# The Third University Mission in Italy: Potentialities and Criticalities

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## Abstract

*The focus of the article is the 'Third University Mission' in Italy; 'Third' because it comes after teaching and research. The expression means, in fact, the active role that the university has in the development of its area of influence through the socio-economic contribution of its activities. The article sets out the main features of the Third Mission that make university an intermediary between knowledge, work, business and local communities. Potentialities, criticalities, excellences and setbacks are underlined in the Italian context in comparison with the international scene, the goal being to answer several open questions. Is there one best way for institutional commitment to the Third Mission? Is there a shared model for the Third Mission in Italy and Europe? Is there funding and dedicated and adequate implementation policies? Does the dominance of technological and scientific aspects of the Third Mission risk widening the gap between sciences and humanities?*

**Keywords:** Third University Mission; Research and development; Governance innovation; Triple Helix.

**JEL**: A12; A13; A14

## *1. Introduction*

The last three decades have seen universities assume an important role in terms of innovation and the development of productive activities. The high-profile training of human capital and the growing importance of technological, cognitive and aesthetic factors for the enhancement of economic processes and production make universities a rich technological, organizational and entrepreneurial source of innovation affecting the competitiveness of local economies.

The contribution may be subdivided in two categories; the first relating to the integration of scientific research into technological applications, the second relating to the integration of such applications into the development of economic activities. The molecularization of technologies and their applications place biological and physical micro-processes in popular consumer goods, bio-medical products, living cell tissues and computers. Robots, artificial intelligence, nanotechnologies, medicines, precision weapons, biological products and life-producing processes are just some of the possibilities offered by the combination of scientific research and technical applications that transform the ways we create, care for ourselves, imagine the future and live the present.

The latest technologies bring greater precision, quality and speed to today's economic activities. Mind, media and technologies have created a new form of society populated by machines that can listen, speak, act and even learn. However, the transition towards this techno-economy is fraught with challenges: the relationship between technology and employment can be extremely problematic (Ford 2015) and evident technological mismatches between labour supply and demand can, in fact, drive unemployment. Such is the case in the Italian context as graduates become ever more abundant in relation to demand, even though many have emigrated in recent years and those left make up less of the total population in comparison with the EU average.

This is why the Third University Mission calls for better job placement as an integral part of the institutional intermediary role that universities must play in relation to the knowledge economy, industry and local and national job markets.

The sophistication of technology, however, has perhaps brought scientific research to a level of industrial and economic centrality like never before. The lab is ever closer to consumer goods and networks of commercial exploitation, opening up two opposing scenarios; the first optimistic, in which scientific research is a progressive and inclusive source of economic value, and the second pessimistic, in which scientific research is systematically conditioned and limited by economic interests. However, this diametricality opens up many non-exclusive possibilities for the socio-economic impact of scientific research. On the one hand, the logic of exploitation affects the university's functional positioning among the powers in play in our ever more technological and consumerist societies. On the other hand, scientific progress and innovation increases the competitive strength of economies and raises levels of skill, know-how and participation across the board in the global citizenship.

India, China and the Asian Tigers have condensed the quantum leap from backward agricultural societies into economic, technological and scientific powerhouses in less than 25 years. Scientific research has become like knowledge and politics: an intangible commodity subjected to the interests of power, which according to their distribution may narrow or widen the agency of institutional organizations, groups and individuals. The Third Mission, by promoting the dissemination of research results and their contribution to socio-economic development, constitutes an opportunity for the university to become a more important player in the socio-political system that regulates production and the use of technology. This requires the development of various techno-institutional levels: national policies in support of technological research, regional systems and models for intervention in technological districts, which are among the most advanced conducts of technology transfer and business incubation.

The challenge is to understand how to foster the transfer of knowledge between university, industry and government in contexts with entirely different environmental conditions than at MIT and in Silicon Valley, where the ‘triple helix’ has been seen to generate winning outcomes. In the United States, for example, the three actors in the field started out from very distant positions, especially regarding direct government involvement. In this case, the ‘triple helix’ approach has brought together technological and economic innovation initiatives that originated in universities and integrated them in the creation of new businesses. Something similar happened in India, where the Bangalore phenomenon and its tech-districts were the fruit of bottom-up success stories. In China, however, the government has a far more central role in a ‘triple helix’ articulated mainly by a managerial and administrative top-down logic (Viale and Etzkowitz, 2010) in which the importance and influence of institutional processes on the social construction of scientific research and innovation is evident.

## *2. The development role of university and industry research*

The ‘entrepreneurial university’ and ‘triple helix’ approaches suggest how universities can assume a more strategic role in innovation and economic development through a stronger relationship with industry and government (Etzkowitz, 2008). Cognitive transfer may thus be activated in productive activities and the open-process application of knowledge so that knowledge takes on the characteristics of a collective good derived from a complex process of exchange, sharing and creative information processing (Stiglitz, 1989).

The main lever by which universities may activate this process is technology transfer. In this regard, the Third Mission involves two strands; the first concerns the creation of innovative companies from a foundation of academic knowledge (i.e. public research spin-offs), the second concerns the creation of new products and processes in innovative sectors through corporate research and development activities (i.e. business spin-offs).
In Italy, where private investment in research and development is severely lacking, there is a risk that the Third Mission acts merely as substitute to the insufficient efforts of industries to support applied research, thus consequently also reducing the resources allocated to fundamental research. This seems to be confirmed by the correlation between ever more entrepreneurial role of universities and the scarcity of financial resources from traditional public channels (Ramacciotti, Danile, 2015). It appears that the Third Mission is more of a crisis avoidance stratagem than a structural and development strategy for the revival of the Italian economy. There is some evidence to confirm such fears. Italian innovation in terms of the share of high-tech business exports over total exports is extremely low compared to other central European countries.

Italy, with 6.6% in 2012, still finds itself ranking well below the European 28-country average (15.3%) and more competitive countries such as France (20.3%), the UK (15.4%) and Germany (14.2%). Furthermore, Italy has a innovation index in human capital of 0.42 against the EU average of 0.58, in the research sector of 0.39 versus 0.53, in entrepreneurial networks of 0.43 versus 0.55 (Innovation Union Scoreboard, 2014).

Within this scenario, the first question in assessing the implications of the Third Mission is the optimal balance between basic and applied research. Successful examples of the entrepreneurial university highlight its role as a originator of basic research and operator in sectors at the bleeding edge of established knowledge, which can generate genuine innovations that are often too risky for private investment (Etzkowitz 2008). In Italy, basic research is experiencing a downward trend in investment with a cut between 2009 and 2010 of over 800 million Euros and between 2014 and 2015 of approximately 100 million Euros. National Interest Research Projects (PRIN) and Basic Public Research Projects (FIRB), in particular, have seen a drastic reduction in investment between 2010 and 2012 (Zegna, 2106). Overall, spending on research and development in Italy is among the lowest in Europe. In 2012, Italy invested 1.26% of its Gross Domestic Product in public and private research compared to the EU and OECD averages of 1.98% and 2.4% respectively. Even private investment in scientific research, accounting for 52% of national expenditure, is one of the lowest in Europe, with the EU average at 62% (ISTAT, 2014).

In Italy, the culture of innovation remains anchored to a model of 'innovation without research', which in the past worked reasonably well in traditional sectors but is no longer sustainable in the global competitive context. In the United States, basic research receives 75% of total resources in the science, technology and engineering sector, 66% of US university research is publicly funded and 68% of total research funding comes from the private sector, which has significant research and development capabilities and invests heavily in applied research in connection with the basic research conducted at universities (National Science Foundation, 2009).

Due to recent technological and scientific developments, the dichotomy between basic and applied research certainly seems to be less pronounced than in the past. Fundamental discoveries in genetics and mathematics have led to new products in a matter of a few years (e.g. new vaccines and software applications), while applied research has in turn has led to important scientific progress, such as in the case of IBM's superconductor research in the mid-80s (Guellec, 1999). In sectors such as pharmaceuticals and electronics, the bond between basic and applied research is particularly strong. In this general context, while large companies tend to be buyers of applied research in private laboratories, small businesses benefit more from the knowledge spillover from public research laboratories (Audretsch and Feldman, 1996).

Although the dichotomy is somewhat less clear-cut, the relation between theoretical and applied research, especially when excessively imbalanced, has multiple significant effects on the dynamics of development. Over the past two decades there has been a significant concentration of research in applied sciences, with the Gini concentration index increasing from 62.6% in 2000 to 69.5% in 2003, while the concentration of research in theoretical areas decreased in the same period from 48.83% to 45.87% (Coccia, Rolfo, 2004). The rivalry between pure and applied research is intimately linked to the reduction in public funds for research, which implies a negative inversion in research and access to funding resources for Public Research Centres and Universities. The steady decline (from the first half of the nineties) in public resource allocations to research institutions has been accompanied by a change in approach of researchers to the market, seen as an important source of necessary financing for scientific activities. The shift towards applied research has increased levels of self-financing, but also rivalry with pure research. The widening of the gap between pure and applied research also feeds the exodus of highly skilled human capital to other industrialized countries that offer better conditions for performing pure research, thus increasing the heavy dependence on foreign countries in the acquisition of technical knowledge and strategic innovation necessary for raising the competitiveness of the Italian productive system. The ever greater Italian brain drain is clearest outcome of decades of such dynamics.

The data shows the extent of the problem. On average, in the five-year period from 2006 to 2010, 97,000 public and private researchers were operative in Italy, which works out as 4.2 researchers per 1,000 workers, and 3.3 in the previous five years. The other major European countries have a significantly greater number and share of researchers: 224,000 in France (8.7 per 1,000 workers), 304,000 in Germany (7.9 per 1,000 workers), 250,000 in the United Kingdom (8.6 per 1,000 workers) and 128,000 in Spain (6.5 per 1,000 workers). Compared to France and Germany, the share of researchers is particularly low in the private sector (Eurostat, 2012).

It is to be noted, however, that the influence of Italian R&D on the labour market is not as static as might be expected. In 2012, the number of workers engaged in R&D activities (240,179) increased by 5.3% compared to 2011, showing growth in businesses (+6.9%), in public institutions (+5.4%), in universities (+3%) and in private non-profit institutions (+1.7%) (ISTAT, 2014). In contrast, between 2012 and 2013, although various indicators of Italian innovation rose, there was a continual decline in investment of venture capital and in expenditure in innovative and knowledge-intensive activities other than R&D, such as those associated with basic research (European Commission, 2014).

Against this backdrop of poor investment and numbers, the performance of Italian researchers and research is actually relatively high in comparison with other countries, with productivity at a good level both in terms of scientific articles published and citations. In the 2013 UK report 'International Comparative Performance of the UK Research Base', Italy ranked in the group of countries with a high number of publications and citations per unit of expenditure. Italy published 3.5 articles per million dollars invested in research and development, with rates of productivity and growth similar to Canada and second only to the United Kingdom, but higher than France, Germany, the United States, Japan and Switzerland.

### *3. The lack of governance in the Italian triple helix*

While European universities are already undergoing profound institutional and organizational changes, with notable outwardly openings, Italian universities are late to the game and have exhibited little institutional coordination of processes and resources.

For example, UK polytechnics have focused their institutional role in research and its applications and reduced the emphasis on teaching and vocational training. In Germany, the Fachhochschulen, in addition to focusing on applied research, have introduced Master's courses offering the opportunity to access doctoral programs at universities. These institutions, which were traditionally oriented to applied research, are intensifying their activities in pure research, but not in Italy, where strategies for supporting such pure research activities are lacking and insufficient (Moscati et al., 2010). The Italian higher education model has never adopted a distinction between higher education institutions devoted mainly to training and universities devoted mainly to research, nor between institutions primarily oriented to pure research and those to apply. This lack of coordination has negative effects on the dissemination of scientific research in productive sectors and demonstrates inadequate strategic policy in uniting industry operators and pools of knowledge, development and institutional governance (Turri, 2011).

In other European countries where economic performance and the contribution of knowledge to competitiveness are higher than in Italy, scientific research and its relationship with industry is encouraged in two specific ways. First, there is the contractual model in which the university offers a service (research and technical consulting) and a private entity finances it, thereby also accessing tax breaks and allowing universities to diversify revenues. This strategy is seeing significant growth in countries such as Holland, Spain and Germany, and not only as a way to combat the decline in public funding. In Germany, for example, the contractual model is the product of greater collaboration between universities and private entities. Indeed, the strong growth in R&D expenditure in privately funded universities between 1995 and 2010 is not attributable to the decrease in public funding, but to the increase in private financing. The second model promoting the relationship between research and industry applications is the cooperative model, in which there is direct collaborative involvement in research activities created between academic institutions and other entities, whether public or private (i.e. research partnerships). This model is widespread in France, where research funding must remain predominantly public (Montanaro, Torrini, 2013).

In Italy, there are indistinct, overlapping, hybrid and spontaneous models and strategies which overshadow the weak technical and scientific governance struggling to connect academic institutions, scientific communities, businesses and government institutions. Research is often funded and carried out as far as getting a product to work in the laboratory, but there is a lack of investment for the 'last kilometre' in the knowledge industrialization process. These results in many innovative start-up technologies being sold abroad thus were undermining their fertilizing potential in the local contexts in which they were generated and predominantly funded (Carboni and Eliteam Group, 2012). A further issue concerning scientific and technological governance in Italy relates to the revenue that universities obtain through researching consulting, which amounted to 3.27 billion Euros in the period from 2004 to 2010, accounting for a quarter of revenue, much of which translates to departmentally managed income for the universities and the personnel involved.

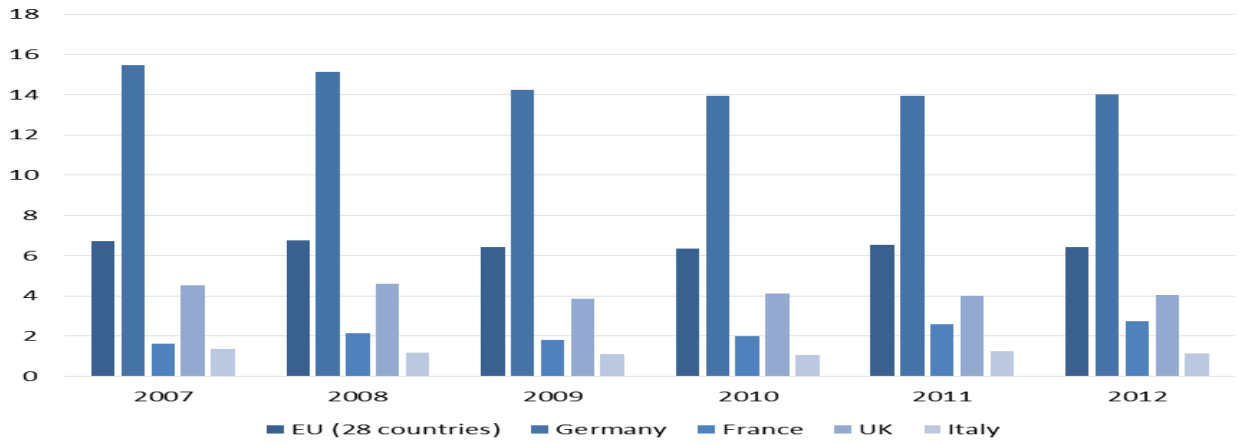
The departments, in order to maintain a certain autonomy in the management of research consulting and its profitability, may at times be seen to resist the authority of the Technology Transfer Office (TTO) in what constitutes a conflict of interest between the Rector's Office, to which the TTO reports, and the departments.
Analyzes show that there is a positive relationship between the resources invested by universities through TTOs, the number of spin-offs and the exploitation of intellectual property. On the contrary, the relationship between resources invested through TTOs and research consulting activities is negative. At the same time, while the total amount of research consulting is not significantly correlated to the resources of the TTOs dedicated to relations with industry, the relationship is negative and statistically significant when considering the intensity of research consulting activities (e.g. in terms of revenue per worker ) (Ramacciotti, Daniel, op. cit. 2015).

This result seems to demonstrate that the propensity to invest in the development of relations with industry is higher in universities with a low intensity of research consulting. This threatens to create conflict between departments and Rector's Offices and disharmony and institutional inefficiencies unconducive to the EU framework Horizon 2020, which has the primary objective of establishing a more effective bond between research and innovation by implementing knowledge transfer from scientific laboratories to production activities and by feeding interactions between research and industry. The framework not only concerns funds allocated by competitive tenders at a European level, but also those transferred to regions, which, in their strategic plans (i.e. Smart Specialization Strategies), must indicate areas of expertise in which to concentrate European resources. The legislative framework is intended to promote the bottom-up approach in relation to technological areas in which research and industry can more profitably relate. However, the Smart Specialization Strategies, which are focused on applied research, could frustrate pure research and limit frontier scientific innovation. Additionally, the Smart Specialization Strategy approach favours metropolitan areas where there are already greater concentrations of advanced facilities, services and technological and professional communities. For non-metropolitan local development systems, this handicap can only be overcome via an advanced governance of the factors that allow access to intangible networks and services of knowledge and innovation.

An examination of the data comparing Italy with other European countries shows that its research system is lagging behind in response to the challenges posed by society and the knowledge economy. University research is almost entirely funded by the public (Figure 3) and collaboration between universities and industry is extremely limited (Eurostat Community Innovation Survey, 2010). The low level of private investment in research, also due to the low technological and scientific profile of Italian entrepreneurship, decisively influences the limited cooperation between companies and institutions and the historical lack of governance of structures supporting research combines with the central government's inefficiency in implementing incentive policies to bring universities and industry together (Montanaro, Torrini, 2013).

Support for university research from industry is, in Italy, significantly weaker than that observed in other European countries (Figure 1). The difference is particularly marked in comparison with Germany, whose industry has undergone remarkable growth in recent years, due in most part to the innovative capacity of enterprises.

**Figure 1: Expenditure on university research financed by industry (percentage values, Eurostat, 2012)**



### *4. Spin offs and entrepreneurial culture: the challenge of knowledge industrialization*

Despite the research limitations in Italy, universities are deeply involved in the challenge for the industrialization of knowledge, in which culture and entrepreneurism interact with research in order to enhance the growth performance of research start-ups and spin-offs. The role of institutional intermediary between the world of knowledge and productive activities is a strategic function of university coordination, especially in relation to contexts involved in innovation.

The relationship between spin-offs and private companies is a central theme in the competitive re-launching of the country system, which will bring positive results only with growth in the open exchange of competences. Companies can provide management expertise and the right approach to markets, while universities can transfer scientific and technological knowledge to those people within the companies that are most oriented to innovation. Furthermore, another aspect to be taken into account to accelerate the growth of innovative activities is the stimulation of collaborative processes between spin-off companies, such as patent sharing, which by increasing the value of intangible assets facilitates access to financing.

The effects of such efforts can make spin-off companies more appealing for venture capital, which can stimulate the growth of immature markets. Spin-off companies are in short supply of capital and the venture capital industry must be in a position to immediately assess the industrialization strength of a specific research project. For this reason, though rarely effectively implemented, in-depth analyses must be made of research-generated business ideas. Researchers often have little experience in developing a plan for industry implementation and need coaching that few manage to deliver effectively. At the same time, it is necessary to simplify procedures for access to public funding and to speed up delivery times, making use where possible of automatic procedures such as the tax credits for R&D. To support new high-tech entrepreneurship, it would be particularly effective to facilitate allowances to contain labour costs and support the implementation of innovative products and services, with particular attention given to the application of the public procurement of innovation (PPI), whose potentiality is widely underutilized in Italy.

The structuring of the Third University Mission seems, however, to generate inconsistencies and inequalities that reproduce historical splits in the territory of the country. The distribution of patents produced by research spin-offs are unequally distributed across disciplines and regions, with humanities and central and southern universities seemingly cut off from positive processes and effects. Considering not the total number of patents filed by universities (1,436 in 2011) but those effectively sold or licensed (405 in 2011, approximately 28% of the total filed), regional asymmetries are even more pronounced: 60% of all sold and licensed patents were generated by just four universities (the Polytechnic of Milan, the University of Milan, the University of Bologna and the University of Siena).

Moreover, factor analyzes show that positive performances of university technological and cognitive transfer are related to the concentration of research in specific subject areas, above all in industrial and information systems engineering. On the contrary, performance is generally negatively correlated to universities specialized in the humanities, with few able to compete and be recognized when indicators of knowledge transfer are patents, research spin-offs research and research consulting. This severely penalizes and marginalizes the humanities even though they are essential in the economic and innovative exploitation of territorial and cultural resources in sectors such as marketing, tourism and capitalization of the cultural and architectural heritage of the country (Biagiotti, Gherardini, 2016).

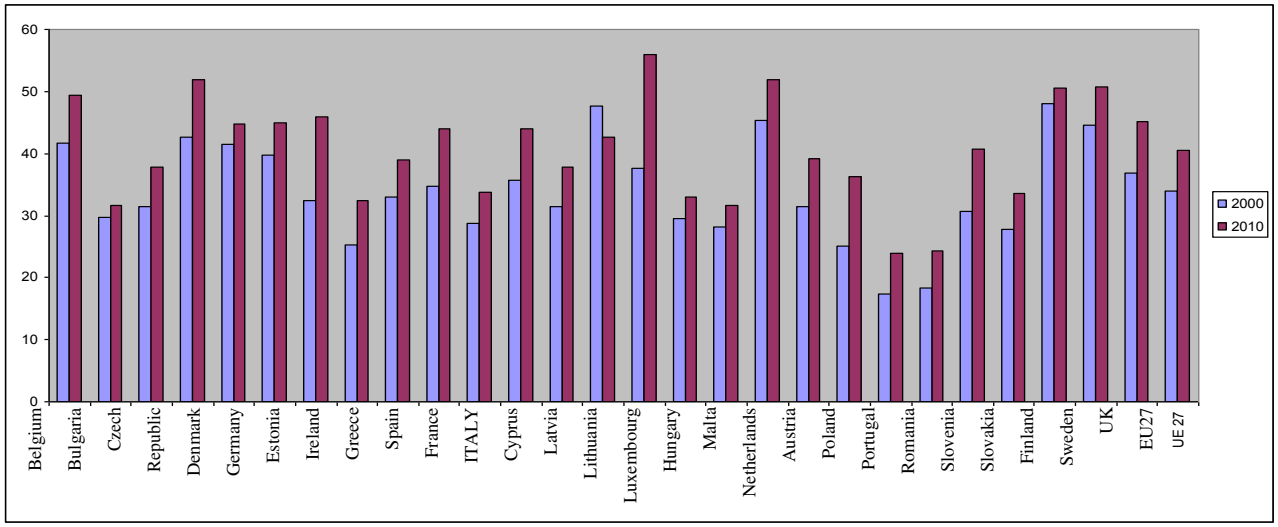
The role of universities in the creation of spin-offs, in any case, should provide, within the context of institutional intermediation between the world of knowledge and productive activities, also promote the necessary evolution of the current widespread entrepreneurial culture in Italy, which, for example, continues to prefer to invest in material over intangible commodities. Economists attribute this market lag to the fragmented production sector, although other research shows that the correlation between small businesses and innovation is far from negative (Thornton, 1999). The problems appear to be related to the prevailing business culture in specific regions and their production choices in attempting to improve productivity and profitability. It is not that innovations are inexistent in the Italian business world, as demonstrated by the studied cases of entrepreneurial excellence, mostly tech-oriented and often involving engineers with a strong connection to universities, who remain, however, frustrated by relations with local and regional authorities (Carboni and Eliteam Group, 2012).

However, old ideas, traditional sectors and already well-oiled mechanisms still seem the safest bet for the country's economy and are still able to keep it afloat. Universities have the potential to influence productive activities, but, on a large scale, this would require a transformation of the prevailing business culture, a 'K-factor' that until now mainstream economics has severely undervalued (Gallegati, 2016), as suggested by the scarce though complex literature in the social sciences on 'when, how, where and why' new businesses (Aldrich, 2011) or business cultures (Martinelli 1994) are generated. In this context, the only paradigmatic certainty in the Sociology of Entrepreneurship is that the arguments of sociologists and psychologists are wholly inadequate if they hold economic activity to be a mere function of the individual (Ruef, 2007) without considering the structural impact of systemic forces and external environments on the birth and development of entrepreneurship. In this sense, the social disciplines, albeit in piecemeal fashion, continue to focus both on the availability and selection of individuals capable of and suited to entrepreneurship and on a large number of external factors, such as the role of universities, to explain the favourable conditions for the emergence of innovative entrepreneurship (Thornton, 1999). In this framework, the role of university coordination between the world of knowledge and entrepreneurs (if not considered a social class, then at least a potential elite group) can be articulated in two functions: a direct function associated with spin-off creation and participation and a complementary function that blends innovation and entrepreneurial culture in influencing the younger generations that the universities educate and train.

## *5. The threat of a jobless future and the importance of university job placements*

Italy lags behind other countries in the capability of its productive activities to assume high profile technological and scientific professionalism. Traditional manufacturing systems widespread in Italian SMEs make techno-economic development and transition difficult. Additionally, the reduction in the influence of large domestic companies has reduced corporate competitive impact in scientific and industrial innovation efforts. The data speaks for itself: the incidence of human resources in science and technology in the active population aged between 25 and 64 years (Figure 2) in Italy was 33.8% in 2010 in comparison with the EU average of 27% and higher incidences in countries such as Germany, the UK and France (with values above 40%), with even higher incidences observed above 50% in countries such as Luxembourg, the Netherlands, Denmark, Finland and Sweden (Eurostat, 2012).

**Figure 2: Human resources in science and technology in European countries; years 2000-2010, percentage of the labour force aged 25-64**




***Source: E*urostat Science, Technology and Innovation Statistics – independently elaborated**

In terms of internal composition, human resources employed in science and technology are approximately two thirds technicians and similar workers (66.4%), while 33.6% are professionals. The latter employment grouping prevails over the former, among the major European countries, only in the UK (54.8%) and Spain (53.9%), with the Italian figure for the professional grouping only slightly higher than that of the Czech Republic (33%) and about nine percentage points lower than those of France (42.9%) and Germany (42.5%).

Of greater importance, however, is the fact that Italy ranks particularly low in the subcategory of S&T professionals composed of scientists and engineers, which at 10% is one of the lowest incidences in Europe (Eurostat, 2012, Carboni, 2004). Given that this professional group is often the most capable of creating innovation and plays a crucial role in technologically-led development strategies, its limited influence on the internal composition of S&T human resources in Italy is another critical aspect that bears on the inadequate professionalization of Italy's occupational structure and on the country's ability to develop technologically-led professional communities. The figures speak volumes about the underutilization and wastage of human capital, particularly of young workers and graduates, since every year a number of young people, mostly graduates, roughly equal to the population of a city such as Siena emigrates (Migrantes, 2016).

In coming out of a very serious crisis, Italy runs the risk of facing a phase of jobless growth, a new wave of employment deindustrialization and disintermediation in services, compounded by slow progress in terms of technological innovation as a resource for the creation of new professions and high skill jobs. The social situation is made worse because Italy provides inefficient public protection against the structural condition of long-term unemployment. Recovery from the last economic crisis is problematic in a country with such high unemployment generally and particularly among young people. The technological and organizational turnaround that many Italian companies need in order to remain competitive will certainly not create additional employment in the short to medium term and it remains unlikely that, over the next few years, the Italian manufacturing industry will maintain the social function of generating additional jobs as was the case in second half of the twentieth century. As regards services, productivity has stagnated in line with employment trends. Italy is likely to stall in the middle of the current development transition, restructuring and innovating companies in traditional economic activities, generally in relation to labor-saving processes, without actually proposing or developing new, innovative and technological activities, or developing generative, creative and high-tech brain power, on which to pin hopes for additional employment for Italy's young and active population.

The relationship between technology and employment is therefore likely to be problematic in Italy and there is a real risk of creating a jobless future. In this regard, a forward-looking vision of managerial and administrative authorities is absolutely necessary, especially in educational contexts. The educational system, and primarily universities, needs to be supported by effective public and private job placement systems. This is one of the tasks of the Third University Mission. Indeed, little transfer of technology and knowledge to the social and territorial context can happen without the involvement of human capital, and, in itself, technology transfer is complementary to the university opening doors to the insertion of young graduates into the working world. For universities, the task concerns, in particular, the development of human capital to bridge the gap between the skilled labour offer and the business world labour demand, and it is opportune that higher education institutions and universities also develop a placement function for their graduates at various levels. Furthermore, job placements should become part of the purpose of the governance of the territorial triple helix of local institutions, higher education and businesses. Universities, in particular, must ensure that, once graduated, students immediately find an outlet to a path of further study or training and work or alternating training and work. The absence of this model in some European countries, such as Italy, has already led to the insidious phenomenon of the new category of young people Not in Education, Employment or Training (NEETs).

In close collaboration with institutions responsible for policies of employment, every university must have the facilities to enable placements and plan courses of study to meet the professional needs of the territory, as per Law 270/2004, paragraph 5, letter E. The university must get to the heart of active employment policies with tools such as curricular and extracurricular internships, experiences abroad, apprenticeship contracts in higher education and research and alternating training and work cycles. One possible channel, though in need of strengthening and reorganization, is the National Civil Service. Italy had a particular need for personnel for childcare, summer entertainment for children of working couples and for the elderly in need of care and companionship. These requirements, which must be supported by appropriate organizational associative structures, supplement those already existing in the public and associated sectors. However, an investment of at least 1 billion Euros would be needed, such as France invests in its National Civil Service, in order to be able to offer selected young people a work commitment of six months a year, for at least three years. Universities should seek agreements with companies for entry into programmes of alternating and integrated training and work. Naturally, support and strengthening of the infrastructure of new networks is a necessary corollary for a society that wants to call itself technological.

There is nothing worse than simply surrendering fatalistically to the likelihood of a bleak, invincible jobless future and a labour-killing techno-economic trend (Carboni, 2016). It is a perspective in which technological determinism would become our master. Even in an optimistic perspective, we cannot simply surrender to technology solving every problem, such as labour-intensive tasks in an ageing society. Among possible and plausible futures, only one will come true, and must not deterministic but one in which we contribute to new ideas and innovations. Consequently, we must pay great attention to the development of the potential of our young people, who, in Italy, are not valued enough within an education system that has not altogether made that technological paradigm leap to a world of smart devices and robots, which requires expertise and know-how that the system is yet unable to transmit, except in a few special cases and exceptions. To invest in education, training and lifelong learning in technology and to develop and enrich teaching methods is obligatory not only in order to improve the quality and skills of human capital, but also to expand the boundaries of the Third University Mission from economic to social considerations.

## *6. A proposal for evolved governance: the Competence Network*

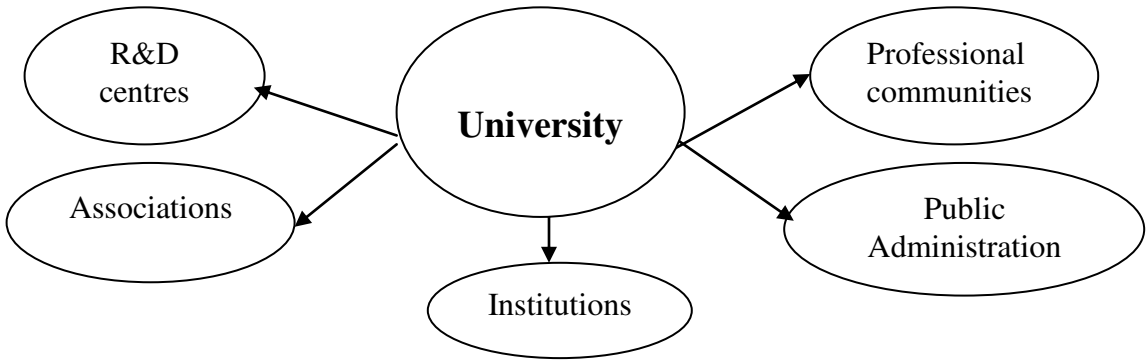
The Competence Network is an infrastructure for learning and knowledge generation, similar to a governance infrastructure that favours specific cognitive and institutional spillovers (Orazi, 2011). Such spillovers, in turn, generate positive impacts on the social and productive dimension of local communities and territories. Anselin, Varga and Acs (1997) have highlighted the positive impact of technological and cognitive spillovers generated by the correlation between private activities in R&D and business performance, pointing to a positive correlation between funding for academic research and added value in the local industry. Based on these mechanisms, effective innovation governance seeks to bring interests and territorial expertise into a shared and controlled process in which actors operate on the basis of open and dynamic relational instruments. Networks of universities, businesses, technological districts, productive infrastructure and incubators and accelerators of innovative companies are concrete references from which to create a system of positive and competitive relations for boosting the innovation and competitiveness of the territories and their economies.

It is the case of some examples of techno-economic Italian excellence. The Emilia-Romagna High Technology Network of universities, research centres and territorial government which exploits laboratories with expertise, tools and qualified human resources to operate in tune with the needs of businesses, creating thematic platforms dedicated to innovative support for territorial development. Another concrete example is the Friuli Venezia Giulia Centre for Molecular Biomedicine (CBM), which is focused on establishing an operational link between research, training and technology transfer, involving a plurality of actions, entrepreneurial services, researchers and students. Lastly, the development company M31 is a multilevel structure active in the Veneto region that combines corporate financing, technology incubation and operational partnership in order to finance start-ups generated by universities.

In this regard, the Competence Network acts as guardian and connector in the exchange and recognition of competences among the different development actors, scientific communities, productive infrastructures, professions, institutional frameworks and governance in the reputational operational space.

The exchange of trust and the capacity to facilitate processes are essential in containing transaction costs involved in joint, negotiative collaboration and freeriding attitudes. The Competence Network functions as a kind of trust mechanism that binds the fundamental relationships from which social capital emerges (Cohen, Prusak, 2001). In this sense, trust is presented as an intangible asset that raises the level of efficiency of the economic system.
From a social point of view, the Competence Network emphasizes the trust bonds in the environmental context, linking actors of the system according to specific economic, technological, organizational and political needs. Such actors are the professional communities that broker systemic relationships, developing bonds in the specialization supply chain that makes up the local knowledge. So configured, the Competence Network is the set of relationships and activities that constitute functional spaces for knowledge sharing and production. In these spaces, the university assumes a dual role of general interest intermediary and certifier of knowledge.

**Figure 3: Competence Network (local system of competences)**




From a political and institutional perspective, the Competence Network is a widespread governance tool whose function is to identify and disseminate knowledge and skills relevant to the revitalization of local development contexts, transporting traditional economies from logic of territorial exclusivity to one that activates and develops intangible technological networks.

The development of a Competence Network requires a strong capacity for partnership in the local system and the creation of external economies and adequate networks of trust. The university and scientific and educational institutions in general entertain relations that influence in an informal way the political, administrative and local production systems. This influence is exercised through personal networks linking the business community and institutions to research and training, thus building professional communities that are fundamental for the circulation of significant system information, for the development of tacit knowledge and local trust and for the recruitment of highly qualified personnel.

The implementation of a social network such as the Competence Network requires a complex phase of start-up costs with significant financial, technological and cognitive investment. This implies a certain dependence on public policies, not only through tax incentives to the business sector but in terms of facilitating businesses ability to collectively produce both material and intangible goods. Of particular importance are policies that increase the quality and specialization of the scientific and educational foundations and that improve communication between research and business. From the standpoint of economic and financial support, central policies also play a fundamental role in interventions that support the development of scientific and research institutions, making centrally defined national choices whose consequences, however, are felt directly at local level, and adjustments to the financial system with the introduction of appropriate mechanisms for the financing and facilitation of venture capital for small innovative enterprises.

## *7. Conclusions*

A few good researchers and systemic inefficiency seems to be the odd recipe of the Italian research system and its role in the Third University Mission. Intelligence and competence are not followed up by adequate organizational capacity and effective governance.

These weaknesses do not favor the institutionalization of the Third Mission functions and their extension to the territories. For the University, being protagonists of the local and urban development implies industrialization and financialization of knowledge and a social and cultural role. As we have noted, many Italian territories are subjected to high young intellectual unemployment. It is a social problem that would require a more active role of the university, especially in the "jobs placement" of their graduates.

The article highlights that the institutionalization of the Third University Mission in Italy is widening the gap between pure and applied research, while aggravating inequalities between advanced industrial and underdeveloped regions and between sciences and humanities, relegating the latter to a marginal role. This is a losing strategy for a country that needs to make of its own historical, literary and architectural heritage a renewed driving force for development. Considerations have also been made of the social and economic impact of scientific research and its capacity for development as a global competitive factor. In Italy, however, there persists the social perception that research has merely a value as an opportunity rather than as a necessity.

On the regulatory and governance strategy front, enterprises, universities and the government do not appear to adequately reward merit. The production of research and scientific innovation involves significant operational risks and management flexibility. Italian legislation and remuneration of labour input does not provide for attractive entry contracts, wages or flexibility if expectations are not upheld. Often the brightest graduates are hired on totally inadequate initial wages, fuelling the attraction for foreign countries that offer better though riskier prospects, .generating underutilization of high-skilled human capital and youth diaspora abroad where there are better prospects.

At the same time, the assessment of funding for public research is overly rigid and frustrates basic scientific activities and the ability to reward potentially successful high tech companies. In Italy, start-ups such as Google and Facebook would simply not be funded.

Finally, in order to generate territorial knowledge governance, it is necessary to transform the institutional approach, giving the Third Mission practical tools and concrete references to contribute to the Italian triple helix. The Competence Network is a theoretical model for the governance of innovation that looks to concrete experiences already underway in some areas of the country (Cfr. 6). These experiences show that institutional cultures assume a key role in shaping socio-political systems. In Italy, however, the culture of innovation remains anchored to a model of 'innovation without research', which in the past worked with traditional sectors but is no longer sustainable.

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