

**“Triple helix in Italy: from national to regional approach”
(Paper ID: W383)**

Secondo Rolfo
Ceris-CNR, Moncalieri (Turin)
Email: s.rolfo@ceris.cnr.it

Giuseppe Calabrese
Ceris-CNR, Moncalieri (Turin)
Email: g.calabrese@ceris.cnr.it

Abstract:

Following the recent changes in the institutional framework (devolution), the Italian regional governments are assuming a new and growing role in the R&D support. This evolution however is not well determined and could cause some conflicts between the national and regional level, especially in the science policy area. This paper analyses the new regional policies covering this matter, the local initiatives in the triple helix context and the future consequences on the national innovation system.

Keywords: R&D, Innovation Policy

Topic area: Regional Innovation Policies

1 Introduction

The competitiveness gap of Europe, and in particular of Italy, as regards those Countries with an higher rate of development involves a double challenge: the first towards the American scientific and production system, which enjoys impressive public and private investments to support the activity of R&D in the civil and in the defence sectors and the extremely flexible and innovative policy of the Federal Government; the second towards those Countries (China and India), whose products, now of good quality and with medium-high technological contents, can compete with success on the global market because of the lower labour costs.

Among the structural criticalities of the European and Italian production system, first of all stands up the scarce size of the companies and their low assimilation and use of the knowledge coming from the base research.

This is a situation which makes still essential a strong role of the public system in the field of the R&D, in order to sustain the competitiveness of the European and Italian production system, to be actuated through an adequate selection of the measures and the adoption of specific strategic lines.

The gap between Europe and United States includes above all the amount of the investments: the expenses in R&D on the GDP are the 2,74% in the United States and 1,92% in Europe. At this proposal it is important to remember that it is relevant the contribution given by the Government expense in the field of the research for the defence that in the United States is equal to the 57% of the total expense, if compared to the average of the Countries of the Ue, equal to the 14% (in Italy it is lower than the 1% of the total expense for R&D). Furthermore, these are not only dimensions of a financial support of which benefit manifold industrial

fields, but also because, whereas in the Countries of the Ue the governments co-finance the research in defence, in the United States the government agencies finance all the R&D costs entrusted to the industries and to the universities.

Another substantial difference between Europe and United States concerns the human capital engaged in the activities of R&D: whereas in Europe there are more than 450.000 researchers operative in the industry and at about 445.000 in the public field (government institutions and secondary schools), the United States count respectively 1.015.000 and 182.000 employees. On the whole the ratio between public and private researchers in Italy is equal to 1,51, whereas in the UE it is 1,03, in Japan 0,48 and in the US 0,17.

As already said, the European gap does not regard only the financial and human resources, but also the organisation. The increment of the competitiveness through the innovation requires in fact also a re-consideration of the traditional policies.

The logic of the linear development model of the innovation (Arrow, 1962) – *fundamental, industrial, pre-competitive* – according to which the strong investments in public base research promoted at cascade, nearly automatically, important effects on the industrial research and development activity - creating products, innovative processes and services – in the U.S.A in the last years it has been supported by a new strategic direction and of financial support for the activity of R&D, which comprehend a close cooperation between the different actors, University, public research institutions, industry and that is exemplified in the concept of Triple Helix (Etzkowitz and Webster, 1991). The new policy of public support to the R&D has been therefore addressed towards the support of programs in strategic fields for the economy and the industry – *ex. nanotechnologies, new materials, genomic* – which see the *joined* participation of university, federal research institutions and companies, and which comprehend coordinated activities carried until the development of new technologies of immediate use for the companies of the field and to the prototyping of products able to rapidly pass in production.

The above described virtuous American circle has still scarce applications in Europe, and pays for a gap both as regards the resources engaged, and as regards the organisation.

Inside the above mentioned European context, the Italian situation is, unfortunately, more backwards if compared with other Countries with similar characteristics. The retard concerns both the organisation of the research and the investments. On these lasts, the deficiency is documented by ten years of continue fall: in fact they are passed from the 1,30% of the GDP (1990) to the 1,07 (2001), unique case among the industrialised Countries. This index for the main worldwide scientific areas is equal to the 2,98 for Japan; 2,69 for the United States and 1,93 for the average UE (before the entrance of the new adherent countries).

As regards the ratio between public and private investments, the public financing to the R&D, if compared to the GDP, is equal (data of 2001) to 0,53 for Italy; 0,57 for Japan; 0,76 for the United States; 0,79 for Germany, 0,82 for France and 0,57 for United Kingdom.

Among the weaknesses there is the general undersize of the national scientific system with respect to the needs and potentiality of an economically developed Country, as well as the scarce information provided to the public opinion on the importance of research as leading element for the socio-economic development.

At the same time the Italian research excellence in some fields is acknowledged at world level, leading to successes both in traditional sectors and in those with medium-high technological content i.e. instrumental mechanics, robotics, microelectronics, optoelectronics and biomedical technologies. Furthermore, we can count on the presence of young researchers, who represent a highly qualified human research capital to be fully valorised, but who are even more attracted by universities and foreign institutions because of the substantial block of the engagements in the public research (for the public research institutions until year 2007).

For Italy the aims included in the “Guide Lines 2002” and that is the achievement in 2006 of a financial level of the R&D equal to the 1,75% of the GDP, of which the 1% public and the 0,75% private, appear completely shared by the European Commission, but at the moment difficult to actuate.

Nevertheless, we think that the real problem of the research (and generally of the innovation) in Italy is not only due to a mere availability of financial resources, but rather to the characteristics of the national system of innovation. This in fact has not its own unitary connotation, but as pointed out by Malerba (1993), it can be seen in two parts: one similar to what can be observed in other Countries, made up by few big companies operating in Italy and by the big universities and research institutes, that even always having given rise until now to a mechanism of triple Helix, have produced a certain collaboration tradition; on the contrary the main part of the companies operates in a sort of secondary innovative system, where the innovation is rarely fruit of an iteration with the scientific system and follow trajectories much more traditional (incremental innovation, without any scientific contribution, with the strong role of the machine and equipment suppliers, as well as of the customers and the local system). In this context, the thesis of this work is that the concept of triple helix has found in Italy scarce success and above all in the area of the real part of the national system of innovation, whereas it remains so much to do in the field of the small companies, even if the institutional changes in process (devolution) open interesting possibilities. For this reason the paper is structured with a paragraph of theoretical assessment related to the different kinds of policies for the innovation and a recall to the legislative system in the field of the research and the innovation; then follow a survey on the national policy for the fundamental research and one on the policies activated by the regions, and finally some short considerations.

2 Theoretical review

Since the 1980s all the governments of industrialized countries and of those undergoing industrialization have adopted a vast range of instruments that can be considered policies for innovation. However, this concept has not yet been clearly defined and the theoretical literature available is still insufficient, while empirical information is fragmented and, in any case, very recent.

Generally speaking, it is possible to identify two aspects within the innovation policies: one is scientific and the other is technological. They are substantially based on the linear model of innovative process, which was criticized by Kline and Rosenberg (1986) inasmuch as the relationship between science and technology is extremely complex and leads to widely varying situations. However, for a long time after the Second World War many governments considered the technological policy an appendix to the scientific policy and they therefore privileged the research activity financing and the growth of connected structures (teaching and research).

Recent investigations have shown the weakness of this system. The technological part has become increasingly more important and has been translated into a true technological policy, by which we mean the overall measures that influence company decisions regarding the development, the sale or the adoption of new technologies (Mowery, 1994). The support measures of European governments is nowadays almost exclusively aimed at SMEs and attempts to improve the link between the world of firms and that of State research.

Since the 1980s all these elements have led the European governments to rethink their industrial and scientific policies and they are increasingly abandoning direct aids for investments and creating a number of more versatile and undirected measures. Some Regions

have also followed this approach as a complement to State programs.

At present, innovation policies embrace four main types of support: mission policies, diffusion and technology transfer policies, infrastructural policies and more recently technological districts.

- *Mission policies* consist of financial support for research into cutting edge technologies, whether carried out by research institutes or firms. The principal objectives of these initiatives are to concentrate State financial resources on both base research and on applied research at a pre-competitive level.

Support for general technologies through co-operation between businesses appears more interesting. Examples of this kind are the Sematech programs in the USA and Esprit, Brite, Race and Eureka in Europe. This second and more recent approach is influenced by the conviction that it is possible to reduce research costs and distribute the risks through co-operation. However, empirical research has shown that economies of scale are not always present and that the appropriation of the results from joint research depends absolutely on the presence of internal structures of knowledge and expertise. The internationalisation, which has occurred in the scientific and industrial context of advanced technologies, also arouses problems of consistency between the objectives of the governments and the beneficiaries. In fact, while at a EU level co-operation between companies and research institutes from different countries is an important goal, the relationship with American or Japanese companies still poses problems. In any case it is important to note that this type of policy for innovation increasingly tends to elude any rigid national formulation to assume international connotations with all the positive and negative implications which have already been encountered, for example within the EU programs and Eureka.

- The *diffusion and technology transfer policies* are the most traditional initiatives. They were based on grants (through subsidies or tax credits) for the purchase of new machinery or equipment incorporating innovations. However, as the characteristics of the innovative process have changed, throughout the 1980s the emphasis has been put on measures aimed at favouring the transfer of knowledge with particular attention to SMEs.

Dodgson and Bessant (1996) point out that these policies may be of little use if the capability gap that often prevents the smaller companies from making use of external know-how is not filled. For this reason the most recent objectives of these policies have become: the promotion of research within the companies; the collaboration between companies and between companies and universities; the creation of new technology-based firms. Moreover, the EU promotes incentives for the employment of young researchers and the creation of research groups (permanent or temporary) with personnel drawn from industry, universities and research institutes. This type of activity is linked to the conviction that a considerable part of innovation is produced tacitly and therefore the diffusion and technology transfer policies must involve those who created the knowledge.

- According to Justman and Teubal (1996) the *infrastructural policies* seem to play a central role since technological development will be increasingly conditioned by the presence of a State offer of technological capability available for a variety of applications by companies or institutions. In such a situation, it is obvious that many of the measures related to mission and diffusion policies for innovation would be a part of the new concept of Technological Infrastructure Policy (TIP), such as scientific and technological parks and research institutes, which act as catalysts of knowledge and incubators for new entrepreneurial activities. Nevertheless in various countries numerous experimental projects have been started at local and national level to set up centres for technological transfer and foster firms in making use of the scientific and technical services offered by these centres and universities. In the more advanced countries, this has led to the creation of a wide structure of technological services and brokerage that mainly involves three

types of protagonists: the producers of innovation (universities and research centres); the collective economic organizations (chambers of commerce, industrial associations); the autonomous institutions created specifically for dealing with technological transfer (agencies, information centres, incubators).

- A recent line of support regards *technological districts*. SMEs marginally introduce explicit activities of R&D, but the SMEs located in industrial districts are introducing intensively process and product innovations. The formation of networks between private and public bodies is the main way to stimulate innovation in SMEs and extend the dissemination of R&D results (Antonelli, 1999). The local rooting of scientific knowledge and competencies is a basic condition to favour innovative initiatives through: the setting-up of innovative centres (Cooke and Morgan, 1994); the involvement of large companies (Ragazzi and Rolfo, 2002); the supply of real services (Acs, 1999); the promotion of business incubators and business angels to favour new technology based firms (Lofsten and Lindelof, 2002). The industrialized areas, or traditional industrial districts, must evolve to high-technology areas where firms, R&D and financial institutions coexist and jointly evaluate innovative initiatives.

According to this basic classification, section 3 examines the Italian institutional and legislative framework, with particular attention on the governance system for fundamental research and the recent changes. Section 4 shows the policies at the national level, that is the National research plan and the sectorial programmes, while section 5 is dedicated to the policies for fundamental research at the regional level both the negotiated agreements with the central administration and the autonomous programmes. The conclusions (section 6) summarize the experience of triple helix in Italy.

3 The Italian institutional and legislative framework

The institutional framework of the research public actors is represented by universities (65), public research institutions (about 70), state and local laboratories and other organisations.

The Ministry of Education, University and Research (MIUR) has a supervisory role on the greater number of research organisations institutionally operating in S&T research (CNR, INFN, INFN, IEN, INOA, INGV, INAF etc.); other bodies fall under the authority of other Ministries which support specific research activities (Council Presidency, Ministries of Agriculture and Forestry, Industry, Health, Labour, Environment, Infrastructures and Transports).

The ordinary funding to public research institutions is annually earmarked by the government on the basis of their respective pluriennial plans and provided by the relevant supervisory Ministries.

The reform of the National Research System has been realised with the aim of creating the necessary conditions for a knowledge-based economic and employment growth of the country, as stated in the law n. 59/97 “... *the reform of the public administration and administrative simplification*”. The core of reform is represented by two distinct but complementary elements: the definition of new rules for the National Research System and of precise operative choices through the National Research Plan.

The new regulative and institutional framework is based on three specific lines:

- *Establishment of a governing structure for the research system*. During 1999, the organizational structure which will support the Government and MIUR in identifying and achieving research political objectives has been developed. At present, the operative bodies are the Committee of Experts for Research Policy (CEPR), the Committee for the Evaluation of Research (CIVR) and the Technical Secretariat, in support of the activities

developed by CEPR and CIVR and by the 4th CIPE (Interdepartmental Committee for economic Planning) Commission "Research and Training".

The establishment of the National Scientific Councils at the contrary is yet in progress; they will represent the national scientific community, in both universities and research institutions.

- *Reform of the public research institutions network.* The re-organization addressed several aspects as the orientation of activities to both the scientific and productive needs of the territory, an increased level of valorisation of results and technology transfer.

It is worth mentioning that in 1999 the reforms of the National Research Council (CNR), the Italian Space Agency (ASI) and the National Institution for New Technologies, Energy and Environment (ENEA) was launched, but in 2002 a new reform vague started without a real evaluation of the results of the previous one (in some cases not yet concluded).

- *Strengthening of the efficacy of the initiatives in support of industrial research,* in order to both increase the level of investments and give them a higher impact and quality. An important step of the reform of the National Research System is represented by Law n.297/99 - "*Reorganisation of measures and simplification of procedures in support of scientific and technological research, technology dissemination and mobility of researchers*". The reform aims at creating a favourable context to industrial investments in research and involving to a larger extent SMEs, which represent the tissue of the Italian productive system. It could be considered a first attempt towards the triple helix in Italy with specific measures as the detachment of public researchers to private firms or the support of *spin-off* initiatives from the public research network (also providing specific facilities to risk capital). The financial provision for all the actions comes from a single fund (FAR - Fund for the support of industrial research), where all available financial resources will flow and a specific section is earmarked for the less favoured regions. The subsequent Decree 593/2000 operatively starts the reform through the unification of a number of laws and regulations which have ruled this field in succession for over 30 years. The implementation of the new support measures will be carried out with both a bottom-up and a top-down approach providing respectively for proposals to be submitted freely in any field and on a continuous submission basis, or under specific calls for proposals on predetermined priority areas.

Finally, SMEs targeted actions support the hiring of researchers, partnerships with and sub-commissioning to public research institutions and laboratories; doctorate grants; secondments of researchers from public research.

The current system of the national facilitations to the research and development activities is the fruit of a long evolutionary journey, last at about three years and finished only in the first months of 2001. The process of reform has the aim not only to simplify the previous picture, but also to join coherently the scientific investigation to the industrial development activities.

Moreover the legislative framework is based on the new 117 article of the Constitutional Law, which attributes to the regions concurring legislative powers in the field of the scientific research and specifies that in order to reach the aims of competitiveness of the system Country, as regards the other advanced Countries, even in Italy the regional and national levels have to avoid overlapping and duplications of measures and operate in a synergical way, in the context of a unique, complex strategic vision.

As regards the division of the competences between State and regions, three ways of intervention have been identified to support R&D:

- *The matters reserved to the exclusive competence of the State:* among these, there are those which support the university research, the national research institutes and the academies; the big base strategic research projects; the projects and the industrial research and pre-competitive development programs and the supporting interventions for the strategic

companies, of a particular productive filiere; the coordination of the participation of the national scientific system to the big European and international projects (European technological platforms); the actions of strengthening of the infrastructural research property of the Country.

- *The matters reserved to the regional competence*: all the interventions have to be attributed to Italian Regions which relevance is strictly linked to the needs of development of the single interested territory (support to the projects of innovation liberally presented by SMEs; actions of support of the creation and of technological transfer; interventions at a regional level in favour of the mobility of the research personnel between the components of the research system, etc.).
- *The matters realised with the participation of national and regional competences*: the local measures now flow together in the main lines of the national programming, and this is due to two reasons: first of all, because of understandable reasons of financial opportunity, because only the complementarity between local and central initiatives can grant the achievement of that critic mass of resources fundamental to prime the dynamic of the innovation of the system; secondly as the same regulatory picture incentives, where it do not even impose, the concentration between the decisional subjects.

Following this scheme the Italian system is based on four pillars. As a matter of fact the first two instruments are exclusive competence of the central government: the National Research Plan (NRP), and the sectorial programmes of the ministries. The other two instruments run at the regional administration level as the self-governing regional programmes and the negotiated agreements between the state and the regions. In the last instrument there is a dissimilar regulation between the National Operational Programme for the Research (NOPR) for the regions in the depressed areas identified under Objective area 1 and the Programme Framework Agreements for the other regions.

4 Policies for fundamental research at the national level

4.1 The National Research Plan

The need to adopt an effective instrument of planning research rises from the awareness that initiatives autonomously developed by the scientific system should be conjugated to the overall necessities of the country in terms of science, technology and innovation. The National Research Plan offers the opportunity to achieve the intersectorial coordination (among different institutional subjects), the critical mass (among different actors and locations), the coherence and complementarity (between the objectives planned and the implementation instruments) which could mobilise hidden or under-used resources.

Fundamental step in structuring a new institutional architecture of the research system aimed at giving science a different role in the country's development, the National Research Plan represents an opportunity for a comprehensive renewal of the national S&T policy. The Plan is articulated as follows:

- medium-long-term structural actions for the advancing of the basic knowledge in the economical, environmental and social systems. In that context, the aim of the Government is to pursue the diversification of the production system, the growth of the research companies already operative and the acquisition of concrete benefits related to the tutelage of the health, to the life and environment quality.

The core of the structural actions is represented by eleven strategic programmes: Post-genome; New medical engineering; Neurosciences; Food quality and wealth; Competitive

and sustainable growth; Nanotechnologies, Microtechnologies and integrated development of materials; Sustainable development and climate change; New systems of energy production and management; Heritage and perspectives in the human sciences; Science and technology in the knowledge-based society; Citizens' rights and safety protection.

Moreover, the Plan provides for two large research infrastructures to be integrated in the Community network and open to the Mediterranean: the Euromediterranean Centre on Climate Changes and a Multipurpose X-Ray Ultrabright Pulsed Laser.

Structural actions will also take account of the value of excellent curiosity- and creativity-driven research by supporting bottom-up research projects in the various disciplines and international scientific cooperation initiatives, with the objectives of creating the conditions by which Italian best talents can continue to work in Italy with satisfaction and high-level scientists are attracted from abroad, starting from Italians presently carrying out successful research in foreign countries.

Within the structural actions a significant number of three year research contracts will be awarded to young researchers, and Centres of Excellence will be established (with both public and private partnership) in order to bring science and market closer, which is the ultimate goal underlying the whole Plan.

- short-medium-term actions look at the valorisation of the results of the scientific investigation, promoting the spin-off actions and the secondary school education. The measures are focused on the technological development of the existing production system, on the development of nets of small and medium companies and of their links with the production system. These actions will accelerate the transition from cost-based competitiveness to competitiveness generated by endogenous innovation, with particular attention to the manufacturing, agro-food and SMEs sectors; transports and intermodality; productive management of cultural heritage and environment protection.
- horizontal actions look at the internationalisation of the national scientific system, accelerating its integration in the common space of the European research and its opening above all towards the developing Countries.

At each one of such thematic orientations correspond specific and independent financial measures controlled above all by the Ministry of Education, University and Research (MIUR) and the Ministry of the Production Activities (MAP). For the projects at medium-long term has been activated the Fund for Investments in Base Research and the Fund for Research programs of national interest (both managed by MIUR) whereas for the actions at short and medium period are active:

- Fund for the Support of Industrial Research (managed by MAP)
- Special Supplementary Fund for Research (managed by MIUR)
- Fund for Technological Innovation (managed by MAP)
- Other financial sources from the Ministries of Infrastructures and Transports, Environment, Industry, Agriculture and Forestry, for investments in R&D initiatives.

With the approval of the S&T policy the Government has defined the priorities for the National Research Plan in 2003-2006. These guidelines have been defined afterwards a wide consultation and concentration among all actors of the Italian research system: the scientific community, universities, public research bodies, enterprises and trade unions.

Strategic choices derive from a deep analysis of the Italian research system and from a punctual identification of its strengths and weakness, as well as from the evaluation of the opportunities for research in the international scenario.

The guidelines identify four strategic lines, which will be complemented by horizontal activities:

- *Advancing of the knowledge frontiers*, with the aim to train the new human capital necessary to support the development of the national scientific system and to carry out fundamental research activities.
- *Supporting research for the development of key multisectorial enabling technologies*, through "mission oriented" priority programmes so as to ensure the training of young researchers, an increased exchange of researchers among research networks, the development of joint public/private laboratories, the integration of the national research system in the European Area of networks of excellence, the development of the sector of high added value products for the national industrial system, the development of entrepreneurial capacities within the national research system (spin off)
- *Strengthening of industrial research and technological development activities*, in order to increase the capacity of enterprises of transforming knowledge and technologies into products, processes, and services with higher added value. The expected results are an increased high added value production; an increased qualified employment in the Italian industrial system; closer collaboration between SMEs and the public research system.
- *Promoting SMEs capacity in innovating products and processes* and creation of systemic aggregations at territorial level. The expected results are: State/Regions agreements in technologically advanced fields; development of actions in productive sectors of specific regional interest through the collaboration among universities, public research bodies, SMEs; development of a new entrepreneurship in high-tech sectors.

A fifth horizontal area is represented by the strengthening of the large infrastructure network for base, base-oriented and applied research, and by fostering of research activities. All actions will be monitored and evaluated according to the most severe international standards.

4.2 The sectorial programmes

In comparison with the initiatives promoted by the NRP and by the NOPR, the measures promoted by Ministry of Environment and the Ministry of Agricultural and Forest Policies are undoubtedly less significant in terms of funds. They are limited not only for obvious reasons of budget, but also for the rationalisation of the support measures, that should centre on a reduced number of targets and, therefore, of beneficiaries. The need to concentrate the resources is reflected in the programming of the sectorial activities. Also the programmes of the single ministries are inserted in the main lines of the national research.

- Ministry of Environment. The activity is essentially lead in the context of the guidelines of the Sixth Framework Programme. Moreover, the Ministry has also taken on a direct role in the scientific investigation in the fields of the chemical-physical, biological-naturalistic, managerial and administrative research, first of all in favour of the tutelage of the environment in order to actuate an articulated action in the realisation of a solid process of bearable development. The resources assigned are equal to 10.329.137 Euro for the promotion of the base and applied research, as well as for projects of technological innovation, finalized to the protection of the environment, to the reduction of the consumption of the natural resources and of the increment of the energetic efficiency. The funds are addressed mainly to research and academic institutes, and to other operators specialised of the R&D.
- Ministry of Agricultural and Forest Policies. In order to support the research in agroindustry, this ministry assign every year to the research and agro-sperimentation institutes (Irsa) a found for the institution of scholarships.

5 Policies for fundamental research at the regional level

As mentioned before, also local measures are part of the main guidelines of the national programming for fundamental research. The measures in the Mezzogiorno regions are included in an organic framework, the National Operational Programme for the Research, as a matter of fact also the initiatives in the other regions are generally negotiated. One of the main result is the establishment of the so called technological districts.

5.1 Negotiated agreement between central and regional administrations

The Institutional Agreement State/Regions (IASR) is the instrument of programming, which permits to each Region, or autonomous Province, to agree on with the central government the aims, the fields and the areas, where make infrastructural measures of common interest for the development of the regional territory.

IASR has been created with the law 662/96 which dictates a new discipline for the negotiated programming.

The possibility to intervene in all fields permits to IASR to cover the whole horizon of the public investments, for the development of the regional territory.

The areas of intervention are:

- The natural resources (water, earth, rubbish, energy);
- The cultural resources
- The human resources (work, education, training, R&D)
- The local development systems (Agriculture, Industry and Tourism)
- The cities
- The service nets and junctions (transports, telecommunications and safety)

As regards the research and the development of the agreements with the southern regions, that are included in the Objective area 1, are regulated by the National Operational Programme “Research, technological development and high-level training” (NOPR), to support the implementation of the del Community Support Framework by the structural funds, whereas for the central-northern regions is necessary to stipulate special Programme Framework Agreements (PFA) with different contents.

5.1.1 The National Operational Programme for the Research

The NOPR is funded by the ERDF (European Regional Development Fund), ESF (European Social Fund) and the Rotation Fund for the implementation of Community policies. Its target is depressed areas identified under Objective 1 (the 6 Southern regions of the country: Apulia, Campania, Basilicata, Calabria, Sicily, Sardinia).

The operative Program has the mission to reinforce the capacity of research and innovation of the meridional system, entering the relevant interventions in a strategic framework faced to the modernisation of the social and economical structure of the Mezzogiorno, to the improvement of the high education and to the occupational qualification.

In order to wide at the maximum the impact of the financed initiatives, the resources of the NOPR are not only exclusively direct to the support of research and development projects. The strategy developed is in fact more complex, and integrates a series of measures to the system which interest the economic and social environment, where it is possible to start technological innovation processes. In that case, the Program intervenes on three directions at the same time, boosting the research activity of the companies, the creation of structure of support to the innovation and the re-qualification of human resources:

- Line 1: research and development of the industry and of the strategic sectors of Southern Italy. The measures indicated by this line interest above all the technological research and development initiatives started by the private field above all through partnership formulas between companies and specialised actors of the R&D.
- Line 2: reinforcement and opening of the scientific and high educational systems. The measures of this line are addressed to the increment and modernisation of the scientific and technological equipments. Concretely, there is a promotion of the reorganisation of the physical net of operators of the R&D, of the university and of the centres of research, essentially trying to draw closer the standards to the averages in force at a national and European level.
- Line 3: development of excellent human capital. This line has the aim to create an autonomous capacity of development through the raising of the amount and of the qualities of the human resources. In that case, the measures are concentrated on the financing of special educational paths addressed to the innovation, both in a university and post-university context, and at a professional and continue training level. The addressees of the training services are not only the researchers and the innovation technicians, but also private managers, public administrators and financial operators involved in any case in the control of the research projects or in the exploitation of the results produced.

The overall investment under this programme for the period 2002-2006 is more than 2 billion euro.

5.1.2 The Programme Framework Agreements

The Programme Framework Agreement (PFA) is an operative planning instrument to put into practice the Institutional Agreement State/Regions. At the moment, it is a experimental procedure and take into account not only R&D. It defines:

- the interventions to realise, specifying the times and the ways of actuation;
- the subjects in charge of the actuation of the single interventions;
- the financial covering of the interventions, distinguishing between the different sources of financing;
- the procedures and the subjects in charge of the monitoring and the verification of the results;
- the engagements of each signatory subject and the eventual substitutive powers in case of inertias, retards or non-fulfilment;
- the procedures of conciliation or definition of conflicts between the subjects participating to the Agreement.

The measures included in the PFA are financed with different resources; national, regional, communitarians and private. In 2004 the national funds dedicated for PFAs for R&D were 78 millions euro but only 5 Regions stipulated PFAs for fundamental research. The pattern adopted by Italian Regions in the PFAs for R&D is twofold. The regional administration of Piedmont has put the procedure into effect by a public notice for wide disciplines, while all the other regions defined specific targets.

- Piedmont. The total cost of the measures made by the PFA is equal to 20,4 millions Euro, of which 14,4 of national origin and 6,0 of regional funds. The PFA finances a band on the scientific research, addressed to the selection of integrated or complex projects in the different fields: science of the life, safety and quality of the food products and of the fodders, bearable development and ecosystems, nanotechnologies-nanosciences and multifunctional materials. The aim is to develop researches which are coherent with the thematic areas contained in the Sixth Framework Program of the European Union, permitting the employ of the results in the industry also in order to encourage the naissance

of new companies. The PFA follows the one the year before with 8,7 millions of Euro of funds.

- Veneto. The total cost of the measures activated by the PFA is equal to 14,8 millions Euro, completely at charge of the central government. Between the financed projects, those which take particular relevance are both the formatives ones for the nanotechnologies, and the research and industrial experimentation ones, applied to the materials. In the field of the biotechnologies, the selected projects are 17, of which 7 in the agro-food field, 2 in the environmental one, 3 in the chemical-pharmaceutical one and 5 the diagnostic one.
- Friuli Venezia Giulia. The total cost of the measures activated by the PFA is equal to 6,8 millions Euro, of which 3,9 of national origin, 0,7 of regional funds and 2,2 of other subjects. The interventions planned are three and interest the constitution of a test and measurement laboratory to verify the interoperability of radio mobile technologies; the realisation of a centre of genetic of the regeneration and of the neurodegenerative diseases to comprehend the molecular bases of the disease and identify new therapies, the start up of a project for the selection and isolation, on large scale, of intracellular antibodies for functional genomics.
- Latium. The total cost of the measures activated by the PFA is equal to 40,0 millions Euro, of which 24,5 of national origin, 10,5 of regional funds and 5,0 of communitarian funds. The aim is to realize a technological district in the aero-spatial field, promoting actions addressed to the support of the scientific activities, incrementing the innovation of the companies and their link with the universities. The program includes, besides, the coordination and the participation to big demonstrative projects, the creation and control of technical-scientific infrastructures, courses of high education, specialization and professional training, and finally the industrial research for the development of new technologies, methodologies and production processes.
- Liguria. The total cost of the measures activated by the PFA is equal to 10,4 millions Euro, of which 6,9 of national origin and 3,5 of regional funds. The sanitary research is the area of intervention established by the PFA, with particular attention to the advanced diagnostic, the prevention, the bio-pharmaceutical, the immunotherapy and the stem cells.

5.1.3 The technological districts

One of the main results of the negotiated activities between central and regional administrations is the planning and expected development of the so-called technological districts which can be activated only on proposal of the single regions and in collaboration with the other local Institutions, the companies, the Universities, the public research Institutes and the system of the venture-capital.

The aim is to promote and stimulate a competitive process between the regions, in order to create in many areas of the Countries poles of research and of excellent innovation at an international level, with the goal to accelerate the process of technological transfer and the development of projects shared between the various actors of the scientific system and of the Italian innovation. Near to a relief of the regional competence it appears necessary a strong national action in order to grant to the districts a competitive capacity which goes beyond the narrow national borders and which can be inserted in national and international nets.

Until now it has been individuated eleven technological districts: with Region Piedmont, on the technologies of the information and of the wireless telecommunications; with Region Lombardy it has been defined a wide agreement, which comprehends three initiatives in the fields of the biotechnologies, of the ICT, and of the advanced materials; with Region Veneto a technological district in the field of the nanotechnologies; with Region Friuli-Venezia Giulia a

district dedicated to the biomedicine; with Region Liguria a district in the logistic and in the intelligent integrated systems; with Region Emilia-Romagna a district in the field of the advanced mechanic; with Region Campania a district in the field of the polymeric and composed materials; with Region Sicily a district in the field of the Micro and Nanosystems; with Region Latium a technological district in the field of the aerospace, aeronautical and airport technologies.

On average each intervention provides funds for 30 millions Euro, in order to mobilize further investments of public and private part, equal at least at three times. The financing of such districts is destined to support also the start-up of innovative companies. Furthermore, at the end of 2004 it have been assigned 140 millions Euro to realise ten new technological districts in all the southern regions.

As pointed out in a recent research of the foundation Cotec (Bosi G., Scellato G.; 2005), the government initiative for the creation of technological districts, where a central role is given to the transfer of technical and scientific knowledge from the universities and the public research institutes, represents an innovation of absolute relief as regards the previous process of delegation to the regions of the policies for the industrial districts and for the innovation (laws 317/91, 598/94, 140/99).

5.2 The regional programmes

Until 2000, all Italian Regions, the ones with special autonomy included, did not have any legislative power in the field of fundamental research, which fell under the competence of Central Government. The legislative delegation dealt only with the industrial sector, in which regional governments intervened more than once. Consequently, the measures promoted by the local authorities to support R&D was related to product and process innovation, and frequently defined as pre-competitive research. For this reason, SMEs R&D grants were included in the policies to support competitiveness, and they were often confused with the generic technological innovation and quality aids.

As Table 1 shows, almost all Italian Regions have expressly inserted even the achievement of applied research investments – otherwise defined as “industrial” research – in the eligible costs according to the benefits of law. In most cases this comes from the delegation to regions of the national laws 598/94 and 140/99.

As mentioned before, the new 117 article of the Constitutional Law assigns to the Regions concurring legislative powers in fundamental research. The framework is the fourth strategic line of the National Research Plan focused on the creation of a systemic aggregations at territorial level.

Table 1 shows the programmes taken by some Italian Regions for fundamental research¹. In same cases refer to specific sectors as in Umbria for Agriculture and Emilia-Romagna for ICT. In Lombardy the measures make reference to the industrial districts². In Friuli-Venezia Giulia, in the Provinces Autonomous of Trento and Bolzano, and in Basilicata, the incentives follow the traditional scheme of the laws to support innovation³. In Campania and Piedmont

¹ As a matter of fact some of them were introduced before the revision of the a Constitutional Law, so that some Regions had assumed exclusive competencies properly of Central Government.

² The definition of industrial district adopted by the Lombardy Region differs from literature. The territorial contiguity of the industrial district has been substituted by the trasveral approach of the industrial meta-district in order to take into account outsourcing in components and services, quite similar to the definition of filiere. This measure supports fundamental, industrial and pre-competitive research in biotechnology; design; new materials and fashion.

³ In Friuli-Venezia Giulia and in the Province Autonomous of Trento only public bodies activities are supported,

the programmes tend to create the “Regional Research System”. Other important initiatives are related to the setting-up of foundations to coordinate public and private bodies on a specific matter, it is the case of the Foundation for Hydrogen in Piedmont, or the agreements with large companies in order to develop R&D activities, it is the case of Finmeccanica group with some Regions.

It’s important to stress that all the above Regions and Autonomous Provinces have appointed a regional minister to the authority on fundamental research matters jointly with other functions, in general either culture, education and university, or productive activities, innovation and new economy. At the moment, only in the case of Campania the delegation granted is substantial in comparison with the other tasks managed by the regional aldermanry (or ministry).

Between the measures adopted by the Italian regions the most interesting are surely the ones elaborated by Campania and Piedmont⁴ for the creation of the “Regional Research System.

The two laws are very similar. On the basis of the principle of the horizontal subsidiarity, both laws expect the direct involvement of universities, public and private research centres, consortiums and cooperatives with research activity finalities and in Piedmont also of the scientific and technological parks, of the sanitary units, of the companies which operate in the research field, of the foundations of bank origin, of the local institutions and of the chambers of commerce.

Table 1: Regional R&D incentives in Italy

REGIONS	TIPOLOGY		
	Fundamental	Industrial	Pre-competitive
Valley of Aosta		X	X
Piedmont *	Regional system	X	X
Liguria		X	X
Lombardy	Industrial districts	X	X
Veneto		X	X
Friuli-Venezia Giulia	Public bodies activities	X	X
Province autonomous Bolzano	SME and public bodies activities	X	X
Province autonomous Trento	Public bodies activities	X	X
Emilia-Romagna	ICT	X	X
Tuscany		X	X
Marches		X	X
Umbria	Agriculture	X	X
Latium		X	X
Abruzzo		X	
Molise		X	X
Campania	Regional system	X	X
Apulia		X	X
Basilicata	SME and public bodies activities	X	X
Calabria			X
Sicily			X
Sardinia		X	X

* Waiting to be passed by the regional council

Source: *Ceris-Cnr*

while in the Province Autonomous of Bolzano and in Basilicata also SMEs initiatives.

⁴ In Piedmont the law is waiting to be passed by the regional council.

The general lines of intervention are: encourage the investments in human capital and sustain the training of young researchers; develop the competitiveness of the production system through the knowledge and the innovation; promote the cooperation and the iteration between the subjects operating in the system; integrate the regional policies of the field and the instrumental and financial resources, of origin both public and private.

Peculiar characteristic of the two laws are the predisposition of the pluriennial programme for the research and the innovation, the constitution of a scientific committee with tasks of connection and consulting and a commission of evaluation of the measures adopted. In Piedmont it is expected also the constitution of an internal commission of technical coordination to harmonize the measures taken in the different assessorships.

One of the first results realised in Campania has been the constitution of regional centres of competence, which have the task to interfaces between the world of the research and the one of the production. This is a unique and with no records experience in Italy, which permits to disseminate and transfer, efficaciously and systemically, knowledge and technologies in the region and in the Country. The centres realised are ten and operate in seven different strategic sectors: environmental risk; biology; arts; new technologies for the production activities; agro-food; ICT; means of transport. Each centre has a leader, referent for the regional administration and a project leader.

6 Conclusions

From this analysis of the national and regional policies in the field of the innovation it is possible to make some considerations. First of all the concept of triple helix is never explicit as it is, on the contrary, mainly a concept still strictly influenced by the traditional formulations, where the relation between the various actors of the innovative system is limited to public producers of knowledge (universities and public research institutions) and to potential beneficiaries, the companies, above all the small and medium ones, in the classic acceptance of a transfer of knowledge from the first to the seconds. Only the law 237/99 offers a feeble and confuse perception of the triple helix, above all in the parts explicitly referred to the detachment of the public researchers at the companies and at the creation of spin-off companies of the public research: in fact in these cases it is clear both the involvement of other public subjects beyond the main ones, and a more innovative formulation which from one side refers to the persons as the real actors of the technological transfer and from another side introduces to normative and financial mechanisms for the constitution of companies from the world of the research, which are like a conceptual revolution in the panorama of the Italian research. Another evolution in that sense is represented by technological districts not only for the single projects itself, but for the logic of the involvement of a plurality of actors, which is at their base.

From the part of the regions, even if in presence of a process of devolution, which leaves wide space to the initiative of the single local governments (concurring legislative powers), the regions have acted according to traditional focused logics essentially on the support of the innovative projects of the companies: even if it have been initiatives for the support of the public research structures⁵, the Italian regions have continued to prefer traditional support measures to the innovation of the companies; in rare cases, it is perceptible in the context of

⁵ The Campania Region with the Regional centre of competence, the Valley of Aosta Region with the local university, the Province autonomous Trento with its technological institute for micro electronics, and the Piedmont and Emilia-Romagna Regions with the support to the establishment of the University of gastronomical science, are clear examples of the direct interventions of the regional governments in the funding of research.

the technological transfer a feeble and confuse perception of the triple helix where, for ex., as in the L.R. 7/02 of Emilia-Romagna, the new entrepreneurial initiatives in the advanced fields are financed from public subjects (universities and research centres) also in collaboration with private subjects (companies).

In conclusion, it seems to be able to state that the process of devolution, eve if it does not permit to the regions to face the support to the innovation in the spirit of the triple helix, actually the cultural backwardness that can be verifiable on these topics, both in the world of the public research, as in the system of the companies and in the local governments, has avoided, until now, to make significant steps forwards in that direction.

7 References

- Acs, Z.J. (1999), "Public policies to support new technology-based firms", *Science and Public Policy*, **26**, 247–257.
- Antonelli, C. (1999), *The microeconomics of technological systems*, Oxford, Oxford University, Press.
- Arrow K. (1962), "Economics of welfare and the allocations of resources for invention in National Bureau of Economic Research", in *The rate and direction of inventive activity*, Princeton, Princeton University Press.
- Bosi G., Scellato G. (2005), *Politiche distrettuali per l'innovazione delle regioni italiane*, Roma, Fondazione Cotec.
- Cooke, P., Morgan, K. (1994), "The creative milieau: a regional perspective on innovation", in Dogson M., Rothwell R. (eds.), *The handbook of industrial innovation*, Aldershot, Edward Elgar.
- Dodgson, M., Bessant, J. (1996), *Effective innovation policy: a new approach*, London, Thomson.
- Etzkowitz H., Webster A. (1991), *Academic-industry relations: the second academic revolution ?*, London, Science Policy Support Group.
- Justman, M., Teubal, M. (1996), "Technological infrastructure policy TIP: creating capabilities and building markets", in Teubal M. et al. (eds.), *Technological infrastructure policy: an international perspective*, Dordrecht, Kluwer.
- Kline, S.J., Rosenberg, N. (1986) "An overview of innovation", in Landau R., Rosenberg N. (eds.), *The positive sum strategy: harnessing technology for economic growth*, Washington, National Academy Press.
- Lofsten, H., Lindelof, P. (2002), "Science parks and the growth of new technology-based firms: academic-industry links, innovation and markets", *Research Policy*, **31**, 859–876.
- Malerba F. (1993), "The national system of innovation: Italy", in Nelson R.R. (ed.), *National innovation systems. A comparative analysis*, Oxford, Oxford University Press.
- Mowery, D.C. (1994), *Science and technology policy in interdependent economies*, Boston, Kluwer.
- Ragazzi, E., Rolfo, S. (2002), "ICT Diffusion Patterns in Industrial Districts, the Role of Leading Firms", *32th EISB Conference, Sophia Antipolis, September 8-10th*.
- NSF (2000), *Science & Engineering Indicators – 2000*, vol.1, Arlington ,VA, 2000;
- Regione Emila-Romagna, Ass.alle Attività Produttive (2005), *Politica industriale e sviluppo del sistema produttivo regionale*, Bologna.