not included as recognized quality labels, due to an insufficient process and products



characterization. Moreover, the typical and traditional products, already known by public, require the upgrading of transformation manufacturing process to increase their competitiveness. Many SMEs are investing their efforts to improve the safety and typical products assurance, to promote the development and the valorization of agro-food sector as entire system, to define the requirements for process and products certification.

2.2.1 AGRICULTURE

In comparison with the country as a whole, the economy of Apulia is characterized by a greater emphasis on agriculture and services and a smaller part played by industry. The share of gross value added generated by the agricultural and services sectors in the total gross value added of the region is in fact above the national average, whereas the share of industry is below.

Agriculture in Apulia is largely modern and intensive, allowing the region to be at the first places in Italy for the production of many products, like “hard” grain and tomatoes in the Foggia province, besides table grapes and oil, with around 50 millions olive trees. Also important is the production of salad, artichokes, fennel, cabbage, celery and oats. The old primacy for almond production has on the contrary been lost. In specific areas fruit cultivation is also relevant, like peaches and kiwi.

The table below present some key figures for the agricultural sector of the Region of Apulia:

Table 3: Agricultural sector key statistics in the Apulia Region		
Agricultural product/ Item	Average annual production value 2006-2009, (in millions of €)	Percentage of national output (average 2006-2009)
Fruits	639,89	13,22%
Animal Products	144,33	2,58%
Cereals (Including Seeds)	258,06	6,51%
Vegetables and Horticultural Products	905,18	10,51%
Animals	158,24	1,76%
Industrial Crops	25,84	3,54%
Agricultural Services Output	280,87	14,05%
Total Output of the Agricultural 'Industry'	2.412,41	6,96%
<i>(Source, Eurostat, http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database)</i>		

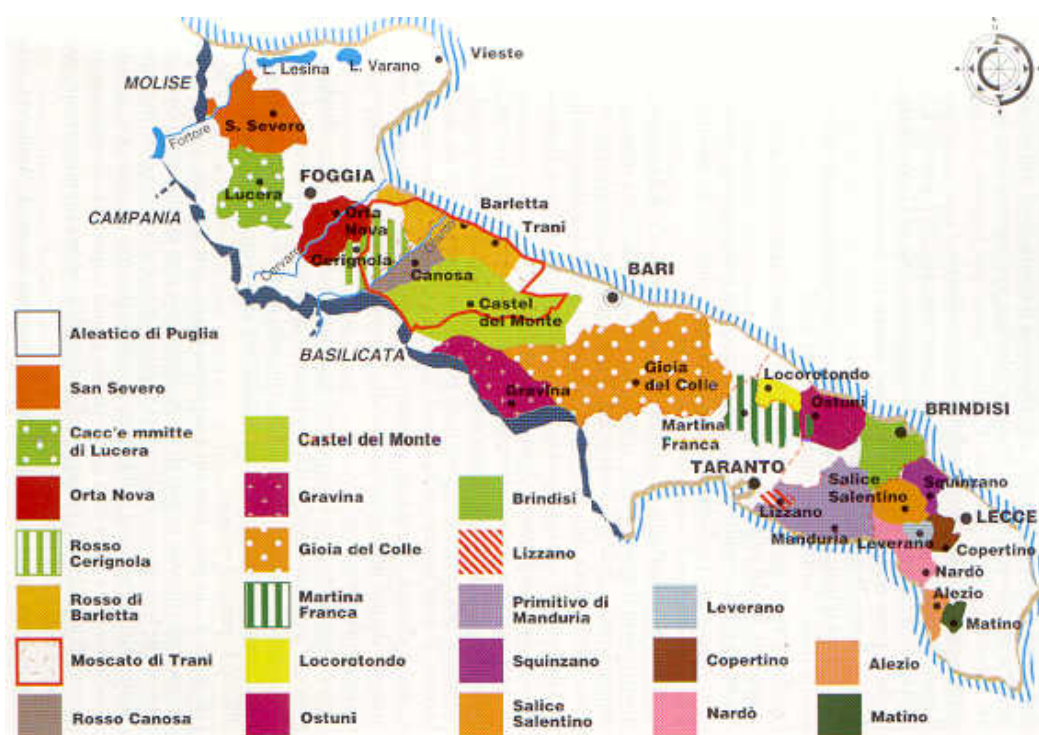
2.2.2 FOOD INDUSTRY

The Apulian food industry can count on a large variety of products and a large number of local typical and traditional products that make this manufacturing sector an important reality, having a continuous positive evolution, despite the negative cyclical dynamics that are investing production activities in the Italian country. According to the annually ISTAT studies, in 2007 the sector food industry in Puglia recorded positive production trends. The value added at Basic prices (VA) produced by Regional Food was 1.1 billion euros, equal to about 5% of the total national and 21% of the South one. In four years considered (2009-2007), the value added showed an increase of 8, 2%, a figure far above than the national one (+2.2%) and South one (+1.2%).

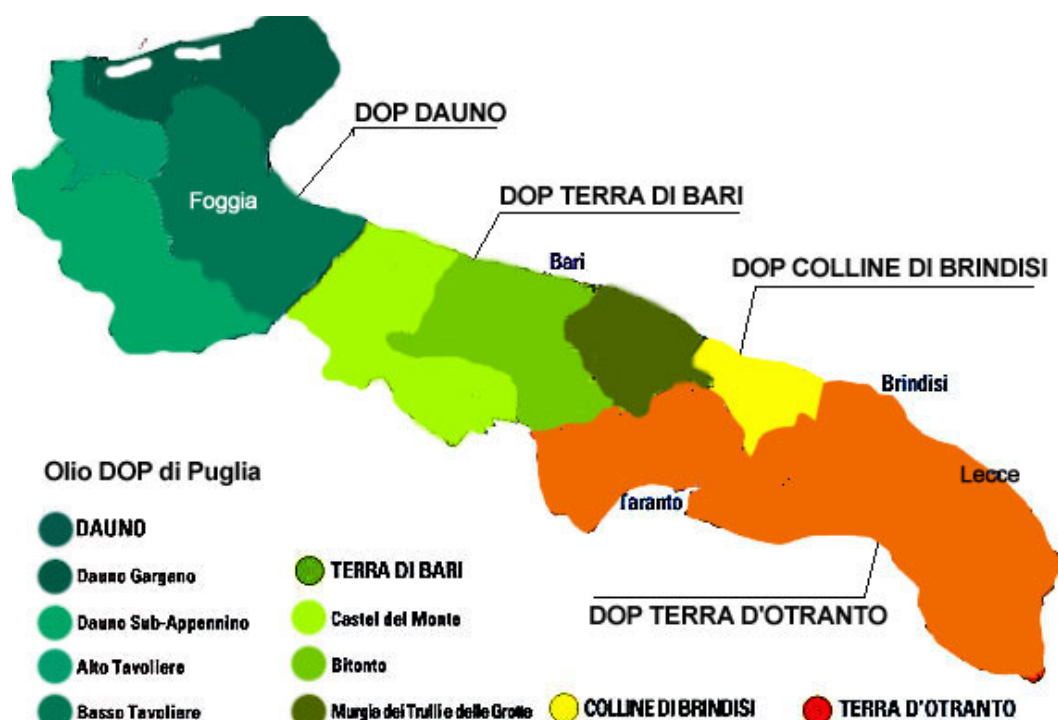
In food products the region has attained a significant degree of competitiveness with foreign producers, even if the competition from emerging countries and the recent financial crisis represent a concrete risk.

In addition to the traditional sectors of wine and oil, also the mill industry and pasta production have a big role in the sector, also being Italian leader in the heavy wheat production (21 % of national total, Istat 2011), while the Apulia is the third Italian region for the pasta production. Significant roles are covered also in the dairy industry, coffee and meat transformation (Bank of Italy 2011).

Graph 3 - Wine production areas



Graph 4- DOP (Protected Destination of Origin) Apulian oils



This growth surely has been influenced by investments in the sector, supported also by specific structural policies Regional and Community for internationalization, trade and industrial processing of agricultural products, which in period 2003-2007 increased by more than 5%. Such trend is very different from the Southern regions ones, which have on the contrary reported a decrease of 5% of investments. In Apulia, concerning the labor employed in the field of agri-food processing, the income from employment has increased (+23%) and gross wages too(+23%) more than in the rest of Italy.

The occupation is rather stable over time and characterized by a predominant use of staff employees. In the years from 2002 to 2007 units of work that is not occupied showed strong oscillations and in the complex have shown growth for the component employment by about 9%, which results to be higher than that of the South (+3%) and Italy (+5%). In the period considered, independent units, instead, after the considerable decline recorded in 2005, marked a change in total almost irrelevant (+1%) while in the rest of the nation have showed an increase, respectively 5% in the South and of 4% in Italy.

Table 4- Food and beverage industry key statistics in Apulia, (Source, Federalimentare, Year 2009)

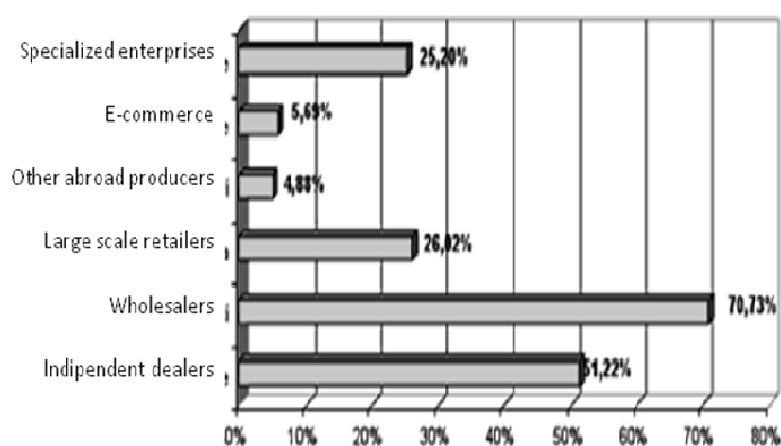
Parameter		Unit	Percentage of national total	Share of employment in manufacturing total
Food manufacture	Number of companies	4898	8%	12%
	Number of persons employed	21857	6%	
Beverage manufacture	Number of companies	334	10%	0.6%
	Number of persons employed	1712	4%	

Channels of distribution

Apulian SMEs use different distribution channels, as indicated in the figure below, moving towards wholesalers and independent dealers, as traditional channels. This means that they have a low contractual power, not being able to deal by direct channel, preferring wholesalers.

Anyway, recent studies show that internet channel is becoming very important for these SMEs, giving chances to explore new markets, to know dynamics and to study products of main player. The use of e-commerce or website adds value and improves their image and communication.

Graph 5- Channels of distribution, 2010



(Source, Eurostat Agrifood districts in global context – Analysis on Apulia Region- I distretti agroalimentari nel contesto globale. Un'analisi sul territorio pugliese, a cura di Maizza Amedeo, F. Angeli, 2010).

2.2.3 EXPORTS OF AGRICULTURE AND FOOD PRODUCTS

The trend for exports of firms in the South working in the food and drinks are extremely positive. The Apulian food industries reached the sales of **4.8 Billion of Euro in 2011**, representing the **3.8 %** of all the total agrifood sales of Italy. The food exports are continuously growing, having reached in 2010, the 0.5 M euro, representing the 10,4% of total. The increase in exports (in the first nine months of 2010) was of 38.8% for agricultural and 22.6% for food.

In South Italy in June 2011, the beverage exports recorded for about 69 million euros (ISTAT), an increase over the first half of 2010 9 , 9%, while exports to food businesses of the South grew by 4.57%, amounting to over 761 million euros.

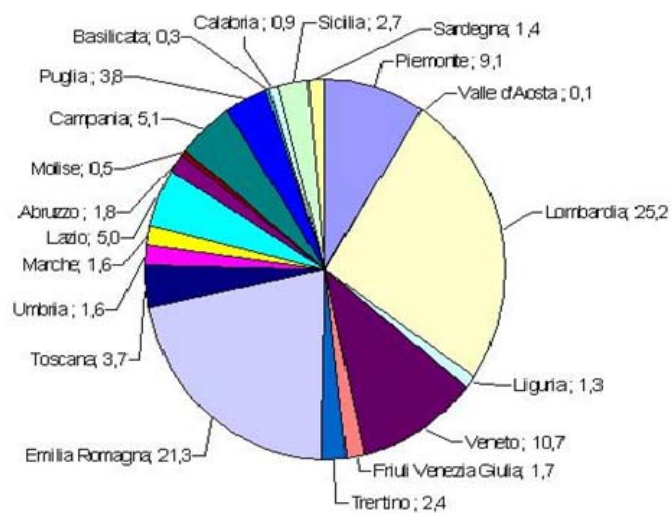
In the first three months of 2012 exports of food products Made in Italy grew at a rate of **6 percent** which is equal to more than triple the average of 1, 7 per cent of national exports. These result confirm the positive trend of last year, when the record amount of 30 billion of food products export was registered. In the table below the recent data about key indicators about food and beverage regional industries are indicated, showing that Apulia is the 7th Italian region for sales in this sector, as well as the 9th for the export on a total of 20 regions.

Table 5- Food and beverage industry key statistics in Apulia, (Source, Federalimentare, Year 2011)

Italian Regions	Sales (estimated- B euro)	Inc% reg. Sales/ total sales	Export (Beuro)	Inc% reg. exp./ tot.exp	Inc.% exp./sales
Piemonte	11,6	9,1	3,7	16,1	31,2
Valle d'Aosta	0,1	0,1	0,0	0,3	31,0
Lombardia	32,0	25,2	4,5	19,5	14,1
Liguria	1,6	1,3	0,3	1,3	18,8
Veneto	13,6	10,7	3,2	13,9	23,5
Friuli Venezia Giulia	2,1	1,7	0,5	2,2	23,8
Trentino	3,0	2,4	1,1	4,8	36,7
Emilia Romagna	27,0	21,3	3,7	16,0	13,7
Toscana	4,7	3,7	1,4	6,1	29,8
Umbria	2,0	1,6	0,3	1,3	15,0
Marche	2,0	1,6	0,2	0,9	10,0
Lazio	6,3	5,0	0,5	2,2	7,9
Abruzzo	2,3	1,8	0,4	1,7	17,4
Molise	0,6	0,5	0,0	0,0	6,0
Campania	6,5	5,1	2,1	9,1	32,3
Apulia	4,8	3,8	0,5	2,2	10,4
Basilicata	0,4	0,3	0,0	0,2	11,4
Calabria	1,2	0,9	0,1	0,4	8,3
Sicilia	3,4	2,7	0,4	1,7	11,8
Sardegna	1,8	1,4	0,1	0,1	5,6
Totale Italia	127,0	100,0	23,0	100,0	18,1

Graph 6- Regional sales vs national sales, 2011

Percentages of regional sales on national sales



Source: Federalimentare, 2011

2.3 THE NATIONAL RESEARCH AND INNOVATION FRAMEWORK

2.3.1 RESEARCH AND INNOVATION GOVERNANCE AT A NATIONAL LEVEL

The research policy development in Italy is based on large multi-annual plans (Economic and Financial Planning Document - **DPEF** enacted through annual budget cycles established by the Financial Law (public budget) of the State. The remarkable role of national public funding, that covers about **38%** of total **GERD**, is one of the distinctive, key feature of the Italian research system. The R&D expenditure as a share of GDP in 2010 (provisional) was **1.26%**, of which business research covered 0.54% while the rest was covered by public and not-for-profit sectors. Private business research is concentrated in the few big companies that form the industry together with many Small and medium enterprises (SMEs). Public research is mainly done at the Universities, with a significant share of GDP (0.20%) covered by state research agencies.

The structure of Italian public research system basically is centralised around the **Ministry of University and Research** (MIUR), which is the hub of this system. MIUR coordinates national and international scientific activities, distributes funding to universities and research agencies, and establishes measures and schemes for supporting public and private research and technological development (RTD) funding. Under MIUR the public research organisations and the universities operate. The **Ministry for Economic Development**, strictly with MIUR, supervises innovation policies for industries and plays a primary role in research policy as long as the oriented and applied research is concerned, having a closer connection with innovation-oriented research.

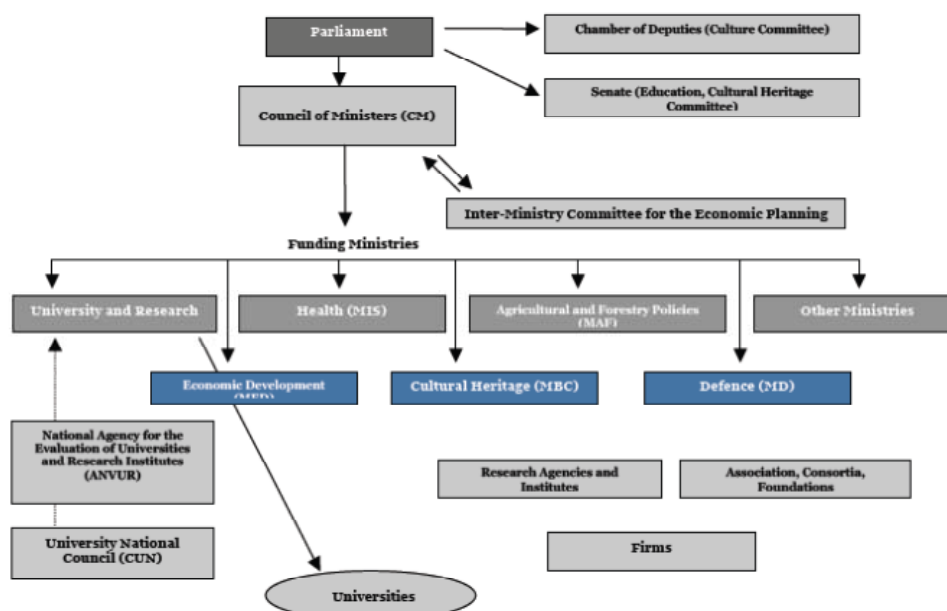
MIUR operates through specific funds. They are the ordinary fund for universities, the fund for public research agencies, **FAR**- Fund for Applied Research and the **FIRB**-Basic Research Investment Fund. Furthermore, fiscal automatic incentives have recently been experimented with use a variety of funds in policy implementation. A new Decree n.19 2012 was recently published, based on the recent reform of the University system, setting the rules for the national system of evaluation, quality assurance and accreditation of the organizations and of the courses. The Decree foresees the possibility of incentives dedicated to be attributed to the universities with the highest performance; **ANVUR** is in charge of the organization of the whole process.

Other actors playing a relevant role in R&D policies are the Health Ministry, with its ISS Higher Institute for Health, the Ministry for Agricultural Policies (see CRA-Council for Research and Experimentation in Agriculture, INEA-National Institute for Agrarian Economics), the Ministry of Cultural Heritage, and the Ministry for the Environment. The strategies and objectives of these ministries are coordinated by the MIUR within the framework represented by the National Research Programme.

(Adapted from <http://www.proinno-europe.eu/inno-policy-trendchart/repository/country-specific-trends>)

Graph 7 – Structure of the Italian RTDI system-

Appendix B Structure of the Italian RTDI system



2.3.2 MAIN STRATEGIC DOCUMENTS FOR RESEARCH AND INNOVATION

In this part the map Policy framework, programs, measures, initiatives and strategies in support of food innovation in Italy and Apulia Region are presented, highlighting the key policies measures, initiatives in support of food RTD and innovation.

In Italy the main strategy is defined in the **National Strategic Reference Framework** and in particular in the PNR – National Research Programme. It is implemented through the National Operational Program (NOP), the Regional Operational Programmes (ROP), the Interregional Operational Programmes (NIOP) and Operational Programmes "European territorial cooperation" for a total of 66 operational programs.

- PNR 2011-2013 – National Research Programme 2011-2013

The National Research Programme (**NRP**) has been set for the 2007–2013 period, reviewed for the period 2011-2013 (March 2011) is based on the Community Strategic Guidelines for rural development, on the major EU priorities associated with jobs creation, growth and sustainability (Lisbon, Göteborg), and in complementarity with other EU policies (Cohesion, protection of the environment, especially, the coordination with the Structural Funds), also taking into account the socio-economic conditions in Italy.

Moreover the programme has been built using an International approach, considering its interaction with EU initiatives (i.e. ERA-NET programs, EU Technological Platforms- ITC, Co-joint Technological Initiatives - ITC, Research Driven Cluster, Public – Private Partnership - PPP, Joint Programming Initiative - JPI, European Innovation Platform- EIP), and the development of big Research infrastructures in the framework of the ESFRI Roadmap. In this way, the Italian approach reflects the EU2020 concepts, contributing to strengthen the cohesion among the EU countries systems.

NRP represents the main Government's Plan for R&D policy and acts as key structural factor of economical politic, , aiming to integration of demand and offer of research, to the creation of a network of platforms and technological infrastructures strictly linked to the industry, to the increasing earning by investments in research.

Strategic actions, priority interventions, “flagship projects” are being carried on by a governance body to let Italian research be more of the actual 0,56% of PIL. The policy priorities of the NRP are science and technology long-term policy agendas. It deals with research in the public sector (universities and public research organisations) and in firms. The plan concerns the state policies that affect the production and utilisation of human and financial capital for R&D in the social and economic Italian system.

The NRP is devised within the context of the economic policies, as one of their structural components; it aims at a gradual integration between demand and supply of research activities, at the building of a network of technological platforms and infrastructures open to the contribution and participation of the productive system, and on the increasing of returns on research investments. The Italian situation is compared to EU and OECD countries positions, both to draw a general scenario and for specific sectors. Consistently with the general public policies of Italian government, PNR envisages, among other provisions:

- a range of additional public appropriations for R&D;
- the promotion and improvement of human capital;
- the strengthening of international co-operation,
- the setting up of research structures and research strategic programmes that allow convergence of public and private sectors;
- the evaluation of research.

Its rationale is to guarantee the consistency and effectiveness in the working of the Italian research system, both for the public and private parts. It achieves this purpose by establishing the objectives, instruments and strategies for the actions of the agents that made up the research system, e.g. universities, public research organisations and firms.

In its introductory part, NRP identifies the crucial aspects that made it difficult to implement a policy of research. It then proposes a range of actions devoted to improving the integration between policies and instruments for the development of research. It defines some guidelines, broken down into strategic objectives and intervention modes. The plan acknowledges the importance of knowledge-driven research performed at Universities and PROs and the need for integration between public and private research.

Its main objectives are:

- the attainment of quality and a critical mass in public and private research;
- growth of the national investment in R&D;
- development of human capital;
- promotion of an efficient technological transfer;
- strengthening of cooperation links between public science and private firms;
- promotion of high technology startup companies;
- enhancement of R&D infrastructures and networks;
- introduction of methodologies for research evaluation and funding.

NRP makes use of indicators covering a wide range of aspects of research and innovation activities in the system. Among them are:

- indicators of size and destination of human capital;
- indicators of investment and expenditure in the system as a whole and in large sectors (university, firms in general and SMEs, non-profit sector);
- indicators on cooperation between the public and private sector (with dedicated information for SMEs);
- indicators concerning innovative activities at firms, ranging from general statistics on process and product innovations' to information regarding high- and low-tech sectors;
- indicators on the output of research (covering also patents registered by universities).

- **National Operative Programme Research and Competitiveness 2007-2013**

NOP (National Operative Programme) Research and Competitiveness 2007-2013, adopted by European Commission Decision C (2007) 6882 of 21.12.07, is the main instrument through which the system of research and entrepreneurship would develop solutions to increase competitiveness and create jobs in the four regions of Calabria, Campania, Puglia and Sicily.

The NOP R & C funds projects in the fields of scientific research, technological development, industrial competitiveness and innovation and has a budget of over EUR 6 billion, half of which, 3.102 billion euros, is ensured by the co-financing European Union through the European Regional Development Fund (ERDF).

The Program aims to:

- the convergence of development levels of regions of Calabria, Campania, Puglia and Sicily to European values, by enhancing their competitiveness in the international arena in a strong and rapidly changing (mission);
- integration into a unified and coherent policy for sustainable development with activities related to research and innovation undertaken or under construction at regional, national and Community (strategy);

- the improvement of the concentration process with the regions, developed in the last years of the Structural Funds programming for declining objectives, actions and resources of the "Strategy-country" according to the characteristics of each territory (governance).

Political accountability and implementation of NOP R & C is attributed to the Ministry of Education, University and Research (MIUR) as Managing Authority (MA) and the Ministry of Economic Development (MISE) as Intermediate body (OR).

Specific objectives are:

- Axis I: structural changes to support and enhancement of the potential for the scientific-technological transition economy of knowledge
- Axis II: strengthening the context for the development of innovative competitiveness
- Axis III: enhancing the quality 'of the NOP and its impact

The actions of the first axis include structural interventions, promotion of scientific and technological networks and facilities to businesses. Pursue the goal of changing the production specialization that characterizes the Convergence regions, promoting the creation and consolidation of sectors oriented to science and technology.

The actions arising from the second axis tend to reinforce one hand the focus on innovation and enterprise development, the other to improve the competitiveness and attractiveness of the area in order to strengthen the ability of firms to adapt the strategies to changes of context.

The third axis includes actions aimed at strengthening the effectiveness of planned interventions, optimizing the strategic management of the same NOP, also provides guidelines for intervention aimed at good practices and transfer of know-how.

- Framework Programme Agreement

The FPA - Framework Programme Agreement (2011) is the framework including the national operational initiative, aiming to give the guidelines for the implementation of PNR, focusing on the following domains:

- I) innovation demand sustain (by supporting entrepreneurship culture and innovation, industrial research, integrated projects of innovation);
- II) offer empowerment (by supporting strategic projects, structural empowerment);

- III) qualification of supply and demand connection (by supporting high-tech districts, labs networks, knowledge transfer networks, innovation poles, south-north osmosis);
- IV) empowering human capital in research and innovation.

The FPA is negotiated between each Convergence Region and the MIUR (Ministry of Education, University and Research); the Apulia Region finalized the AQP Puglia in 2009, as described in paragraph 2.5.1.

MIUR defines how to enable the resource involved by Framework Programme agreements. These documents identify sectors or areas according to the National Research Programme 2011-2013, forecasting intervention similar for the Convergence regions, providing, for the sole industrial research line, two operating modes:

- a) open call, for all eligible players of the relevant territory, for selection and financing of industrial research projects, projects activated according to the rules of Article. Ministerial Decree No. 12 of DM. 593/00 (that is the implementation of Legislative Decree n. 297/99);
- b) "Call" aimed at the development / strengthening of district and public-private laboratories, starting from those already funded by the Ministry, to be activated according to Ministerial Decree No. 13 of the DM 593/00.

In this way, the FPA should represent the implementation tool able to ensure a strict commitment of significant resources in quality initiatives and to create relevant socio-economic impact on affected Convergence areas, ensuring that interventions are likely to contribute to those "structural" changes of socio-economic conditions in the South Italy, required by European Union through the provision of Structural Funds.

2.3.3 SCIENTIFIC PRIORITIES RELEVANT TO FOOD INNOVATION

In the NRP 2011–2013 the Agrofood system has been indicated as one of the strategic sector to be addressed by new research policies. In the agrofood sector new research lines will be introduced, in order to develop high productive agricultural systems, environmental sustainable, and new productions jointly addressing diet and health aspects. More attention to the chemistry application to agriculture will be paid too, considering the natural environment and that modified by humans, and the overall quality of life.

In particular, the **FOOD AND DIET-HEALTH** domain represents one of the priority to be addressed by the new research approach. In the document it is stated that due to its particular conformation, geographical location and climatic changes, Italy is being exposed to natural hazards. It is a priority to invest in improvement of the territory knowledge, including natural phenomena and anthropogenic ones, by Research and Development activities and technology.

The interactions among agriculture, food production and environmental are very important too for their implications on eco-agricultural practice, which eroded the biodiversity of the planet and absorbed environmental resources, by occupation of land and expulsion of natural wastes. The Country needs to revise or introduce new lines of research, with the aim of contributing to development of agricultural systems highly productive and ecologically sustainable, and to develop products able to address the relationships between diet and health. The development of new environmentally friendly farming systems should consider, as priority goal, a more prudent use of chemicals in agriculture. It must also consider the interaction between the natural and the human modified one, also evaluating the impact of life quality.

Other priority defined in the NRP is **MADE IN ITALY**: in 2008, Italy obtained one of the most relevant foreign trade surplus in manufactured goods at global level (64 billion of Euro), behind China, Japan and Germany.

The Made in Italy includes the Equipments, Home furniture, Fashion and Food (together accounting for 50%), but unfortunately invests in research only 26% of Italian manufacturing. Made in Italy needs a profound transformation that involving companies, research institutes, universities and public administrations

AGROALIMENTARE is the 3 year project included in this programme under the scheme "Projects of national Interest". It is carried on by CNR: Agrofood Department, CIS-MIUR: Italian Agrofood System.

6 priority areas are addressed, including the study on :

- multitrophic plant-pathogens relation for a better sustainable agriculture;
- secondary metabolism of vegetables with nutritional improvement of nutritional features of food,
- biodiversity and comparative genomics
- structural and functional genomics characteristics of breeding
- intensive fruit culture,
- grapevine, apple and peach
- interaction between agriculture and environment.

The impact of this action should be of strong relevance in an interactive person-environment context, with effects on process optimization in nutrition field, on improving the quality of life and savings in agriculture.

The estimated cost is 50BL Euro.

Website: www.miur.it

2.3.4 RESEARCH AND INNOVATION FUNDING AND MEASURES

From February 17, 2001 the research and innovation Italian funding system has been reformed, combining into a single measure - the Leg. 297/99 - all the previous rules with a view to reorganization and rationalization of the system industrial research facility managed by MURST / MIUR.

The law intention is to grant and support mainly the industrial research, but the activities may not extend only to precompetitive development subsequent to pure research, and can realize the results of research in a project or a prototype of a new product (or pilot plant for a new process).

The **FAR** – Fund for Applied Research – is the main fund managed by MIUR to apply this law and its financial source is set annually in the Ministerial budget.

Three kinds of procedure can be followed:

- evaluation: research projects and / or training projects individually presented and produced by eligible entities with no deadlines or default themes;
- negotiation: the Ministry identifies specific areas and sectors of intervention and prepares special invitations to invite those eligible to propose projects;
- Automatic: direct interventions to encourage SMEs to recruit and employ researchers or commit research projects to research centers.

Eligible entities for funding are:

- industrial enterprises producing goods and / or services;
- business activities of transport operators;
- craft businesses;
- research centers with independent legal personality;
- consortia and consortiums, composed in any way (thus including universities), provided with financial participation by the majority of the entities referred to above;
- science parks and technology, including a specific list of MIUR.

The **FIRB** -Basic Research Investment Fund is one of the means of implementation of the National Research Plan (NRP) aiming to sustain the research performed by universities, research institutions; individuals engaged in research, having public or private legal entity and priority for statutory purposes, in research. Through the program "Future Research in 2012" the Ministry intends to encourage both the renewal and the emerging and existing scientific excellence in universities and public research institutions related to MIUR, in order to strengthen national scientific bases, even in view of a more effective participation in European initiatives related to the European Union Framework Program, also allocating adequate resources for the funding of basic research projects by young researchers.

Furthermore, fiscal automatic incentives have recently been experimented with use a variety of funds in policy implementation.

Table 6 Measures managed by MIUR (Ministry of Education, University and Research)

Type of initiative	Short description	Start/ End date of date of publishing	Budget and source of funding	Web link (if available)
Fund	<p>FIRB - Fund for Investment in Basic Research - Program Future in Research</p> <p>2012 aims to promote generational change within the universities and research institutions. It is addressed to:</p> <p>a) PhDs Italian or EU unstructured at the Italian universities and public research bodies related to MIUR, not older than 33 years at the date of expiry of the notice, in possession of a PhD for at least 2 years. The doctoral students must have at least five publications with an ISBN or ISSN (line of action 1);</p> <p>b) PhDs Italian or EU unstructured at the Italian universities, government or non-state, inter-university consortia, and public research institutions related to MIUR, not older than 36 years at the date of expiry of the notice, in possession of PhD and research for at least 4 years. The doctoral students must have at least ten publications with an ISBN or ISSN (line of action 2);</p> <p>c) Young teachers or researchers who have not completed their 40 th year at the date of expiry of the notice, already structured at the Italian universities, state and non-governmental, and public research institutions belonging to the Ministry of Education. Teachers and researchers must have at least fifteen publications with an ISBN or ISSN (Line of action 3).</p> <p>The cost of the projects must be between 500,000 and 1,200,000 euros, for a minimum duration of 3 years</p>	January 2012/ 22.02.2012	EUR 58,834,677.00 (gross of the evaluation and monitoring).	http://www.istruzione.it/web/ricerca/firb
Fund	MIUR funds Research Projects of National Interest (PRIN) presented by	DM 27.12. 2011,	EUR	http://prin.miur

Table 6 Measures managed by MIUR (Ministry of Education, University and Research)

Type of initiative	Short description	Start/ End date of date of publishing	Budget and source of funding	Web link (if available)
	<p>University.</p> <p>Objectives of the programme are to finance research projects freely presented by Universities in the 14 thematic areas as defined at national academic level; promote and develop actions according to a system approach, by promoting interactions between the different actors of the national public research and between them and other public and private research organizations. The programme evaluate positively giving a premium those projects involving international collaborations (no payment to researchers or research organizations abroad allowed) addressing Horizon 2020 goals.</p>	n. 1152 (edited on 12 Jan 2012)	175.462.100,00	.it/ http://prin.miur.it/
Measure	<p>Smart Cities</p> <p>This measure funds Networks of Small, Medium and Large Businesses and Research Organizations involved in innovative Research and Development projects able to contribute to the development of "Smart Cities", such as integrated actions for sustainable development and the development of society and social innovation. Project ideas should promote actions applying the most advanced solutions with direct impact public interest areas and should develop social integration models to solve urban and metropolitan problems. Grants of up to 20% of eligible expenses combined with a subsidized loan of up to 75% represent the incentives.</p> <p>"Projects of social innovation", in implementation of initiatives osmosis North-South provided under Axis III of the program. 40 M euro are reserved for the youngs living in Italian southern regions (Convergence area) no older than 30 years.</p> <p>Policy areas are:</p>	<p>Start: 02/03/2012</p> <p>End: 30/04/2012</p>	<p>overall resources by NOP R & C 2007-2013 (200,696,821.00, of which 50% ERDF and 50% FDR</p>	

Table 6 Measures managed by MIUR (Ministry of Education, University and Research)

Type of initiative	Short description	Start/ End date of date of publishing	Budget and source of funding	Web link (if available)
	<ul style="list-style-type: none"> • Smart Mobility • Smart health • Smart education • Cloud computing technologies for smart government • Smart cultures and Tourism • Renewable energy and smart grid • Energy Efficiency and low carbon technologies • Smart Mobility and last-mile logistics • Sustainable natural resources (waste, water, urban biodiversity) 			
Measure	<p>National Technological Cluster</p> <p>This measure aims to the creation of large aggregates, starting from old and new single districts, focusing on certain strategic issues, useful and interesting for the national industry, with the goal to develop the creation of a single cluster for each area.</p> <p>8 scientific-technological areas were identified by MIUR for the Clusters including green Chemistry, Agrofood, Life Sciences, Technologies for Smart Communities. The activities financed Industrial Research and Experimental Development activities and training.</p> <p>Each project should include a 5 years Strategic Development Plan responding to emerging needs in the areas of reference. The Plan should promote solutions to problems of supply chain by linking with other technological districts and other public-private combinations, in order to improve investments' attractiveness and training of qualified human capital.</p> <p>Four Projects of Industrial Research (also including Experimental Development activities and Training) should be granted. At least two projects must be implemented within the framework of international collaboration agreements, the</p>	<p>Start: 30/05/2012 End:28/09/2012</p>	<p>408 MEuro (368 MEuro by FAR funds and 40 Meuro by NOP Research&Co mpetitiveness 2007-2013.</p>	<p>http://www.ponrec.it/bandi/cluster/</p>

Table 6 Measures managed by MIUR (Ministry of Education, University and Research)

Type of initiative	Short description	Start/ End date of date of publishing	Budget and source of funding	Web link (if available)
	maximum duration of projects is 36 months.			
Measure	<p>The Development Agreements aim at facilitating the realization of relevant investments for the strengthening of productive structure, with particular reference to South Italy.</p> <p>This measure extends to many areas giving opportunity to industrial sector, including tourism and trade, giving also access to foreign firms with branch in Italy, by simplified procedures and possibility to choose between different types of facilitation.</p> <p>The development program of the contracts may cover one or more investment projects including also industrial research and experimental development. It may also include the creation of functional infrastructural works to be charged to public funds.</p>	<p>Start: 29/09/2011 End: 01/06/2015</p>	<p>Ministry of Economic Development (MISE) with the involvement of the Southern regions.</p>	
	<p>Districts for High Technology, and Public-Private laboratories</p> <p>This measure funds interventions aimed at the developing and strengthening the “High Technology Districts” and “Public-Private laboratories and networks” already existing and the creation of new High Technology Districts and / or new combinations.</p> <p>This measure is directed at enhancing the opportunities for market and society, offered by the dynamics of technological change and rapid evolution and convergence of enabling technologies, as well as their impact 'on the structural mutation' of the economic regions of convergence. In this light, become significant strategic inter-institutional transactions with value inter-disciplinary and international, aimed at integrating research, education and innovation.</p>	<p>Start: 16/12/2010 End: 21/04/2010</p>	<p>915 million euros by NOP 2007-2013 R & C covered by ERDF - and national resources - Revolving Fund (FDR).</p> <p>389 M</p>	

Table 6 Measures managed by MIUR (Ministry of Education, University and Research)

Type of initiative	Short description	Start/ End date of date of publishing	Budget and source of funding	Web link (if available)
	<p>Districts for High Technology, also will develop a critical mass of interdisciplinary skills and capabilities that can create innovative entrepreneurship by emerging scientific and technological knowledge, incorporating and / or connecting to a public-private as well as establishing new connections with similar experiences existing outside regions of convergence.</p> <p>Apulia Region will receive 135M for Districts, 10M for Labs 80M for new districts, for a total amount 225M.</p>		<p>euros for High Technology Districts and Public-Private Laboratories ; 526 M Euro for the creation of new districts and / or combination s.</p>	

2.4 THE REGIONAL RESEARCH AND INNOVATION SYSTEM

2.4.1 INNOVATION GOVERNANCE AND FUNDING AT A REGIONAL LEVEL

Apulia Regional key entities are supporting the development of the agro-food sector, composed by public and private entities, operating at different levels to create synergies concurring at the creation of an integrated system. In particular, the Apulia Region has been carrying on a global strategy to enforce the integration and to favour the communication and interaction among different players supporting them in a common and unique process of sustainable innovation. In this framework very important has been the Region authority role and the creation of a dedicated Agency, named ARTI, with the institutional function to gather all academic and research players in strict conjunction with territory and local industries. In this way this Agency is representing a natural bridge to facilitate exchange of experiences, becoming also pole favouring the links with SMEs and local or productive initiatives, supporting the economic growth of the agro-food sector.

2.4.2 KEY PLAYERS OF THE REGIONAL RESEARCH AND INNOVATION SYSTEM FOCUSING ON FOOD

This section focuses on the identification and brief description of the key players of the regional research and innovation system, focusing on food. Entities such as University Departments/ Faculties, Other Educational Institutes, Research Institutes/ Centres, Innovation and Technology Transfer Organizations, Business Support Entities, Public Authorities, clusters and networks are presented.

The academic and research entities play an active role in developing new process and products useful for innovative and competitive SMEs.

In Apulia there are 4 main public Universities: University of Bari “Aldo Moro”, Polytechnic of Bari, University of Salento (Lecce), University of Foggia and one private university, the Jean Monnet LUM, located in Bari. Considering the Academic institutions, the main Universities offering academic curricula in the field of agrofood and supporting the sector are University of Bari, with 2 specialized faculties: Agronomic Faculty (covering all the main food chains, such as dairy products, meat, vegetables, cereals), Biotechnology, Animal safety and wellbeing, the University of Foggia has the Agronomic Faculty and the Food Technology Faculty. These are the big poles where research groups work in strict conjunction with enterprises and other international institutions to develop new processes and support innovation.

The **Polytechnic of Bari** and **University of Salento** participate at this process too developing collateral curricula such as process engineering, managing engineering, electronic engineering, developing knowledge on industrial processes or applications useful to the agrofood transformation and industry (i.e. develop of finger print, RFID applications, etc.). The economical faculties belonging to University of Bari and University of Foggia and University of Salento complete this system providing economic analysis or studies on the sector, developing economic topics also related to agro-food innovation, and providing

academic curricula useful in this sector. The same role is being played by the private university, the LUM, which develops curricula in the economic and management area.

Graph 8 - Main patents at national and European level

Titolare	Titolo	Anno deposito
Elenco brevetti depositati in Italia		
UnifG-DISA	Procedimento per la produzione di matrici attive con funzioni antimicrobiche	2005
UniBA-DPPMA	Sequenza nucleotidica specifica per il ceppo L47 di <i>Aureobasidium pullulans</i> e suo impiego per lo sviluppo di diagnostici molecolari	2002
UniBA-DPPMA	Metodo per la rilevazione di fitovirus in piante mediante RNA antisense e piante trasformate	2002
UniBA-Dipartimento di biologia e patologia vegetale	Procedimento per la disinfestazione di terreno agrario	2004
UniBA-Dipartimento di biologia e patologia vegetale	Nuovo Ceppo di <i>Aphanodadium album</i> (Preuss) W. Gams, limitatore biologico di alterazioni parassitarie delle piante	2006
UniBA -DPPMA e CNR-IVV	Miscela di batteri lattici per la preparazione di prodotti da forno senza glutine	
UniBA -DPPMA	Corredo diagnostico per il rilevamento di infezioni da fitovirus nelle produzioni vivaistiche ortoflorofutticole	2004
CNR-IGV	Nuove varietà (Creso/grano)	
CNR -ISPA	Procedimento per preparazione di barretta vegetale	2006
CNR -ISPA	Procedimento per prevenire l'alterazione microbiologica dei prodotti da forno	2005
CNR -ISPA	Procedimento ed apparecchiatura per la determinazione rapida di deossinivalenolo in una matrice a base di cereali	2006
CNR - ISMAR	Indice biotico di qualità lagunare	n.d
CNR - ISMAR	Unità per colture algali monospecifiche	n.d
CNR - ISMAR	Tecnica di induzione alla maturità sessuale della mazzancolla	n.d
CNR - IPP	Azione nematostatica e nematocida dell'1,3,7-trimethylxanthina (caffeina)	n.d
CNR - IVV	Metodo per l'identificazione del virus A della vite (GVA), anticorpi monoclonali (Mab) contro GVA e linea cellulare di ibridoma atta a produrre gli anticorpi monoclonali stessi	n.d
CNR - IVV	Metodo per l'identificazione del virus B della vite (GVB), anticorpi monoclonali (Mab) contro GVB e linea cellulare di ibridoma atta a produrre gli anticorpi monoclonali stessi	n.d
CNR - IVV	Proteina 36K del virus italiano della maculatura anulare del garofano (CIRV)	2001
Elenco brevetti depositati in Europa		
UniBA-DPPMA	Diagnostic Kit and method for detecting phyto virus infections in plant production	2004
UniBA-Dipartimento di biologia e patologia vegetale	Process for the disinfestation/fertilization of agricultural area	2005
CNR-IBBE e UniBA-DPPMA	Biopeptides with anti-hypertensive activity from bovine beta casein	2006
CNR -ISPA	Method for the detection of phosphine in cereals	2006
CNR -ISPA	Tetraphosphonate cavitans as molecular receptors in mass sensors for gases and method for determinino phosphine by using said sensors	2006 (depositato da Bari)

“La ricerca pubblica in ambito agricolo ed agroalimentare in Puglia” - - Brevetti Italiani ed Europei

“Public research in agricultural and agro-food fields in Apulia” - Italian and European Patents, ARTI PUGLIA, 2008

RTD entities represent a solid point of reference in the Apulian scenario: they are active in researches useful for the entire productive system, supporting the food and feed chain according to EU strategies and national and regional policies, thus permitting the creation of a common growth of innovation with enterprises. Many Apulian research institutes belong to CNR – National Research Council of Italy – and gives support to the agrifood research system, developing advance research to those aspects related to food production or to plants.

CNR ISPA - Institute of Science of Food Production belongs to National Research Center of Italy (CNR) and is the major public research institute in Apulia specialized in food research, with its national headquarters in Bari and a branch in Lecce. It represents one of the most important research center in Italy and in Apulia, with its long time research and advanced knowledge in food and feed safety and food quality. The CNR ISPA employees more than 100 researchers, has high equipped laboratories (chemical, microbiologic, quality control labs) and international experience being partner or coordinator of several international projects.

Other CNR institutes are briefly presented (IGV – IVV) in the table below.

The **Agricultural Research Council (CRA)** is a national research organization which operates under the supervision of the Italian Ministry of Agricultural, Food and Forestry Policies (MiPAF), with general scientific competence within the fields of agriculture, agro-industry, food, fishery and forestry. CRA gathers together the experience of 15 Centers and 32 Research Units organized in 5 Departments (i.e. Vegetal Biology and Production; Animal Biology and Production; Transformation and Valorization of Agro-Industrial Products; Agronomy, Forestry and Land Use; Quality, Certification and Reference). In Apulia the CRA is present with some branches specialized in wine and cereals.

CRSA (Sperimental Research Center for Agriculture) operates in the field of applied research to agriculture, in particular developing new methods or processes for improving grape cultivars and wine transformation processes. This center is participated by Apulia Region, Municipalities of Locorotondo and Cisternino, Province of Bari and Taranto, University of Bari – Faculty of Agronomy, SMEs, Consortium too and represent an example of public-private experience to support innovation in a specific area and in a specific sector (wine and enology). The Center is closed to a Professional Training Institute specialized in enology and wine processing.

The key regional entities in support of food RTD and innovation are indicated in the table attached at the end of this document. They include:

- Academic and research entities;
- Business support entities;
- Innovation and technology transfer entities;
- Funding institutions.

In the following table the main institutions operating in the field of research and innovation are presented.

Table 7 - Description of key players of the regional research and innovation system focusing on food

Type of entity	Legal name of entity	Short description	Main role in the regional research and innovation system	Website
Academic entity	UNIVERSITA' DEGLI STUDI DI BARI "A. MORO" Faculty of Agriculture	<p>The University of Bari is the main Apulian University with 15 Faculties.</p> <p>The Faculty of Agriculture develops advanced research in the field of microbiology, biotechnologies, plant protection. It has different kinds of courses: the first level (3 years) including Agricultural Science and Technology , Protection and Management of Land and Agro-Forest Landscape, Food Science and Technology. The second level courses for the full degree (2 years) are: Food Science and Technology, Management and Sustainable Development of Mediterranean Rural System, Medicine of Plants.</p> <p>The Faculty of Agriculture has three departments: Agro-Forestry and Environmental Chemistry and Biology; Animal Productions; Agro-environmental and territorial sciences.</p>	The University is the key player for the research and innovation system, developing researches connected to the main Apulian productive chains, being in contact with Regional entities as well as SMEs. The University has many relationships at international level.	www.uniba.it http://www.uniba.it/ateneo/facolta/agraria
Academic entity	UNIVERSITA' DEGLI STUDI DI BARI "A. MORO" Faculty of Biotechnologies	<p>The Faculty of Biotechnological Sciences has different courses: 3 years courses for a first degree level (Biotechnology of process and products innovation, Medical and Pharmaceutical Biotechnology) and 3 2 years courses for the full degree in Industrial end environmental Biotechnology, Medical Biotech and Molecular Medicine, Biotechnology for food Safety and Quality. The Faculty hosts the Ministerial Centre of Excellence for research in "comparative genomics" (CEGBA),.</p>	The University of Bari has high expertise in biotechnology at international level. It promotes the Apulia Region carrying on innovative actions funded by the EU, for innovation and improvement of industrial-research, by applications of biotechnology to local productions (food, environment, health), which lead to the creation of the Apulian Biotechnology Pole.	http://www.biotec.uniba.it/
Academic entity	POLITECNICO DI	The Polytechnic University of Bari has 3 faculties	The Polytechnic of Bari plays a technical role in	www.poliba.it/w

Table 7 - Description of key players of the regional research and innovation system focusing on food

Type of entity	Legal name of entity	Short description	Main role in the regional research and innovation system	Website
	BARI	(Engineering – 2- and Architecture) and 15 spin-off companies, operating in different field of manufacturing engineering or in advanced services applied to different sectors (electronic, management, ICT,etc.).	the innovation system, developing advanced research in the ICT and electronic field, in managing areas too, creating a knowledge pattern to be used or applied to food sector for the processes improving and/or monitoring	
Academic entity	UNIVERSITA' DEL SALENTO	The University of Salento has 10 Faculties developing research in important sectors, main economic and engineering, biotechnologies giving its support to development of local SMEs. It has 28000 students, 3 Campuses (Lecce, Arnesano e Brindisi), 17 Departments, 22 Research Centres and Institutes and 4 Specialization Schools.	The University of Salento is a research university aiming to develop basic and applied research. The research activity ranges within a cooperation network among Italian and foreign universities, public and private research centers , and national and international enterprises.	www.unile.it
Academic entity	UNIVERSITA' DEGLI STUDI DI FOGGIA	The University of Foggia has 6 Faculties developing research in many important sector. The Faculty of Agriculture, organized in 2 Departments, is strictly connected to its territory offering 3 years degree courses (Enology and wine growing, Agriculture science and technology, Food Science and Technology) and 2 year full degree courses (Food and human nutrition sciences, Agriculture science and technology, Food Science and Technology, Enological and wine producing sciences).	The University of Foggia is being a pillar for the agrofood research, being specialized agriculture engineering, enology and wine growing. It represents a reference point, also at international level, for these branches.	www.unifg.it www.agraria.unifg.it
Research entity	CNR ISPA	CNR ISPA carries on research to improve quality and safety of agro-food productions, by basic and applied research, technology transfer and education. The research programme is focused on the following thematic areas: production of food with improved organoleptic and nutritive characteristics; development of innovative processes to obtain products of agro-industrial interest; identification of risk factors in food safety and achievement of safe foods and feeds through monitoring and decontamination of toxic components.	CNR ISPA is a reference point at international level in some food safety and quality field. This gives the opportunity to local SMEs to have a high-level interlocutor, with advanced research. It is well integrated with SMEs and companies (at national and international level) and it can give a good support for the innovation based growth.	www.ispa.cnr.it

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Type of entity	Legal name of entity	Short description	Main role in the regional research and innovation system	Website
Research entity	CNR IPP	The Institute for Plant Protection (IPP) of CNR, located Florence, has one Organizational Support Units in Bari. The mission of IPP is the study of plants stress factors, in order to identify resistance mechanisms and methods of defense against biotic stress and abiotic stress protection in order to improve quality and quantity of agricultural food production and for a sustainable and environmentally friendly growth. The research are conducted with both programs under the ordinary funding and participation in national (MIPAAF, PON) and international (EU) projects,	The Section of Bari has specific expertise in agrarian nematology. Research lines concern biodiversity, taxonomy and phylogeny of nematodes of agricultural interest, chemical, physical and agronomic control strategies, biological control, host and parasite genetics, the study of host-parasite relationship and the relationship between nematodes, viruses and other microorganisms.	www.ipp.cnr.it
Research entity	CNR IGV	The main mission of IGV-Bari is to safeguard and preserve the plant genetic resources with specific reference to the germplasm of cultivated plants interesting in the Mediterranean basin such us cereals (wheat, oat, barley, etc.), grain legumes (fava bean, pea, bean, cowpea, chickpea, lupine, lentil, etc.), fodder legumes (vetch, French honeysuckle, etc.) and various vegetables (cabbage, eggplant, pepper, artichoke, etc.).	The results and acquired experience have allowed the Section in Bari to become a reference of excellence in the national and international scientific community in the field of the safeguard of plant biodiversity. This favoured the creation of a network with several public and private subjects interested in the exploitation of plant genetic resources. IGV is proprietor of 2 patents concerning new varieties of durum wheat.	www.igv.cnr.it
Research entity	CRSA	The Center for Research and Experimentation in Agriculture "Basile Caramia" is a non-profit organization founded in 1987 by the Region of Puglia, the province of Bari and Taranto, University of Bari and Foggia and other public entities. The Center performs mainly researches on olive (implementation of programs to improve health and conservation of local germplasm) and grapes (conservation and study of autochthonous germplasm, approval of clones for table and wine grapes, oenological and viticultural experimentation, genetic improvement of table grapes).	The CRSA participates in several regional projects and is very active in the field of the promotion and valorization of local citrus-growing products, fruits, olive and wine of Puglia.	www.crsa.it/

Table 7 - Description of key players of the regional research and innovation system focusing on food

Type of entity	Legal name of entity	Short description	Main role in the regional research and innovation system	Website
Research entity	CRA	The Agricultural Research Council (CRA) is a very important research actor, with a strong specialization in the field research, agricultural processes and cultivation of food products. CRA is involved in several projects, and focuses in particular on grape and wine research. CRA is a national structure and has 4 branches at local level strictly connected to the areas in which they operate (grape, wine and cereals, zootechnical and cropping systems in Apulia).	CRA closely operates in conjunction with central administrations, local and regional institutions, companies and various trade, industrial and legal associations. As an outcome of this organization scheme, the Regions in particular, which serve as links between local organizations and agriculture, have assumed a key role in defining the orientation and course of CRA's research.	www.entecra.org
Research entity	IAMB	The Mediterranean Agronomic Institute of Bari works in four thematic areas: Land and water resources management, Integrated pest management of Mediterranean fruit tree crops, Mediterranean organic farming and Sustainable agriculture and rural development. It was established in 1962 by CIHEAM (International Centre for Advanced Mediterranean Agronomic Studies), an intergovernmental organization including 13 Mediterranean countries with headquarters in Paris.	The Mediterranean Agronomic Institute of Bari is a centre for post-graduate training, applied scientific research and promoter of in-loco partnership actions in the framework of the international cooperation programmes. The mission of IAM-Bari is that of implementing the institutional goals of CIHEAM in programmes of international co-operation to development and the specific requirements of the different territories and national economies of Mediterranean countries.	www.iamb.it
Business support entities	CONFINDUSTRIA PUGLIA	Confindustria Puglia is the main Apulian association of enterprises, representing independently their interests in the political and trade system and protecting the corporate interests at regional level. The association proposes suggestions for regional policies and the community of industries, promoting also the collaboration among local points operating in the six Apulian provinces.	Confindustria has the role to aggregate their associates, informing and creating direct contacts to know tools and opportunities to innovate the economic system, through specific meetings with policy makers and/or credit and financial institutions, Apulia Region Department for economic development.	www.confindustria.puglia.it
Business support entities	Legacoop Puglia	Legacoop Puglia is a Legacoop regional branch organization of the National League, including the Apulian entities participating at the National League of Cooperatives and Mutuals. Legacoop Puglia acts independently from any	Legacoop Puglia represents, assists and protects cooperatives, associations and organizations to achieve their goals. It works to stimulate, in any sector, especially young workers and women, users and SMEs to organize into cooperatives	http://www.legacooppuglia.it

Table 7 - Description of key players of the regional research and innovation system focusing on food

Type of entity	Legal name of entity	Short description	Main role in the regional research and innovation system	Website
		political force, for the promotion, development, enhancement and protection of co-operation of mutuality without purpose of private speculation, founded on the principles of participation and self-management. It has a agro-food section in Apulia, with 14% of cooperatives operating in this sector	and associations appropriate to address the market.	
Business support entities	CNA Puglia	CNA Puglia is the regional branch of National Confederation of Crafts and SMEs, representing the interests of small businesses, SMEs and many forms of self-employment. In Italy it counts approximately 670,000 associates. The Agrofood section is very active to protect the industry needs and requirements.	CNA Puglia plays an important role in the region, assisting and representing its associates for priority questions in agrofood sector, by participation at institutional discussion plans.	www.cnapuglia.it
Innovation and technology transfer entities	D.A.RE.	D.A.RE. is the Apulian technological district, composed by several Universities and Research centers, labs and SMEs of food sector. It represent the main interface for funding between Italian Ministeries and local enterprises, transferring technological research. It provides services to foster technological innovation, managing complex projects on industrial research and precompetitive development, disseminating research results, favoring the internationalization of product and process innovation.	D.A.RE. has the role of boosting innovation among its partners, bringing together 60 enterprises and many academic and research institutions. D.A.RE. favours the joint participation of its consociates to public call for tenders and call for proposal in the agro-food innovation, through National programs (i.e. PON), In this way the district push the demand of innovation by SMEs creating a critical mass.	www.darepuglia.it /
Innovation and technology transfer entities	ILO PUGLIA	The Industrial Liaison Office in Apulia is a network of singular offices organized by Universities and Research Centers. The new ILOs system includes 4 Apulian Universities and the CNR. The network aims to encourage the development of technological innovation in companies and contribute to the realization of new projects; to promote innovation and encourage cooperation and technology transfer from Universities and Research centers.	ILOs play an important role as link between innovation supply offered by research institutions and demand of technology coming from industry. ILOs favour the technology matching and support SMEs in their process. ILOs organize also advanced training addressed to innovative SMEs and meetings with specialized players for fund raising and business development -Start up and venture capital.	

Table 7 - Description of key players of the regional research and innovation system focusing on food

Type of entity	Legal name of entity	Short description	Main role in the regional research and innovation system	Website
Innovation and technology transfer entities	ARTI PUGLIA Regional Agency for Research, Technology Transfer and Innovation	ARTI is the public agency with the function of driving the process of innovation in the region, being the operational body of the Region.	The Agency leads very important initiatives to support research and TT, by organizing meetings, programmes and initiatives (i.e. Start Cup, Innovation Festival, Talents networks, training on IPR and patents, etc.). It favours the encounter between venture capital and SMEs for promising business ideas.	http://www.arti.puglia.it/
Funding institutions	Fidindustria Puglia	It is a credit consortium supporting SMEs associated to Confindustria Puglia. The Consortium brings together more than 1,500 companies, has secured assets for 15M, loans granted for 40M and 20 agreements with banks.	This financial consortium, born under the aegis of Confindustria, support SMEs for investments and new developing projects allowing credit at special competitive conditions.	www.assindustria.ba.it
Funding institutions	INVITALIA	The Apulian branch of INVITALIA supports new business initiatives proposed by young people or by unemployed, according to the Italian laws for microcredit, for young entrepreneurship, in different sectors for manufacturing and services (including the professional ones).	This public institution has the role to interact with other local Public institutions to know regional needs and cooperate for funding initiatives (i.e. with Apulia Region)	www.invitalia.it
Funding institutions	Fondazione Cassa di Risparmio di Puglia	This Bank foundation belongs to a local financial bank group and aims to support new socially relevant initiatives for the economic growth of our territory.	The foundation is an active player in supporting new initiatives, including those addressing the food sector, which is relevant in Apulia.	http://fcrp.integrasoluzioni.it/

2.5 POLICY FRAMEWORK FOR INNOVATION AT A REGIONAL LEVEL

2.5.1 OBJECTIVES AND PRIORITIES

The Regional policy has reinforced the technological and productive **districts system**, to strengthen the economic future perspectives, focusing on the promotion of industrial clusters as a powerful way to boost local development and competitiveness. The Apulia Region set **12 districts**, namely a network of firms linked each other or to productive sectors. These companies are also linked to institutions involved in related activities, although in not closed areas. All the Universities, Polytechnics and Research Centers (in addition to associations, corporations and unions) in collaboration with industry can produce innovation in the markets boosting the competitiveness of the Apulian manufacturing. In the agro-food sector the Region recognized 2 agro-food productive districts (The Agro-food District of Food Quality “Terre Federiciane”, operating in Bari and Foggia areas with 683 partners; the Agrofood District of Food Quality “Jonico-Salentino”, operating in Lecce, Brindisi and Taranto areas with 187partners)and 2 technological ones (Agro-food, Biotech).

In addition, with Deliberation n. 1552 issued on 7.08.2009 the Apulia Region has indicated as parts of innovative industrial sectors, those enterprises that develop or give valorization to the research results also in the field of agro-food. In particular it gives reference to biological compounds research for quality, typical and safety of food products, to traceability and characterization, (market related too), of the value and innovation of products, to biotechnologies, including eco-friendly productions with low water use as well as those technologies finalized to OGM individuation.

The main axes to sustain the research and innovation have been set as follows:

- Axis 1 – Support to the innovation demand by enterprises
- Axis 2 – empowerment of technological offer by the research system
- Axis 3 – Qualification of matching between demand and offer
- Axis 4 - Improvement of human resources in the R&I sector.

A recent document has been issued by Agrofood Resources Dept. of Apulia Region setting “**Guidelines for research and experimentation in agriculture 2012-2014**”. IN this document the Apulia Region defines strict ways for linking agriculture and agrifood Apulian enterprises with scientific research system and knowledge promotion, in order to create an integrated system including research, testing, demonstration and innovation transfer process as a competitive key factor for economic development of agrifood productive chains. Moreover, the guidelines indicate the objectives and road map to be addressed by entire Region to support and promote in a proper way the research and innovation system, according to PSR 2007-2013 aims and setting the main research topics, the activities typologies to be carried on by

research projects, funding schemes and procedures, as well as the selection, monitoring and assessment mechanisms.

The regional guidelines indicate the strategic directions as follows:

- to speed and make research closer to the needs of innovation expressed by market and consumers;
- To answer in a proper way to the knowledge and innovation demand expressed by Apulian agricultural enterprises and by agrifood system to improve the economic, manufacturing, environmental sustainability conditions;
- consolidation of financial resources invested in research to strengthen critical mass. Improving the operative and managing procedures for regional initiative supporting research and innovation in agrofood sector;
- to strengthen relationships and networks among research institutions, between research entities and agrofood manufacturing chains, favouring confrontation process, mutual cooperation and participation (including the financial one) to projects of common interest;
- to encourage the development of scale economies to increase agrofood production competitiveness;
- to develop synergies and professional growth of players involved in research, supporting the interdisciplinary and avoiding any duplication of research initiatives;
- to facilitate procurement and access to technological innovation for agrofood enterprises, promoting their application and the validation processes by final users; to integrate production, transfer and dissemination of research results and output; knowledge sharing;
- to build a consistent evaluation system for the agriculture and agrofood research and its impacts on Apulia Region;
- to promote the implementation of coordination and integration, including structures and processes, of different initiatives supporting at regional level the research and innovation in this sector, also by applying a consultation mechanism to consolidate different actions taken by Agriculture Service and other Regional Services operating in the field.

The regional policy is being realized by three main programs:

1. PO 2007-2013 - ERFD Operational Program
2. Apulian Rural Development Programme (PSR) 2007-2013
3. Apulia Region Framework Programme Agreement

1. PO 2007-2013 - ERFD Operational Program

In the Operational Program of Apulia Region is stated the regional Policy for Research and Innovation, to be applied in particular through three main axis:

AXIS I - Promotion, enhancement and dissemination of research and innovation for competitiveness;

AXIS VI - Competitiveness of productive systems and employment;

AXIS VIII - Governance, institutional capacity and competitive and effective markets.

Main activities promoted by the ERDF OP aim to:

- a) support the demand for research and innovation of enterprises;
- b) the strengthening of some regional networks within specific APQ being implemented with a joint participation of enterprises, universities and specialized laboratories, such as:
 - Technological Districts, with particular reference to mechatronics, biotechnology and hi-tech;
 - Networks of public-private research laboratories operating in the following areas: mechatronics, food, new technologies for production systems, biotechnology for human health, energy, aviation space, new materials and new technologies for systems production.

The Apulia Regional strategy acts the national strategy (AQP-PON) by funding four main actions: 1) scientific and technological areas (150 m €); 2) networks for strengthening scientific-technological potentiality (225 m €), 3) empowering scientific-technologic structures and equipments (20 M €), 4) programmatic integration for obtaining effects of system (10M €). The PO was issued in February 2008.

Webiste: www.fesrpuglia.eu/

2. Apulian Rural Development Programme (PSR) 2007-2013

The Rural Development Programme (RDP) issued by Apulia Region, respecting the National Strategic Plan, aims to meet the needs of individual companies and broader economic and social ones (local areas and systems involved), finding ways and means according to an integrated approach for the country and development planning. The Apulia Region favors three types of integration aggregating more subjects in the scope of a chain or territorial area, that are:

- The Integrated Chain Projects (PIF), which mobilize and encourage strategic alliances between SMEs, aiming to increase competitiveness in the markets;
- The Multi-Pack for Youth, allowing to a single applicant to apply for interventions that integrate different measures;
- The Local Development Plans (LDP), prepared by Local Action Groups (LAG) belonging to Leader areas (EU Leader approach) to guide, support and assist operators in the process of economic diversification.

In addition, several measures of the RDP are being implemented in an integrated way in order to enhance and protect the environment, land and landscape and improving the attractiveness of the territory.

The main Axes are:

- Axis I - Improving the competitiveness in agriculture and forestry;
 - Axis II - Environment and improvement of countryside;
 - Axis III - Quality of life in rural areas and diversification of the economy;
 - Axis IV - implementation of Leader plans.
- The RDP was issued in January 2008.

Website: www.svilupporurale.regione.puglia.it/

3. Apulia Region Framework Programme Agreement

The APQ Regione Puglia – Framework Programme Agreement – implements the actions according to specific and operational objectives set in the National Research and Competitiveness Operational Programme 2007-2013. Four lines of intervention are defined as follows:

1) Scientific-technological Area

The first line of intervention is to strengthen the research potential and innovation of regional actors involved in scientific and technological areas of strategic importance for the Apulian economy. Planned investments of up to 150M € in some priority areas, including Health and Human biotechnology and food processing system.

2) Strengthening of scientific-technological potential

The second action line provides up to 225M € to support the innovative potential of Universities, Research Centers and SMEs, promoting the development of scientific and technological sectors of excellence and High technology Districts and networks, as well as the creation, enhancement and development of public-private laboratories and networks in regional strategic sectors, including Health and biotechnology, agro-food system, advanced manufacturing systems.

3) Strengthening of structures and scientific-technological facilities

The third line of action concerns the development of important centers of excellence capable to match innovation needs and strategic repositioning of business sectors. This line provides 20M € in the areas of advanced materials and agro-food system.

4) Programmes and system effects

The fourth line of action provides 10M € for the promotion of network services for innovation (counselling, promotion, mentoring).

The AQP started in 2009 with a budget of 405 M €.

Website: <http://www.ponrec.it/documenti/apq/apq-puglia.aspx>

2.5.2 FOOD RELATED PROJECTS FUNDED BY CURRENT NATIONAL PROGRAMMES

In the past 5 years many big projects proposed by Apulian RTD jointly with SMEs have been awarded under the **National Operating Program Research and Competitiveness 2007-2013** for more than **40 million €**. The rationale of the PON is economic catch-up of several southern regions of Italy lagging behind. The purpose of the Operating Programs is to promote the competitiveness of the economic system of these regions, and improve the scientific, technological and economical position of the whole country in the international context. The follow tab lists the awarded projects in Apulia.

Table 8- Food Related Projects Funded by National Operating Program Research and Competitiveness 2007-2013 (source: www.ponrec.it)

Measure Ref.	Title of project	YEAR	Funding
PON01_01435/7	Fruit & Vegetables products with high service level: technologies for food quality and new products	2011	€ 4.097.500,00
PON01_00851/3	Bio-innovations for dairy products with high health level of contents	2011	€ 3.024.750,00
PON01_01435/F15	Innovative skills for convenience products	2011	€ 148.000,00
PON01_00851/F2	High training course: biotech for dairy products	2011	€ 953.560,00
PON01_01226/6	From nutraceuticals to drugs for integrated strategies	2011	€ 1.230.000,00
PON01_00878/6	DIRECT FOOD - Made in Italy and Local traditional food products valorization by integrated management of food chains and innovative channels (producer-consumer)	2011	€ 214.200,00
PON01_01841/1	EpiSud - Program to develop methodologies for the identification and control of animal mycobacterial infections	2011	€ 1.275.000,00
PON01_01841/F1	Researchers and technicians training in development of methodologies for identification and control of animal mycobacterial infections	2011	€ 46.000,00
PON01_01480/F9	Technological and processing innovations to irrigation reuse of urban agro-industry waste water for a sustainable water resources management	2011	€ 5.318.336,75
PON01_01226/F8	Training project for development of nutraceuticals and biotechnology healthy products	2011	€ 219.305,00
PON01_01611/6	Sustainability of potted plant production in Mediterranean environment	2011	€ 949.000,00
PON01_01145/10	Innovation and technological development for South Italy cereal chain sustainability and competitiveness	2011	€ 5.127.650,00
DM29040/5	AgroBioPack: Environmental technologies for bioactive packaging for	2008	€ 1.006.700,00

Table 8- Food Related Projects Funded by National Operating Program Research and Competitiveness 2007-2013 (source: www.ponrec.it)

Measure Ref.	Title of project	YEAR	Funding
	Apulian fresh dairy products		
DM29221/1	Bio-innovation for the typical Apulian mozzarella	2008	€ 831.300,00
DM29223/4	Biotechnologies for fresh-cut table grapes production	2008	€ 1.212.761,50
DM28953/7	FOODSYS Integration of new technologies and systems to characterize national food typical products on global markets	2008	€ 2.249.564,00
DM29028/2	New technologies for typical regional fresh pasta production with high-quality level and functional compounds by vegetables	2008	€ 1.214.641,00
DM28830/3	Apulian Hortobiotics: vegetable probiotics foods. Biotechnological applications for new probiotic foods with high quality and innovation level in the preservation and processing of vegetables.	2008	€ 773.693,70
DM6798/3	Buckwheat enhancement by process and product innovation	2007	€ 724.513,48
DM19410/F3	Advanced training for researchers experts in bioinformatics studying molecular biodiversity	2006	€ 2.779.000,00
DM19410/2	Bioinformatics Laboratory for Molecular Biodiversity	2006	€ 2.156.165,80
DM18092/F	AGRO-GEN Genomics Laboratory for characters of agronomic relevance in durum wheat: useful genes identification, functional analysis and molecular marker-assisted selection for development of the national seed industry	2006	€ 6.929.384,49

The projects were founded according a cluster theme approach in order to avoid waste of economic resources and to create critical mass of money and human capital around a specific theme considered strategic for the territory.

2.6 FOCUS ON SPECIFIC MEASURES, PROJECTS AND INITIATIVES

In this section the focus is placed on 3 measures sustaining innovation and addressing also the food industry, RTD and innovation implemented by Apulia Region. The Apulia Region doesn't have a specific fund for agrofood sector, but this is included in the main strategic sector of Regional interest for economic development. Consequently, all the measures addressing RTD and innovation are directed also to food and agrofood system, due to its relevance in the regional scenario.

The main criteria for the selection of the specific measures and projects were their relevance to the thematic objective/ priority of food innovation and to the key players in food RTD innovation process.

Table 9 . Main Apulian Region measures sustaining research and innovation

Name of the measure	Investments in Research for SMES
<i>Key actors</i>	Businesses from all economic sectors including the food industry.
<i>Funding</i>	PO 2007-2013 Axis I – Intervention line 1.1 DGR n. 2155 issued on 14/11/2008:
<i>Rationale</i>	<p>The Apulia Region supports investments by Apulian SMEs addressed to develop research and technological development based on industrial research and pre-competitive development.</p> <p>The maximum financial contribution is 1M euro for industrial research, 799k euro for pre-competitive development, 300k euro for technical feasibility studies, 200keuro for patents.</p>
<i>Particular sector and subsector</i>	Industry and Agro-food industry
<i>Target group(s)</i>	Apulian SMES, operating as individual and/or associated with other firms
<i>Focal points and specific objectives</i>	Industrial research
<i>Key activities and Main outcomes/ Indicators for goals achieved</i>	<p>294 proposals received, 148 admitted for a total of 80ML of investments. Public funding: 48ML Euro. Agro-food SMEs investments represent 9% of total.</p>
<i>Ex-post evaluation</i>	Not available
<i>Follow-up actions/ sustainability</i>	www.sistemapuglia.it

Table 10 - Main Apulian Region measures sustaining research and innovation

Name of the measure	Operational innovative enterprises
<i>Key actors</i>	Businesses from all economic sectors including the food industry.
<i>Funding</i>	10 mln €, Operational Programme, Programming Period 2007-2013 Axis I – Az. 1.1.3: Sub-Azione 5.7 - Aiuti alle piccole imprese innovative operative
<i>Rationale</i>	The measure aims to support the growth of existing innovative operating micro and small enterprises who wish improve their competitiveness through the application of research results in the main strategic industrial sectors of Apulia (agro-food included). In particular the measure supports the investment projects enhancing the results of previous research.
<i>Particular sector and subsector</i>	All business sectors including the food industry.
<i>Target group(s)</i>	Apulian innovative operating PMI (SMEs operating in a certain manufacturing field, developing new processes or new products, being constituted in the past 3 years.
<i>Focal points and specific objectives</i>	Promotion, enhancement and dissemination of research and innovation for competitiveness
<i>Key activities and Main outcomes/ Indicators for goals achieved</i>	19 proposals received, 13 admitted for a total of 15ML Euro amount for investments and management. Public funding: 7ML Euro. Agro-food SMEs investments represent 5% of total
<i>Ex-post evaluation</i>	Not available
<i>Follow-up actions/ sustainability</i>	http://www.sistema.puglia.it/portal/page/portal/PianoLavoro/InnovativeOperative_2011

Table 11 - Main Apulian Region measures sustaining research and innovation

Name of the measure	Network of public research laboratories
<i>Key actors</i>	Research centers, Universities
<i>Funding</i>	Public funding: Regional Funds integrated with ERSF and FSE for a total budget of 40ML Euro

<i>Rationale</i>	The project aims to enhance the Apulian infrastructures of public laboratories of universities and public research trying to reach the international technological levels. The object is to create a Network of research laboratories for the aggregation of the system of the research supply in order to favour and support the innovation demand by SMEs, gathering Universities and Research centers. The way down is to create "nodes" throughout the area, based on highly specialized technology to be available and useful for research activities by Apulian companies, in order to generate a diversified industrial specialization in the region or respond to specific needs of a social nature.
<i>Particular sector and subsector</i>	Life science and agro-food sector, biotech, new materials.
<i>Target group(s)</i>	Research centers and labs , Agrofood SMEs, Districts and other research entities
<i>Focal points and specific objectives</i>	Creating and enforcing the research system in supplying innovation and technologies to facilitate and support needs and requirements by SMEs. The objective is to give Apulia a strong technological infrastructure with a breakdown structure of local points, distributed in a reticular way in all the region according to a very high level of technological specialization for SMEs innovation.
<i>Key activities and Main outcomes/ Indicators for goals achieved</i>	19 financed projects for a total of 80ML of investments. Agro-food networks are focused on: Electronic noise, germplasm conservation, new varieties, functional foods.
<i>Ex-post evaluation</i>	Not available, the project is still running.
<i>Follow-up actions/ sustainability</i>	Not applicable

Table 12 Main Apulian Region measures sustaining research and innovation

<i>Name of the measure</i>	Supporting new innovative SMEs
<i>Key actors</i>	New small and micro enterprises from all economic sectors including the food industry.
<i>Funding</i>	PO FESR 2007 – 2013 - Asse I – Az. 1.1.3: Act. 5.6 - Aiuti alle piccole imprese innovative di nuova costituzione 5ML euro for financing about 10 micro and small enterprises
<i>Rationale</i>	The measure aims to stimulate the creation of new start-up enterprises (micro and small) which wish improve their competitiveness through the application of research results in the main strategic industrial sectors of Apulia (agrofood included)
<i>Particular sector and subsector</i>	All business sectors including the food industry.

<i>Target group(s)</i>	Apulian SMEs of new constitution – start up enterprises.
<i>Focal points and specific objectives</i>	Promotion, enhancement and dissemination of research and innovation for competitiveness The measure is valid while financial resources last, starting from Sept 2011.
<i>Key activities and Main outcomes/ Indicators for goals achieved</i>	. Not available
<i>Ex-post evaluation</i>	Not available
<i>Follow-up actions/ sustainability</i>	http://www.sistema.puglia.it/portal/page/portal/SistemaPuglia/BandoNuoveImpreseInnovative

Table 13 - Main Apulian Region measures sustaining research and innovation

<i>Name of the measure</i>	R&D programmes deployed by SMEs
<i>Key actors</i>	New small and micro enterprises from all economic sectors including the food industry.
<i>Funding</i>	PO FESR 2007 – 2013 Asse I – Az. 1.1.2: Programmi di ricerca industriale e sviluppo sperimentale realizzati da PMI Budget: 10ML euro
<i>Rationale</i>	This measure supports the Apulian SMEs development by financing their procurement of special consultancy services for the technological processes and products innovation. In particular SMEs can apply for support services for innovative concepts, for innovation planning, technological tests, IPR management, business plans for industrial R&D or TT, projects , environmental and energy efficiency services.
<i>Particular sector and subsector</i>	All business sectors including the food industry.
<i>Target group(s)</i>	Apulian SMEs.
<i>Focal points and specific objectives</i>	Promotion, enhancement and dissemination of research and innovation for competitiveness The call is open from April 2012 to November 2012 and the projects should be

executed in 12 Months starting from grant approval.	
<i>Key activities and Main outcomes/ Indicators for goals achieved</i>	Promotion, enhancement and dissemination of research and innovation for competitiveness
<i>Ex-post evaluation</i>	Not available
<i>Follow-up actions/ sustainability</i>	http://www.sistema.puglia.it/portal/page/portal/SistemaPuglia/AiutiServizi

2.7 FUTURE POLICIES, STRATEGIES AND PLANS

2.7.1 POLICIES AND PLANS AT A EUROPEAN LEVEL

At a **European level**, future research, technological development and innovation activities during the next programming period 2014- 2020 will be funded by **Horizon 2020** (<http://ec.europa.eu/research/horizon2020/>). Running from 2014 to 2020 with an €80 billion budget, the EU's new programme for research and innovation is part of the drive to create new growth and jobs in Europe, Horizon 2020. It will combine all research and innovation funding currently provided through the **Framework Programmes for Research and Technical Development**, the innovation related activities of the **Competitiveness and Innovation Framework Programme (CIP)** and the **European Institute of Innovation and Technology (EIT)**. The proposed support for research and innovation under Horizon 2020 will:

- Strengthen the EU's position in science with a dedicated budget of € 24,598 million. This will provide a boost to top-level research in Europe, including an increase in funding of 77% for the very successful European Research Council (ERC), (**Excellent Science**);
- Strengthen industrial leadership in innovation € 17,938 million. This includes major investment in key technologies, greater access to capital and support for SMEs, (**Industrial Leadership**);
- Provide €31 748 million to help address major concerns shared by all Europeans such as climate change, developing sustainable transport and mobility, making renewable energy more affordable, ensuring food safety and security, or coping with the challenge of an ageing population, (**Better Society**).

It is expected that food related research and innovation will be funded by all the above-mentioned pillars of Horizon 2020. **Excellent Science** focuses to the production of new knowledge; **Industrial Leadership** focuses to the adoption of innovation by industry; **Better Society** focuses to tackling particular society related challenges.

Excellence science is expected to feature food related topics. **Industrial Leadership** features reference to technologies relevant and applicable to the food industry (Biotechnology; Advanced manufacturing and processing; Nanotechnologies; Advanced materials; Development of these technologies requires a multi-disciplinary, knowledge and capital-intensive approach.). **Better Society** features particular reference to «**Food security, sustainable agriculture, marine and maritime research, and the bio-economy**» and «*Health, demographic change and wellbeing*».

2.7.2 INITIATIVES INFLUENCING THE DEVELOPMENT OF POLICIES IN FOOD INNOVATION

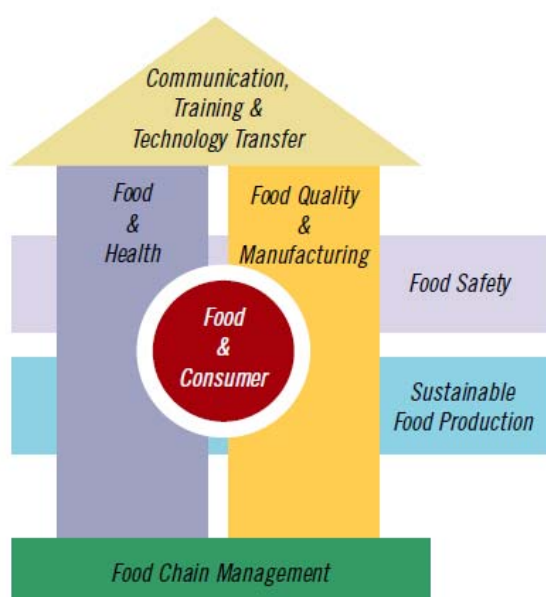
In this section we present two basic initiatives undertaken at a European level that influence the development of research and innovation policies for the food sector. The **European Technology Platform “Food for Life”** is an industry led initiative that aims to promote food innovation. The **Joint Programming Initiative “Agriculture, Food Security and Climate**

Change” tackles at international level research challenges of a wider scope, in particular the challenge of providing sufficient high quality food through sustainable agriculture in the context of climate change.

a) European Technology Platform “Food for Life”

The European Technology Platform Food for Life, (www.etp.ciaa.eu), was created under the auspices of the Confederation of the Food and Drink Industries of the EU (CIAA) in 2005 to strengthen the European-wide innovation process, improve knowledge transfer and stimulate European competitiveness across the food chain. The ETP brings together stakeholders from **agriculture, food processing, the supply and ingredients industry, retail, catering, consumers and academia**.

A **Strategic Research Agenda** (SRA), (http://etp.ciaa.eu/documents/SRA_2007_2010.pdf) has been developed for years 2005- 2020 by six different Working Groups focussing on the scientific and technological requirements. The **Strategic Research Agenda**, based on the shared vision of the different stakeholders, lists the activities which are considered most important and identifies research priorities covering all scientific and technological areas within **nutrition, food production, manufacture and distribution**. It also pays special attention to studies to ensure and maintain consumer trust and confidence in the food supply. The following key interacting research areas have emerged as a result:



Graph 9- Schematic presentation of the research areas required to reach the vision of the ETP Food for Life, http://etp.ciaa.eu/documents/ETP_implementation_action_plan_20081017.pdf

A detailed **Implementation Action Plan**¹ has been presented that describes the research, training, education and dissemination requirements needed to fulfil the vision and strategy. The Implementation Action Plan identifies the following **Key Thrusts**, i.e. research priorities leading to products, processes and tools:

¹ http://etp.ciaa.eu/documents/ETP_implementation_action_plan_20081017.pdf

- **Key Thrust 1- Improve health, well-being and longevity:** Three research priority areas are identified in which the development of new processes, products and tools that improve health, wellbeing and longevity is most needed and expected to be most successful. These are:
 - optimal development, wellness and ageing,
 - intestinal health and immune functions, and
 - weight management and obesity.

The proposed research aims at achieving breakthroughs in nutritional and food science and food technology, which will subsequently be implemented in food products (Food Quality and Manufacturing) and introduced to the market, which will require knowledge of consumer sciences and consumer behaviour (Food and Consumer).

- **Key Thrust 2- Build consumer trust in the food chain:** This is organised in three pillars:
 - Evaluation of risks versus benefits,
 - System innovation methodologies in the food production chain, and
 - Consumer studies.

The proposed research aims at securing breakthroughs in food science and technology, with a strong link to food safety and consumers' perception of innovation and safety.

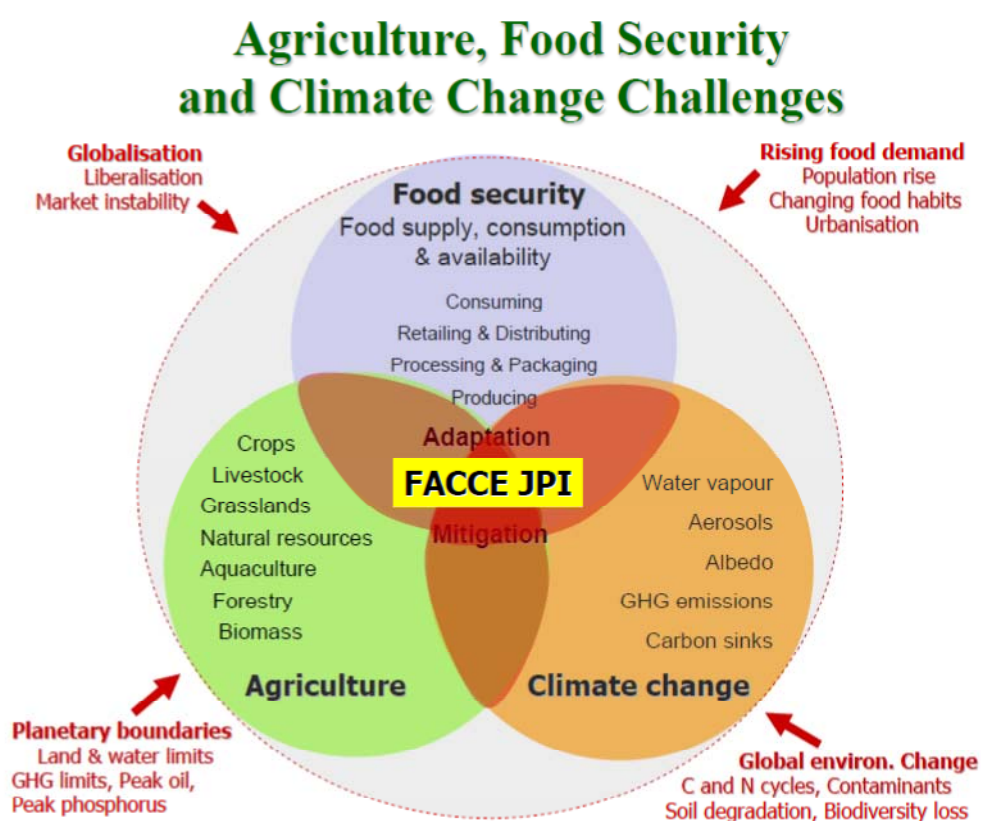
- **Key Thrust 3- Support sustainable and ethical production**
 - *Sustainability of European food chains:* the focus is to meet the need to better understand and analyse the sustainability of the food chains as the most sustainable option can be difficult to identify.
 - *Solutions for sustainable food chains:* this will focus on research to improve sustainability in the different parts of the food chain. Scenario technologies will help to identify future improvements along the food chain. Solutions will focus on technological and managerial approaches and will include consumer studies
 - *Food system efficiency and effectiveness:* focusing on research where the influence of the actions of the various actors in the food chain needs to be analysed. Improvement potentials for technical and managerial solutions in each step of the chain need to be identified and framework strategies defined to address institutional, social and entrepreneurial challenges.

The support being made available from Food for Life for national stakeholders is facilitated via the activities of the **National Technology Platforms** (http://etp.ciaa.be/asp/nat_food_platforms/nat_foodplatforms.asp). Food for Life is providing an available inventory of national and European funding schemes, as well as a guide of best practices for attaining funding for innovation and networking and clustering for SMEs. The latter is being made possible via business development and management and innovation support.

b) Agriculture, Food Security and Climate Change Joint Programming Initiative (FACCE JPI)

The Agriculture, Food Security and Climate Change Joint Programming Initiative (FACCE-JPI, <http://www.faccejpi.com>), which was adopted in October 2010 for launching by the European Council, aims to address the **challenge of providing sufficient high quality food through sustainable agriculture in the context of climate change** and involves twenty one European countries overall.

This initiative was established to enhance European research capacity in the light of the **projected increase of world population to about 9 billion people by the mid-century along with an increasing demand for food, feed, fibre and bio-fuels**, all in a context a changing climate and under a more stringent environmental regulation.



Graph 10- Agricultural, Food security and Climate Change Challenges, taken from http://www.faccejpi.com/faccejpi/content/download/3352/32772/version/3/file/FACCE_JPI_July-2011_v2.ppt

FACCE- JPI sets a Scientific Research Agenda with 5 core research themes as follows:

1. **Sustainable food security under climate change**, based on an integrated food systems perspective: modeling, benchmarking and policy research perspective.
2. Environmentally **sustainable growth and intensification of agricultural systems** under current and future climate and resource availability;

3. Assessing and **reducing trade-offs** between food production, biodiversity and ecosystem services;
4. **Adaptation to climate change** throughout the whole food chain, including market repercussions;
5. **Greenhouse gas mitigation**: N₂O and CH₄ mitigation in the agriculture and forestry sector, carbon sequestration, fossil fuel substitution and mitigating GHG emissions induced by indirect land use change.

2.7.3 POLICIES AND PLANS AT A NATIONAL AND REGIONAL LEVEL

At a **national and regional level** no future policies, plans and strategies related to research and technological development for the next programming period 2014- 2020 are made officially public at the time this report was compiled (May- June 2012).

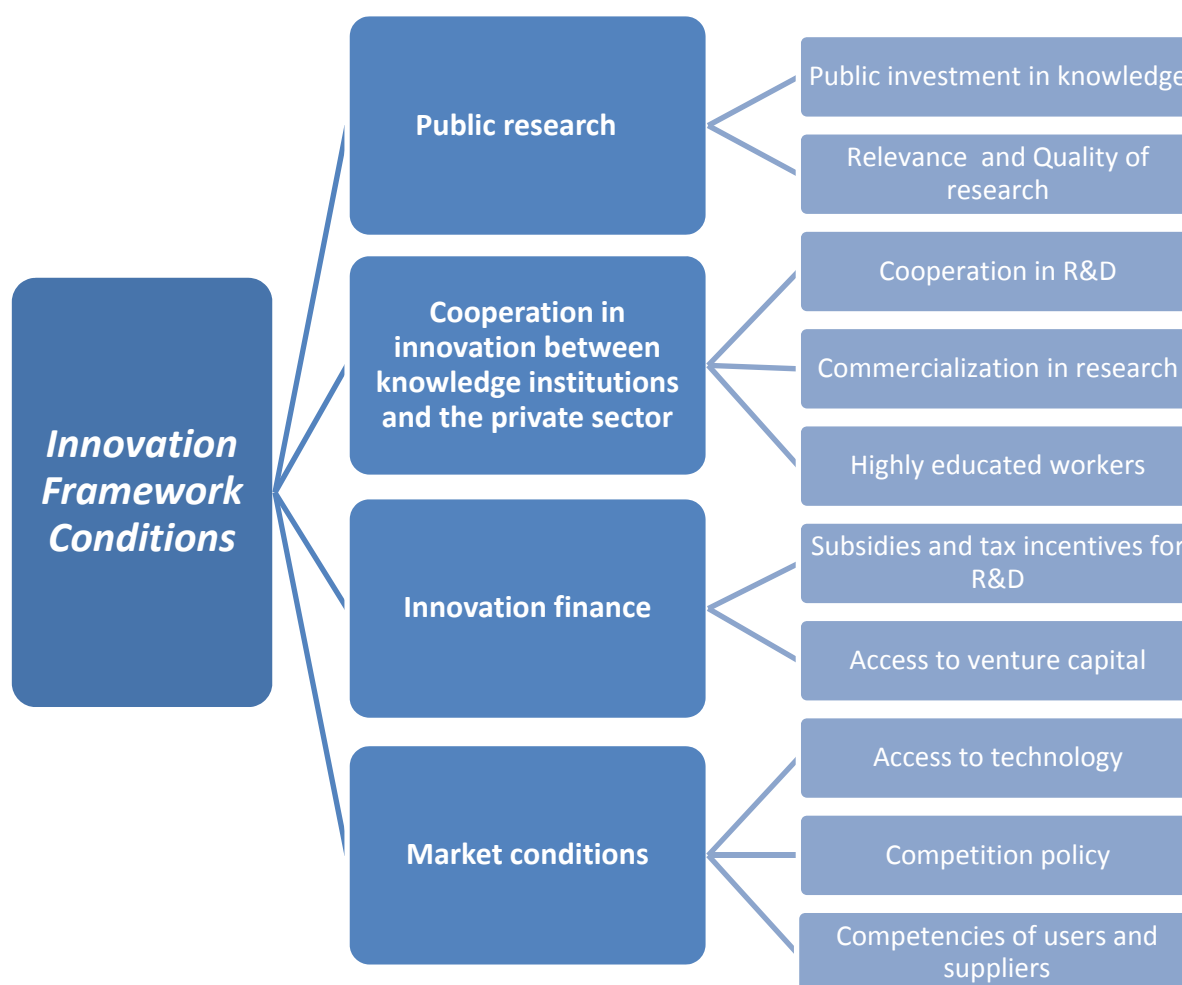
It has been announced the creation of a new national plan covering the period 2014-2020 aiming to prepare Italy to be more competitive at international level. The Minister for Education, University and Research, is in charge of its preparation and the plan should be issued in late 2012-early 2013. The National Plan of Research will provide a program of wide-range period, seven years, and will be aligned on the Horizon 2020 the 80 billion program that the European Commission is preparing to launch in 2014. The Minister worked in this direction following the true European policies and pushing the national policies for alignment, counting also on an intelligent use of resources, in order to obtain significant consequences both social and technological.

2.8 PRELIMINARY ASSESSMENT OF NATIONAL AND REGIONAL INNOVATION POLICIES AND PLANS

2.8.1 FRAMEWORK FOR THE ASSESSMENT OF INNOVATION POLICIES AND PLANS

The preliminary assessment of the innovation policies and plans should be able to answer to the following key question: ***“In which extent the specific policies and innovation framework conditions contribute to the achievement of the innovation and economic performance goals”?***

Below a structured approach to evaluate the innovation framework conditions is presented (adapted from “Benchmarking Innovation Policy and Innovation Framework Conditions”, Norwegian Ministry for Trade and Industry and Inside Consulting, January 2004, <http://www.oecd.org/dataoecd/37/34/33705586.pdf>). The approach assumes that there is a strong link between innovation performance and innovation framework conditions. The following aspects represent the necessary pillars that support innovation:



Graph 11- Framework for the Assessment of Innovation Policies and Plans, (adapted from “Benchmarking Innovation Policy and Innovation Framework Conditions”, Norwegian Ministry for Trade and Industry and Inside Consulting, January 2004, <http://www.oecd.org/dataoecd/37/34/33705586.pdf>).

The findings from the preliminary assessment of the Innovation Framework Conditions are presented below. To the most possible extent indicators were selected to represent the food innovation sector of the region of Apulia. When this was not possible, a more general reference was made to: a) innovation (not specifically food related) and b) the entire country.

2.8.2 PUBLIC RESEARCH

i) Public investment in knowledge: Total R&D expenditure (GERD) for Apulian Region was 0.8% of GDP in line with the Mezzogiorno average at 0.9% and below the national score. R&D expenditure in Italy is 1.26 of total national GDP (2009, Eurostat). Business enterprise sector accounts for more than 50% of total GERD. EU average for the same years was up to 2% with businesses contribute to R&D going around 1.23 % of GDP. OECD average was 2.27% of GDP. Apulia Region shows investment in research and development scoring 3 times less than that of EU average and this may probably have a negative effect in knowledge production. It should be noted that no breakdown of the GERD to food RTD is available.

Table 12- Total R&D expenditure (GERD) EU 27, Italy and Apulia , 2010²

	Government Sector	Higher Education	Business sector	Total
EU 27	0.27%	0.49%	1.23%	2.1%
Italy	0.18%	0.36%	0.67%	1.26%
Apulia Region	n.a.	n.a.	n.a.	0.8%

ii) Relevance and Quality of research: a number of key statistical information taken from the SJR & Country Rank is used to provide some quantified and verifiable information about the Relevance and Quality of research in Italy.

Statistics on scientific research in Italy reveal a striking contradiction. While the country's R&D resources significantly lag behind those of other major economies, its output, in terms of scientific publications, is not only one of the most prolific in the world, but also highly recognized in several fields.

In recent years, Italy's annual R&D spending, has scored low, compared with the European Union average. With 48%, the public sector is a large contributor to R&D funding, with private sector only recently leading—an uncommon occurrence in major world economies.

Table 13- N. of publications years 1996-2010, 2010

Country	Documents	Citable documents	Citations	Self-Citations	Citations per Document	H index
United States	5.322.590	4.972.679	100.496.612	46.657.626	20,18	1.229
China	1.848.727	1.833.463	7.396.935	3.937.424	5,66	316
United Kingdom	1.533.434	1.392.982	24.535.306	5.911.758	17,42	750
Japan	1.464.273	1.429.881	16.452.234	4.953.600	11,72	568
Germany	1.396.126	1.321.606	20.437.971	5.412.521	15,79	657
France	1.021.041	964.320	14.156.535	3.310.129	15,09	604
Canada	790.397	748.787	12.187.113	2.406.404	17,55	580
Italy	762.290	720.911	9.861.600	2.316.810	14,45	515
Spain	583.554	547.858	6.573.014	1.692.724	13,12	412

Source: <http://www.scopus.com/home.url>

Italy counts an average of just 3.4 researchers per 1000 people employed, against 8.2 in France. Yet between 1996 and 2010, Italy produced 762,290 scientific publications, putting the country in eighth position worldwide and fourth in Europe. The predominant fields are medical science, space science, mathematics, and physics. Over this same period, Italian publications were the seventh most cited internationally (9.86 million) particularly in the fields of molecular biology and genetics, immunology, space science, and neuroscience and behavior—illustrating researchers' proficiency in these fields.

²

[http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=File:Gross_domestic_expenditure_on_R%26D,_by_sector,_2005_and_2010_\(%25_share_of_GDP\).png&filetimestamp=20120113091423](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=File:Gross_domestic_expenditure_on_R%26D,_by_sector,_2005_and_2010_(%25_share_of_GDP).png&filetimestamp=20120113091423)

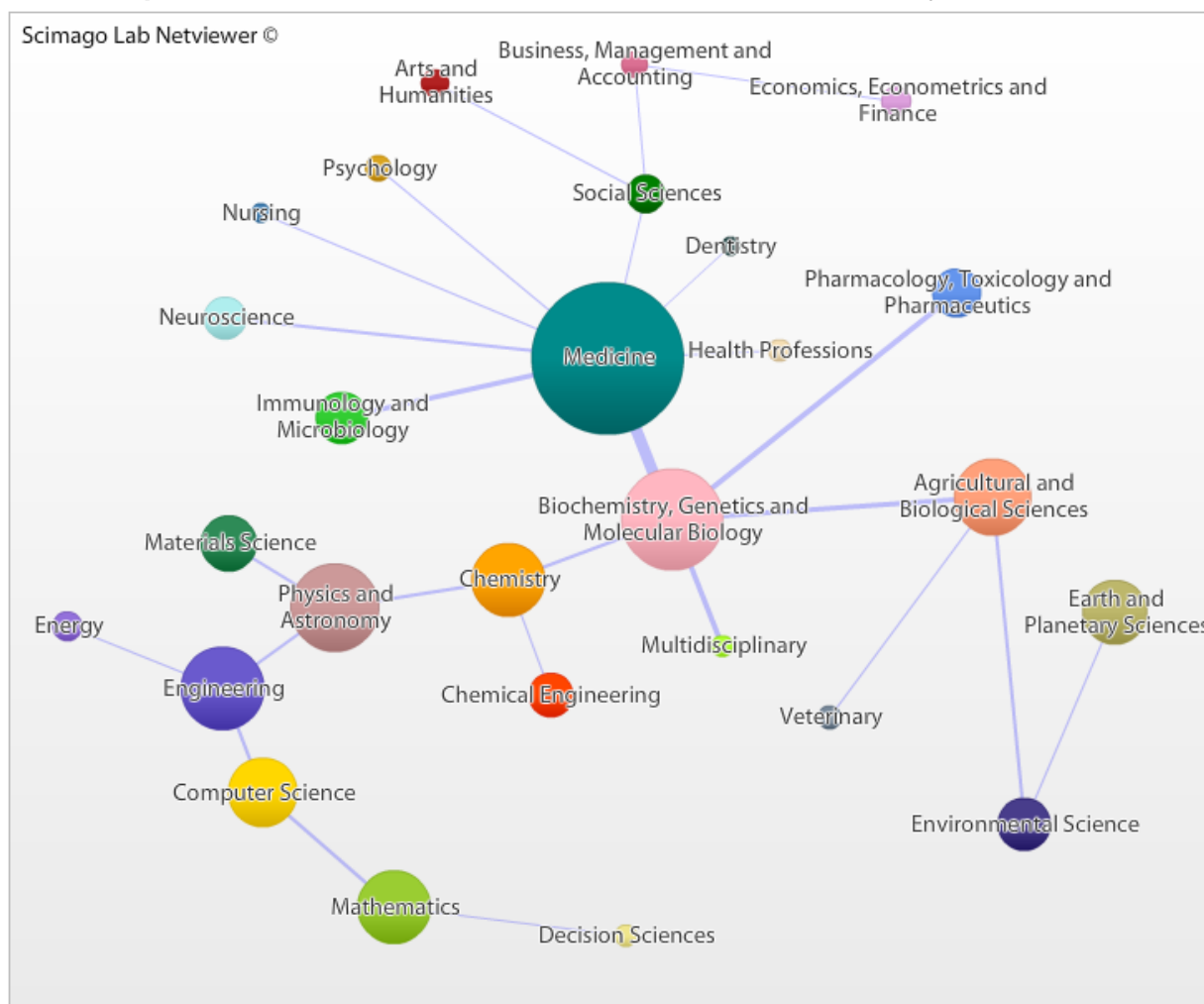
Table 14- N. of publications in food science subject category years 1996-2010

Country	Documents	Citable documents	Citations	Self-Citations	Citations per Document	H index
United States	62.167	59.490	1.082.169	437.318	17,77	230
Japan	22.216	22.078	220.631	70.799	10,33	106
Spain	16.655	16.442	219.108	76.433	15,15	103
United Kingdom	16.254	15.441	279.669	58.462	17,82	143
France	13.760	13.400	192.597	46.931	14,62	111
Germany	13.117	12.618	150.342	33.661	12,23	107
Italy	12.387	11.990	149.181	36.636	13,76	103
China	12.318	12.229	83.735	34.693	12,69	72
Canada	11.352	11.001	181.943	36.584	17,53	120

Source: <http://www.scopus.com/home.url>

The main conclusion is that Italian scientific production stands at high better position in comparison to other innovation metrics both in terms of volume as well as quality (impact). As to relevance, it is noted that agricultural sciences scientific production is quite less than in other scientific areas, nevertheless of significant quality. In particular food related scientific production with almost 20% of the overall agricultural and biological science ranks at the seventh position worldwide and fourth in Europe.

Graph 12 Scientific Publications Co-citation networks in Italy, 2009-2010³



2.8.3 COOPERATION IN INNOVATION BETWEEN KNOWLEDGE INSTITUTIONS AND THE PRIVATE SECTOR

i) Cooperation in R&D:

R&D expenditure in the EU-27 increased by an average of **3.3 %** a year between 2003 and 2008, reaching EUR 237 billion in 2008. Germany, France, Italy and the United Kingdom together accounted for more than half of the EU-27 total.

The business enterprise sector (**BES**) was the largest of the four main institutional sectors of R&D performance in 2010, accounting for 58.6 % of EU-27 R&D expenditure. The higher education sector (HES) and government sector (GOV) followed, with shares of 23.3 % and 12.8 % respectively. In 2009 the EU-27, 54.10 % of R&D expenditure was financed by the BES and 34.9 % by GOV, while in Italy the 44.2 of R&D expenditure was financed by the

³ SCImago. (2007). SJR — SCImago Journal & Country Rank., from <http://www.scimagojr.com>

BES and 42.1% by GOV⁴.

In Italy the business sector accounts for of GDP out of the 0.67 % of the total national GERD, approximately **53%** of the total.

This is lower than the average European Union figures, that are approximately 58% of the average total of 2.1% of GDP.

It is indicative of the low participation of the private sector in R&D activities and therefore of the low level of interaction between knowledge institutions and the private sector.

The food industry is included in a Medium-low R&D intensity sector a rather “traditional” one exhibiting a rather low penetration of innovation (*Source: The 2010 EU Industrial R&D Investment Scoreboard, European Commission, JRC and DG RTD*). The food producers sector ranks at 14th position in the overall R&D intensity for the EU, US and Japanese companies in the 2010 Scoreboard, with a 1.2% overall R&D intensity towards the 15.9% of the first one sector (pharmaceutical&biotechnology). In Italy

According to a recent study on agrofood research⁵, the cooperation between public institutions and private sector appears low, due to small dimensions enterprises, in Europe as well as in Italy, (about 96% SMEs). Looking to FP7 food funded projects, in Italy the projects Coordinators belong only to Public institutions, without any participation as leader by industry. In the table below, data about innovation and linkages and entrepreneurship in Italy compared to EU ones are shown, indicating average figures below the European values, with some data regarding interesting aspects for innovation, such as SMEs innovating in-house capability and community designs.

Table 15- N. Innovation Union Scoreboard 2011 database

(<http://www.proinno-europe.eu/inno-metrics/page/annexes-0>)

	EU27	IT
ENABLERS		
Human resources		
1.1.1 New doctorate graduates	1,5	1,6
1.1.2 Population completed tertiary education	33,6	19,8
1.1.3 Youth with upper secondary level education	79,0	76,3
Open, excellent and attractive research systems		
1.2.1 International scientific co-publications	301	465
1.2.2 Scientific publications among top 10% most cited	10,73	9,80
1.2.3 Non-EU doctorate students	19,19	6,24
Finance and support		
1.3.1 Public R&D expenditure	0,76	0,54
1.3.2 Venture capital	0,095	0,035
FIRM ACTIVITIES		
Firm investments		
2.1.1 Business R&D expenditure	1,23	0,67
2.1.2 Non-R&D innovation expenditure	0,71	0,61
Linkages & entrepreneurship		
2.2.1 SMEs innovating in-house	30,31	34,09

⁴[http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=File:Gross_domestic_expenditure_on_R%26D_by_source_of_funds,_2005_and_2010_\(%25_of_total_gross_expenditure_on_R%26D\).png&filetimestamp=20120112093620](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=File:Gross_domestic_expenditure_on_R%26D_by_source_of_funds,_2005_and_2010_(%25_of_total_gross_expenditure_on_R%26D).png&filetimestamp=20120112093620)

⁵ <http://www.enea.it/it/produzione-scientifica/energia-ambiente-e-innovazione-1/anno-2012/n.-3-maggio-giugno-2012/ricerca-e-filiera-alimentare>

2.2.2 Innovative SMEs collaborating with others	11,16	5,98
2.2.3 Public-private co-publications	36,2	20,7
Intellectual Assets		
2.3.1 PCT patent applications	3,78	2,05
2.3.2 PCT patent applications in societal challenges	0,64	0,36
2.3.3 Community trademarks	5,59	5,23
2.3.4 Community designs	4,77	6,86
OUTPUTS		
Innovators		
3.1.1 SMEs introducing product or process innovations	34,18	36,91
3.1.2 SMEs introducing marketing/organisational innovations	39,09	40,62
Economic effects		
3.2.1 Employment in knowledge-intensive activities	13,50	13,70
3.2.2 Medium and high-tech product exports	48,23	50,36
3.2.3 Knowledge-intensive services exports	48,13	31,47
3.2.4 Sales of new to market and new to firm innovations	13,26	11,79
3.2.5 Licence and patent revenues from abroad	0,51	0,16

In the recent years, Italian Government is investing increasingly in supporting and funding research and development projects based on a strict cooperation between public and private institutions.

ii) Commercialization in research: this aspect can be assessed based on IPR indicators and patents. According to the IPR 2012 Index Italy ranks 24 out of 130 at global level, and 14 out of 19 at Regional level (Western Europe); the Intellectual Assets, in particular the PCT patent applications result 2.05 towards a 3.68 EU27 average. These data show a moderate-low attitude of Italian system to commercialization in research.

iii) Highly educated workers: Total R&D personnel (Percentage of active population - numerator in full time equivalents, Source Eurostat 2010) for the business sector is almost half of the EU27 average⁶:

Table 16- Total R&D personnel, (Percentage of active population - numerator in full time equivalents, Source Eurostat 2010)

	All sectors	Business enterprise sector	Government sector	Higher Education
Italy	0.88%	0.42%	0.13%	0.29%
EU27	1.04%	0.53%	0.15%	0.35%

The statistics for employment in technology and knowledge-intensive sectors as a percentage of the total of employment in technology and knowledge intensive sectors (Eurostat 2008)⁷:

⁶

<http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do?sessionId=9ea7d07e30d94e77bed77fbc4b2eb3c5efd36636d65f.e34MbxSahmMa40LbNiMbxAMbhuQe0>

Table 17- Employment in technology and knowledge-intensive sectors, (Eurostat 2008)

	Medium high- technology manufacturing	Low and medium low- technology manufacturing	Low-technology manufacturing
Italy	22%	48.9%	28.7%
Apulia	15%	55%	30%
EU27	n.a.	n.a.	n.a.

2.8.4 INNOVATION FINANCE

i) Subsidies and tax incentives for R&D: the article 13 of Law 140/97 indicates the fiscal measures in support of innovation or investment in R&D. The incentives consist of tax deductions that companies made themselves subject to authorization. This is actually a "tax bonus" to be used to offset taxes that the company has to pay. The amount of the tax credit depends on the geographic area where the company operates and in which are then invested and the size of the company. Law 140/97 incorporated the EU legislation on State aid in favour of research, development and innovation (2006 / C 323/01).

1) R&D staff costs deduction. L. 296/06 art. 1, section 266 (ex art. 1, paragraph 347, L. 311/04) The incentives consist in deduction of R&D staff costs from the calculation of IRAP tax base (net benefit equal to 3.90% of the cost deducted)

2) Tax credit for scientific research

Law n.2011/106 art. 1

Support for companies which outsource research activities to universities or public research institutions. The extent of 90 per cent of the amount of investment that exceeds the average investment in research conducted in 2008-2010 is tax credit deductible.

3) Tax breaks for enterprises network

The tax break introduced by Law 78/2010 provides that companies belonging to a formalized Network or Consortium of enterprises, which decide to set aside a specific reserve a share of profits for the realization of investments under the joint program of the network are entitled to tax exemption for the amount designated to the network reserve fund for a maximum of 1 Million € per year.

4) Tax credit for high-tech specialized profiles recruitment

Hiring of highly qualified personnel possessing technical or scientific degree, employed in research and development activities. The benefit consist of a tax credit equal to 35% of sustained costs with a constraint to keep the new staff employed for at least 3 years.

The measure's resources available are 25 million euro for 2012 and 50 million euro for 2013. The objective of the measure is to promote at least 4 000 new hires.

⁷ <http://appsso.eurostat.ec.europa.eu/nui/setupModifyTableLayout.do>

5) Tax credits research and development

Tax credits equal to 30% of R&D investment budgeted and certified from auditor incurred from the subsequent tax period 31/12/2011.

Minimum investment required to access the measure: 50 million €/ year.

Maximal deduction per tax period: € 600 thousand per year.

ii) Access to venture capital: In 2011 private equity and venture capital players operating in Italy closed a total of 326 deals (+12% on the 292 deals of 2010) for a total amount invested of 3,583 Bln Euros, a significant increase (+46%) on the 2,461 Bln invested in 2010.

The largest number of investments continued to regard the expansion segment with 139 deals, while the early stage segment recorded 106 deals, in line with 2010.

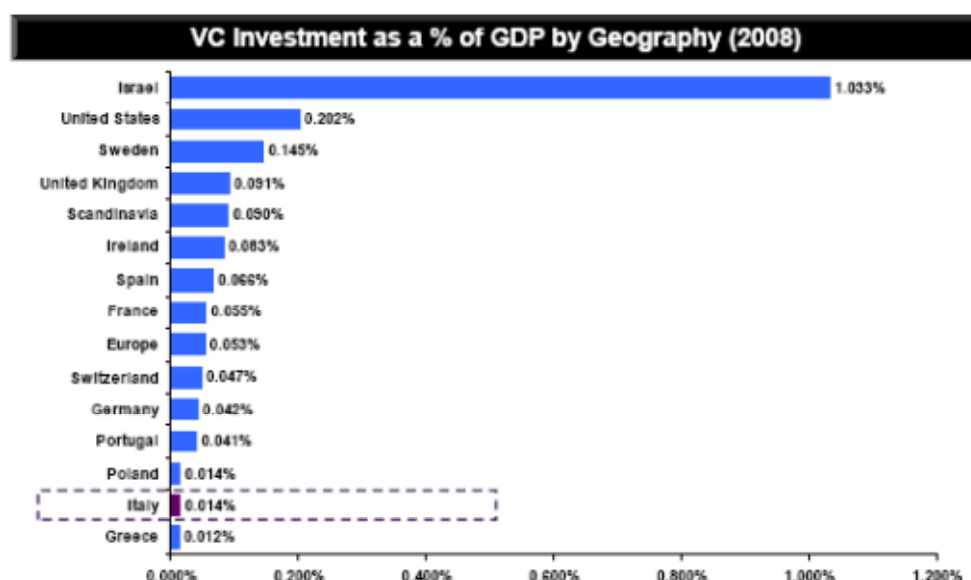
As in the past years, the largest part of invested resources (2,261 Mln Euros), flowed into buyouts (+37% on 2010 figures) and expansion deals that represented 19% of total (674 Mln Euros). Also replacement capital investments grew (559 Mln Euros) thanks to a number of large deals.

While 2010 saw a recovery in fundraising, partly thanks to the creation of Fondo Italiano di Investimento, 2011 marked a new slowdown with 1,049 Mln Euros raised, -52% on 2010 figures (2,187 Mln).

Finally, as of December 31 2011, the total portfolio of investors in Italy amounted to 1,136 companies, for an equivalent value calculated at cost of 20.1 Bln Euros.

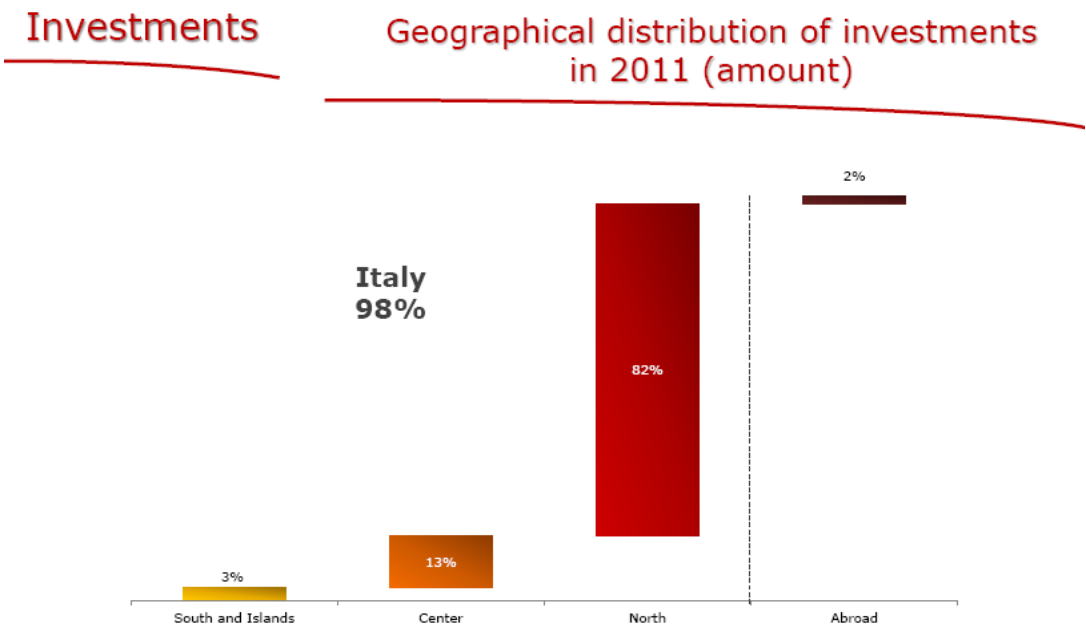
At the end of 2011, the resources available for investments, net of pan-European and captive players' resources, amounted to 5.9 Bln Euros.⁸

Graph 13 Venture Capital Investments



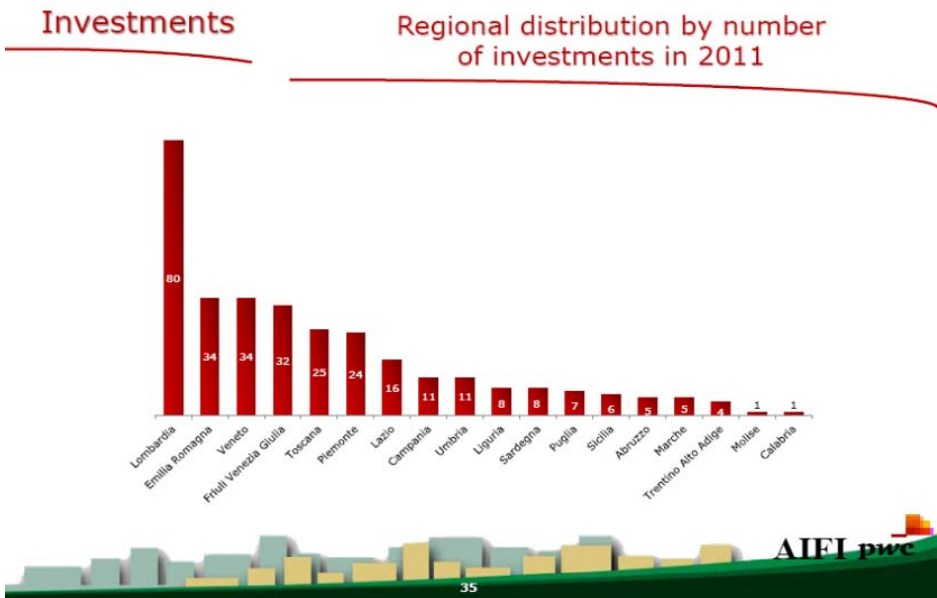
⁸ (source AIFI-PricewaterhouseCoopers 2011)

Graph 14 Venture Capital and Private Equity investments in Italy



Source AIFI-PricewaterhouseCoopers 2011

Graph 15 Venture Capital and Private Equity investments in Italy

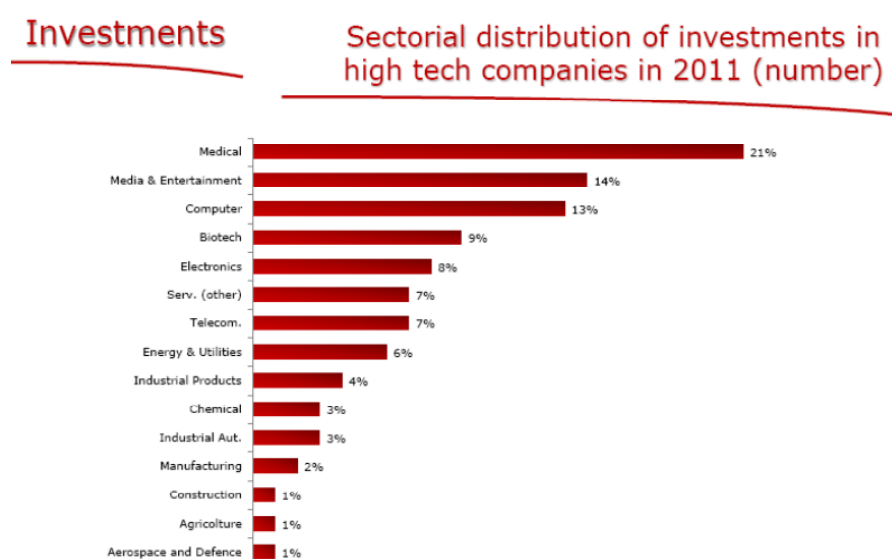


PRICEWATERHOUSECOOPERS 2011

SOURCE

AIFI-

Graph 16 Venture Capital and Private Equity investments in Italy



Source AIFI-PricewaterhouseCoopers 20

The above graphs show venture capital investments in Italy very low compared to other industrialized countries. Italian VC investment as a % of GDP is 0.014 scoring at the same level of Poland.

Main reasons for the low Italian score in the venture capital and private equity sector are:

- presence of a small number of professionals
- coexistence of heterogeneous operators in terms of objectives and logical behaviour
- limited number of large high tech companies
- lack of regulated markets for the developed listing of high-tech companies.⁹

The geographical distribution of the investments is almost totally directed to the north part of the country (82%) while the South Italy Regions account only for 3% of investments with Lombardia, Emilia-Romagna and Veneto as front runner. As for the Puglia Region the score is to be considered low lagging far behind the top ranking regions.

2.8.5 MARKET CONDITIONS¹⁰

i) Access to technology: Access to technology is measured by the quality of government-supported services in terms of availability of specialized research and training locally as well as the quality of private suppliers of technology and know-how. Italy has a medium low access to technology, ranking at 19th position out of 27 countries.

⁹ Innogest Capital: Venture Capital Fund in Italy

¹⁰ Adapted from "Benchmarking Innovation Policy and Innovation Framework Conditions", Norwegian Ministry for Trade and Industry and Inside Consulting, January 2004, <http://www.oecd.org/dataoecd/37/34/33705586.pdf>

ii) Competition policy: Based on data from the OECD, the Danish Competition Authority has developed a comprehensive index for sizing the level of government regulation of local competition. Italy has a medium low access to technology, ranking at 19th position out of 27 countries.

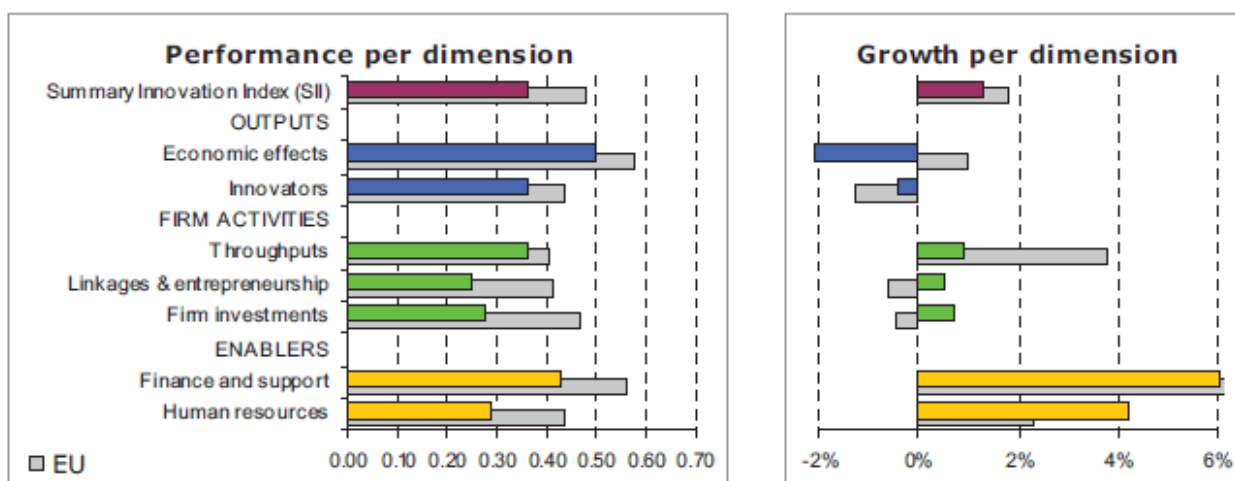
iii) Competencies of users and suppliers: The competencies of suppliers and buyers are an important source in enhancing innovation. Italy ranks at medium level, positioning at 15th place on 27 countries.

It should be noted that it was not possible to assess these factors for the food sector in particular (or the region of Central Macedonia itself). We assume that the overall results of the study can be considered indicative of our area of investigation.

2.8.6 SUMMARY OF MAIN CONCLUSIONS

For Italy, one of the Moderate innovators, innovation performance is below the EU27 average and the rate of improvement is also below that of the EU27. Relative strengths, compared to the country's average performance, are in Finance and support and Economic effects and relative weaknesses are in Human resources, Firm investments and Linkages & entrepreneurship.

Graph 17 Innovation Performance



Over the past 5 years, strong growth has come from Human resources and Finance and support which have been the drivers of the improvement in innovation performance, in particular as a result from strong growth in S&E and SSH doctorate graduates (12.8%) and Broadband access by firms (29.8%). Performance in Firm investments has not improved and performance in Innovators and Economic effects has worsened, in particular due to a decrease in New-to-market sales (-7.8%) and New-to-firm sales (- 5.3%).¹¹

¹¹ By EIS report 2009 - <http://www.proinno-europe.eu/metrics>

The main findings from the examination of the innovation policy framework conditions in Italy are presented below along with a preliminary description of the type of measures that should be applied:

Public investment in knowledge is below EU average . The public financing mechanisms are becoming consistent and more finalized towards innovation	<ul style="list-style-type: none">•Increase public investment of RTD programmes•Improve the public funding procedures and mechanisms in support of RTD, also avoiding overlapping of measures and projects
The quality of Italian research is very good in terms of scientific publications production (high H index), but low in terms of applicative output	<ul style="list-style-type: none">•Emphasise and support national and international RTD cooperation•Improve technological transfer and open innovation
The private sector does not sufficiently invest in RTD and the interaction between knowledge entities and the industry is medium-low	<ul style="list-style-type: none">•Improve tax and other incentives for the industry to invest in innovation•Reinforce the mechanisms to enhance RTD cooperation and interaction for BES
Commercialization of research results as evident from IPR indicators and patents is low	<ul style="list-style-type: none">•Built and reinforce IPR support and other innovation enabling mechanisms such as incubators, venture capital, seed capital, industrial liaison offices, networks
The number of highly skilled personnel compared to EU 27 average in industry is low	<ul style="list-style-type: none">•Enforcing incentives for SMEs to hire highly skilled personnel that will enhance their innovation profile and support the adoption of research results to their operations
Innovation Finance has a low weight and Market Conditions	<ul style="list-style-type: none">•Enforcing tax incentives for R&D•Enforce pre-commercial procurement procedures in government practices

2.9 COMPARISON AGAINST INTERNATIONAL FOOD CLUSTERS

Below we present some key figures and qualitative information about three selected regional food clusters which can be described as particularly developed based on the achievements and their international status. The regions of East Netherlands in the Netherlands, Emilia Romagna in Italy and Oresund in Denmark / Sweden all participated in the Food Innovation Network Europe (FINE)¹², an FP6 funded network of European food regions joining forces to encourage innovation and cooperation to make Europe more competitive in world food markets.

	Strengths	Weaknesses	Opportunities	Threats
Emilia-Romagna	<ul style="list-style-type: none"> - Strong presence of networks contributing to, food research, communication (with the consumer and policy makers) and promotion - Good level of stakeholder consultation on food policy and research - Strong scientific competences in the region in different institutions: knowledge centres, stakeholder organisations, networks - High visibility and international image of typical and traditional food products - Good capabilities of networking in middle-size and large firms 			
Oresund	<ul style="list-style-type: none"> - Food innovation at interfaces' in Øresund SE. An on-going initiative that has developed the food cluster's innovative capacities - High nr. of competent network and stakeholder organizations - High level of private RTD Spending - Innovative milieu around Lund, resulting from entrepreneurial spirit and cross-disciplinary approach - Increasing attention for cross-sectoral cooperation. (eg. Functional foods) and research 	<ul style="list-style-type: none"> - Low involvement of SMEs in RTD and low research orientation. Collaboration is oriented on large firms with strong research base - Decrease in private RTD Spending - Weak understanding between researchers and industry: poor knowledge of each others sectoral problems and agendas - Lack of highly skilled RTD competences in firms - Weak integration between Denmark & Sweden in RTD & innovation 		

¹² FINE Network site is <http://zakonczone.ppnt.poznan.pl/networkfine/index.html>. The information are adapted from the FINE deliverable «Strategic Objectives for developing innovation clusters in the European food industry, http://zakonczone.ppnt.poznan.pl/networkfine/Obrazki/Final_Report-SWOTandSOR.pdf

	East- Netherlands	Emilia- Romagna	Oresund
Surface Area	8,557km ²	22.117	20,869 km ²
Inhabitants	3,072,441	3,583,842	3,598,410
GDP per inhabitant	29,300	31,000	~28,000
Unemployment %			
Share of population employed in the food sector			
Value added per employee			

2.9.1 EAST- NETHERLANDS

2.9.2 EMILIA- ROMAGNA

2.9.3 ORESUND

2.10 ANNEXES

Graph 18 Venture Capital Investment in EU 15 and selected countries, 2009

Table 7.1: Venture Capital Investment (VCI) by stage of development in EUR million and as a percentage of GDP, EU-15 and selected countries, 2009

	VCI at early stage		VCI at expansion and replacement stage		Buyouts	
	Amount invested in EUR million	% of GDP	Amount invested in EUR million	% of GDP	Amount invested in EUR million	% of GDP
EU-15	1 890.5	0.02	8 143.5	0.07	11 173.8	0.10
BE	131.1	0.04	471.8	0.14	456.1	0.13
BG	4.1	0.01	2.2	0.01	0.0	0.00
CZ	0.0	0.00	10.4	0.01	51.0	0.04
DK	79.4	0.04	120.2	0.05	288.6	0.13
DE	436.2	0.02	612.3	0.03	1 375.8	0.06
IE	29.9	0.02	26.4	0.02	8.5	0.01
EL	5.0	0.00	16.2	0.01	140.2	0.06
ES	44.5	0.00	543.4	0.05	307.5	0.03
FR	353.2	0.02	1 625.3	0.09	1 411.8	0.07
IT	40.0	0.00	627.0	0.04	325.5	0.02
LU	38.3	0.10	35.3	0.09	0.0	0.00
HU	0.5	0.00	3.3	0.00	187.4	0.20
NL	110.6	0.02	427.3	0.07	213.3	0.04
AT	18.3	0.01	72.8	0.03	41.5	0.02
PL	1.1	0.00	72.5	0.02	411.1	0.13
PT	30.4	0.02	150.6	0.09	118.2	0.07
RO	0.5	0.00	56.6	0.05	21.5	0.02
FI	57.1	0.03	234.8	0.14	96.8	0.06
SE	111.8	0.04	456.0	0.16	647.4	0.22
UK	404.6	0.03	2 724.1	0.17	5 742.6	0.37
NO	82.5	0.03	141.0	0.05	384.8	0.14
CH	195.0	0.05	285.8	0.08	229.4	0.06
US	4 530.5	0.04	8 423.4	0.08	:	:

Source: Eurostat (online data code: [htec_vci_earl](#), [htec_vci_exre](#) and [htec_vci_buyout](#))

Science and technology Eurostat Pocketbook, 2011

Graph 19 Patent applications to the EPO, EU-27

Table 6.1: Patent applications to the EPO, total number, per million inhabitants and AAGR, EU-27 and selected countries, 2002–2007 ⁽¹⁾

	Total		Per million inhabitants		AAGR 2002-2007
	2002	2007	2002	2007	
EU-27	50 462	57 725	104	117	2.7
BE	1 287	1 472	125	139	2.7
BG	15	29	2	4	14.7
CZ	88	162	9	16	13.1
DK	935	1 057	174	194	2.5
DE	21 503	23 929	261	291	2.2
EE	6	23	4	17	32.6
IE	224	288	57	67	5.2
EL	74	109	7	10	8.0
ES	938	1 451	23	33	9.1
FR	7 321	8 421	119	132	2.8
IT	4 168	5 107	73	86	4.1
CY	7	9	9	11	6.3
LV	6	19	3	8	25.2
LT	3	8	1	2	25.2
LU	61	110	137	230	12.6
HU	120	173	12	17	7.5
MT	4	8	10	20	15.8
NL	3 442	3 656	214	223	1.2
AT	1 269	1 797	157	217	7.2
PL	81	146	2	4	12.4
PT	41	121	4	11	24.1
RO	11	21	1	1	13.2
SI	76	103	38	51	6.3
SK	24	42	5	8	11.7
FI	1 257	1 323	242	251	1.0
SE	2 002	2 719	225	298	6.3
UK	5 500	5 422	93	89	-0.3
IS	35	28	123	91	-4.6
LI	26	31	785	895	3.7
NO	377	515	83	110	6.4
CH	2 641	3 224	364	429	4.1
HR	37	32	8	7	-2.8
MK⁽²⁾	:	1	:	0	:
TR	60	220	1	3	29.6
AU	988	917	50	43	-1.5
CA	1 754	2 377	56	72	6.3
CN	548	2 118	0	2	31.1
IL	889	1 303	140	188	7.9
IN	432	545	0	0	4.8
JP	20 218	20 657	159	162	0.4
KR	2 260	5 607	47	116	19.9
RU	180	281	1	2	9.3
TW	486	1 004	22	44	15.6
US	31 171	31 908	108	106	0.5

⁽¹⁾ 2007 estimated.

⁽²⁾ MK: 2006.

Source: Eurostat (online data code: [pat_ep_ntot](#))

Graph 20 Employment in Science and Technology¹³

	People working in an S&T occupation					People who have a tertiary education and work in an S&T occupation				
	(1 000)	(% of total employment)				(1 000)	(% of total employment)			
	2010	2007	2008	2009	2010	2010	2007	2008	2009	2010
EU-27	66 761	29.9	30.1	30.8	31.0	40 672	17.2	17.6	18.5	18.9
Belgium	1 530	33.1	32.5	33.5	34.2	1 115	23.7	22.9	23.8	24.9
Bulgaria	687	21.9	21.6	22.9	22.5	526	16.3	16.0	17.1	17.2
Czech Republic	1 721	33.3	33.8	35.6	35.3	708	11.5	11.8	13.4	14.5
Denmark	1 112	36.0	37.8	39.4	40.9	678	21.9	22.5	24.1	24.9
Germany	14 210	36.8	36.6	37.0	37.2	7 333	18.1	18.3	19.1	19.2
Estonia	179	27.3	26.7	30.0	31.4	125	18.0	17.9	21.1	21.9
Ireland	495	23.3	23.5	25.9	27.0	404	17.7	18.3	20.6	22.0
Greece	1 055	23.1	23.3	23.4	24.1	840	17.9	18.2	18.3	19.2
Spain	4 906	24.2	25.3	26.2	26.6	3 928	18.7	19.6	21.2	21.3
France	8 495	31.9	32.0	32.7	33.0	5 503	19.6	20.0	20.6	21.4
Italy	6 853	31.9	31.5	30.6	30.0	3 034	12.5	13.1	13.2	13.3
Cyprus	104	27.0	27.2	26.4	27.3	85	21.3	21.8	20.9	22.1
Latvia	284	29.8	31.1	32.4	30.2	185	15.7	17.2	19.5	19.7
Lithuania	433	26.9	29.2	30.3	32.3	336	19.0	20.5	22.1	25.0
Luxembourg	112	39.5	41.5	50.9	50.8	73	26.3	27.9	33.8	32.9
Hungary	1 063	26.6	27.8	28.3	28.1	660	15.5	16.3	17.2	17.5
Malta	45	27.3	28.1	28.7	27.6	23	13.6	14.1	14.3	14.0
Netherlands	3 231	37.6	37.9	38.0	39.3	1 904	22.0	22.5	22.9	23.1
Austria	1 280	29.7	29.9	31.2	31.4	526	11.5	11.8	12.8	12.9
Poland	4 509	26.2	26.3	27.4	28.3	3 028	16.0	16.3	17.8	19.0
Portugal	966	17.6	18.5	19.2	19.8	623	10.9	11.5	12.1	12.8
Romania	1 836	18.6	19.3	19.7	19.9	1 165	10.8	11.7	12.1	12.6
Slovenia	309	31.2	32.0	32.7	32.4	177	17.9	17.9	18.5	18.6
Slovakia	728	29.3	29.0	30.0	31.4	348	12.1	12.2	13.6	15.0
Finland	859	34.5	34.9	35.3	35.2	609	23.1	24.6	25.0	24.9
Sweden	1 878	39.3	39.6	40.6	41.4	1 187	23.9	24.4	25.5	26.1
United Kingdom	7 880	26.9	26.9	27.9	27.4	5 551	18.1	18.1	19.4	19.3
Iceland	64	33.4	36.3	38.4	38.6	37	18.9	20.6	21.8	22.2
Norway	976	36.9	37.4	38.7	39.1	703	25.9	26.3	27.7	28.2
Switzerland (1)	1 736	39.5	40.7	41.1	:	949	20.4	21.7	22.5	:
Croatia	413	24.0	24.9	26.5	27.0	267	14.7	15.3	16.6	17.4
FYR of Macedonia	128	20.7	19.0	19.9	20.1	89	13.1	11.9	13.2	13.9
Turkey	2 945	12.5	13.4	13.4	13.1	2 034	7.7	8.6	9.0	9.0

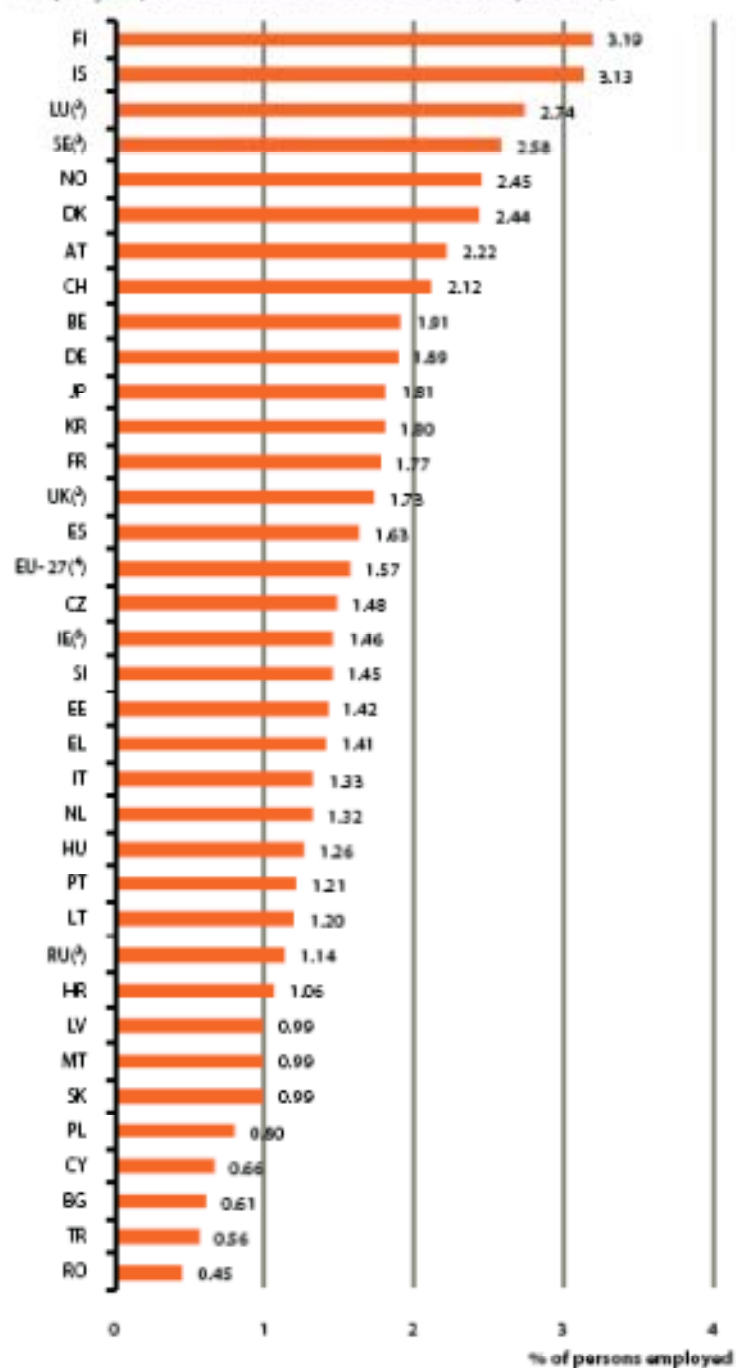
(1) 2009 instead of 2010 for the number of people.

Source: Eurostat (online data code: hrst_st_nocc)

¹³http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=File:Human_resources_in_science_and_technology_2007-2010.png&filetimestamp=20111130175041#file

Graph 21 R&D personnel (% of persons employed) EU-27

Figure 3.2: R&D personnel (HC) as a percentage of persons employed, EU-27 and selected countries, 2007 ⁽¹⁾



⁽¹⁾ Exceptions to the reference year: 2006 (IT), 2005 (EL), 2004 (CH), 2003 (NL).

⁽²⁾ National estimate.

⁽³⁾ Underestimated or based on underestimated data.

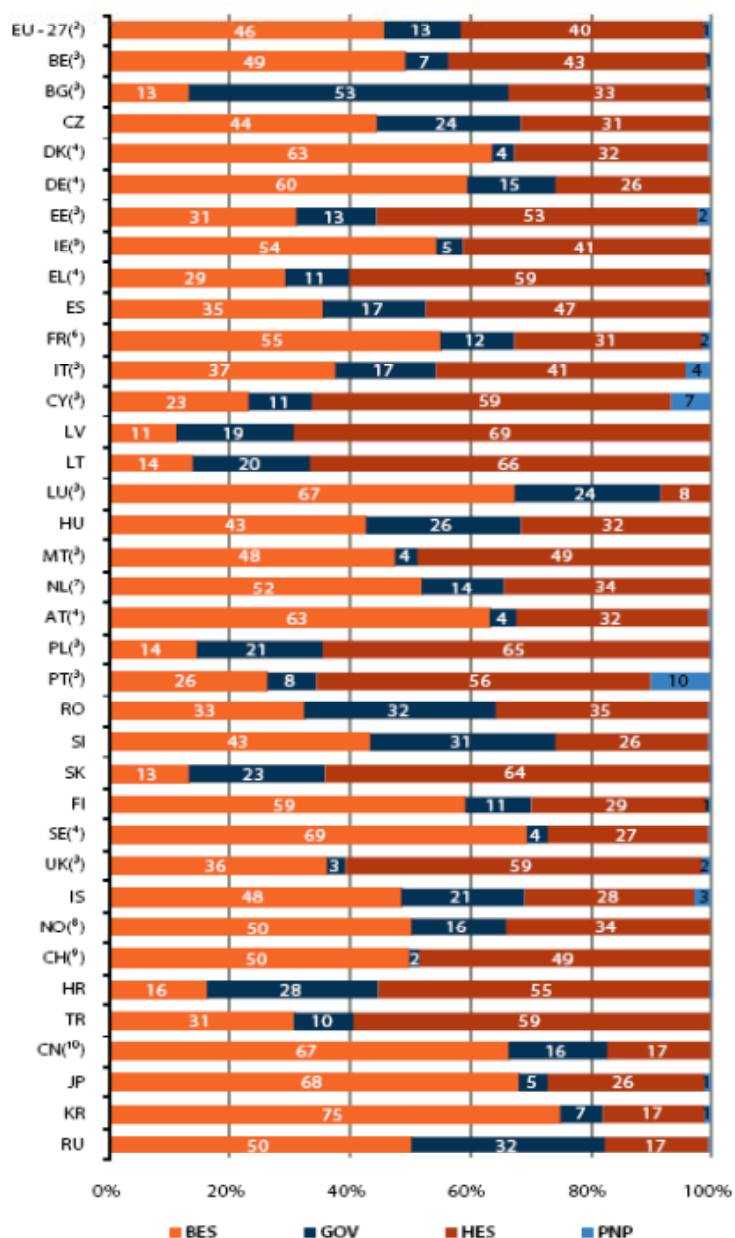
⁽⁴⁾ Eurostat estimate.

⁽⁵⁾ Provisional data.

Source: Eurostat (online data code: [rd_p_perslf](#)), OECD-MSTI for JP and KR

Graph 22 Researchers by sector EU-27, 2008

Figure 3.5: Researchers (FTE) by sector of performance as a percentage of total, EU-27 and selected countries, 2008 ⁽¹⁾



⁽¹⁾ Exceptions to the reference year: 2007 (EL, FR, TR, NO, CN, JP, KR), 2004 (CH).

⁽²⁾ Eurostat estimate.

⁽³⁾ Provisional data (in EE provisional data for total and BES only).

⁽⁴⁾ National estimate.

⁽⁵⁾ BES: provisional data;

HES: national estimate.

⁽⁶⁾ GOV: defence excluded (all or mostly).

⁽⁷⁾ GOV sector includes PNP sector, provisional data.

⁽⁸⁾ BES and GOV: university graduates instead of researchers.

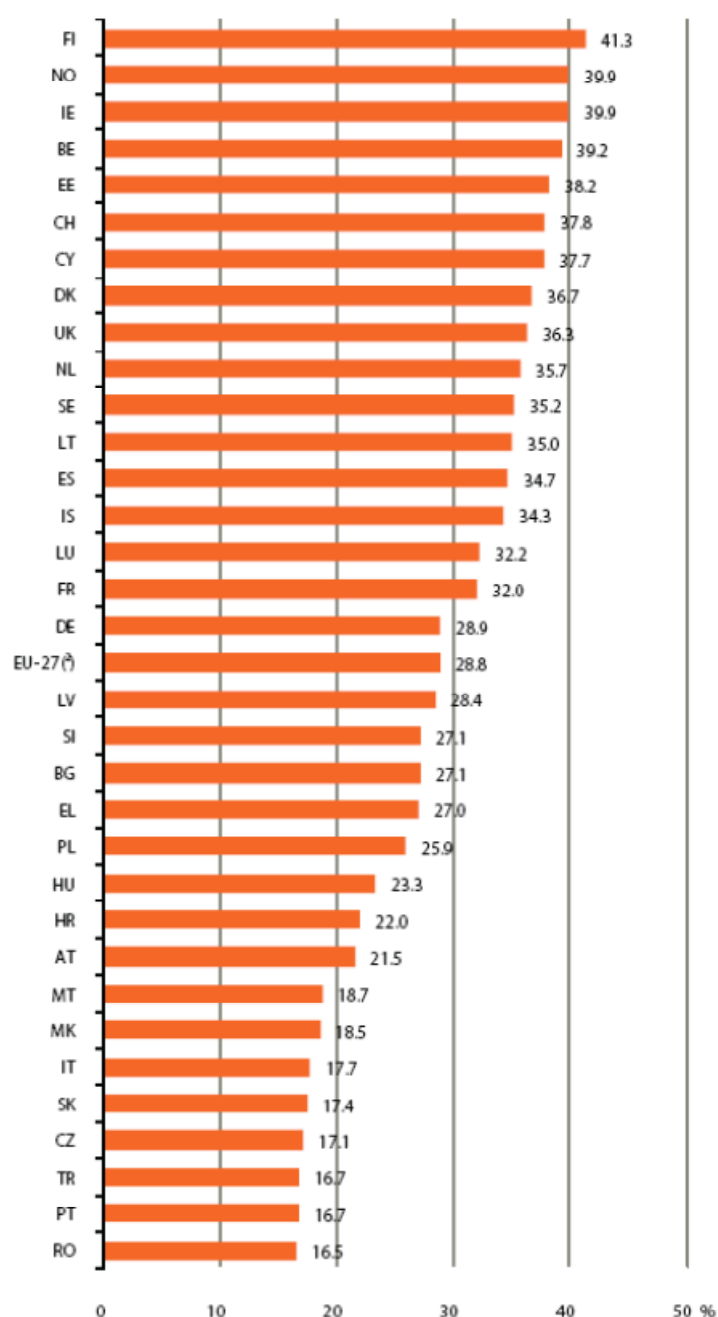
⁽⁹⁾ Federal or central government only.

⁽¹⁰⁾ Data do not comply with Frascati Manual recommendations.

Source: Eurostat (online data code: [rd_p_persocc](#)), OECD-MSTI for CN, JP and KR

Graph 23 Human Resources in Science and Technology Education EU-27, 2009

Figure 4.7: HRSTE aged 25–64 as a percentage of active population, EU-27 and selected countries, 2009 ⁽¹⁾



⁽¹⁾ Exception to the reference year: 2008 (LU).

⁽²⁾ Eurostat estimate.

Source: Eurostat (online data code: [hrst_st_ncat](#))