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Determinants for the success of European research projects. What you must know to have your research proposal granted.

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INTRODUCTION

This research helps in understanding the complex world of the competitive research in Europe, dealing in particular with Framework Programmes and the characteristics expected from research proposals in order to be funded.

The European Commission uses Framework Programmes as financial policy action to support the achievement of its strategic objectives. The allocation of resources, through multiannual framework programmes, boosts research and innovation in all different fields regardless national, regional or economic logics: direct and competitive funds are allocated according to excellence, expected impacts and outcomes planned by proposals, through an *ex ante* peer review evaluation by selected and independent experts. Actors engaged in this competition are mainly universities, research centres, public bodies, NGOs and the private sector.

In the last 20 years many Higher Education Systems in Europe have experienced a marked change in the funding mechanism: public funds have been more and more reducing pushing public universities and research centres to raise external funds. European Commission programmes are one of the main financial resource to be taken into consideration in order to fund research projects, development and innovation.

Therefore competitiveness for the research sector have become a mantra, a pillar for strategic decisions at the governance level.

This work, after a comprehensive description of the framework programmes, their history, the actors and the rules of the play, aims at explaining the reasons why some country gains more funds than others,

why some organisation raise more funds than others and what fundamental rules have to be respected during the planning phase of a research project.

Chapter I: The Research in Europe: a path towards internationalisation.

*Just as primary instruction makes the teacher possible, so he renders himself dispensable through schooling at the secondary level. The university teacher is thus no longer a teacher and the student is no longer a pupil. Instead the student conducts research on his own behalf and the professor supervises his research and supports him in it. (**Wilhelm von Humboldt**)*

1. A HISTORICAL OVERVIEW: RISE AND DEVELOPMENT OF RESEARCH IN EUROPE

In an attempt to conduct a thorough "meta-research" - research about research - this works aims at understanding who and why raises funds from European Framework Programmes, outlining how to be successful in research projects funded by the European Commission. The present part is deeply rooted in the history of European Framework Programmes and the whole European Research Area, our starting point to reach the underway Horizon 2020 and the coming FP9.

The field of research in Europe has a long tradition, and its origins are strictly connected with the history of its oldest Universities. Science and research have always run hand in hand along the developing of the history of human knowledge and society. Starting from the Middle Age, the traditional universities – which evolved from Catholic and Protestant Church schools – established specialised academic structures with the aim to properly educate a greater number of students, and train them as professionals (Ponnusami e Pandurangan 2014). At that time universities only trained students to become clerics, lawyers, civil servants and physicians. Yet, the blooming of the Classical age transformed the ultimate purpose of the university, which was no more to foster practical arts, but to develop "knowledge for the sake of knowledge" – and, by the 16th century, this principle was considered integral to the civil community's practical requirements. Hence, academic research was encouraged for the advancement of scientific investigation: by that time, science had become essential to university curricula for its "openness to novelty", in the attempt to discover the means to control nature and benefit civil society (Rüegg 1996). In analogy to the ancient world's works, Rüegg relates the "New World" idea to the idea of "new knowledge". This process was facilitated by the fact that, in the mid-16th century, the rise of scholarly and scientific journals made it feasible to "spread innovations among the learned"; by the 18th century, in fact, many universities were able to publish their own research journals. Still in the 18th century, the rise of the Age of Enlightenment encouraged the transition from the "preservation and transmission of

accepted knowledge" to the "discovery and advancement of knowledge"; younger universities effected that change more quickly, and adapted to Enlightenment ideas regarding the harmfulness of monarchic Absolutism more readily than the older ones (Ponnusami e Pandurangan 2014).

During the majority of its life, scientific research has been conceived as activity to be shaped and performed by single scholars or, at least shared among few scientists and/or students. Nevertheless the future of research could have been radically different. Not only because the widening of its boundaries but also thanks to the radical change in its structure: its actors, a supranational level of collaboration, its funding systems etc. In fact, moving on to the 19th century, the German and French models of universities became so predominant in Europe that Russian and British universities ended up holding them as example. The German model in particular, as conceived by Wilhelm von Humboldt - the founding father of Berlin University[1] - is based on Friedrich Schleiermacher's liberal ideas: universities should disclose the process of the discovery of knowledge and, at the same time, they should teach students to take into account of fundamental laws of science. Under Humbold's influence, seminars and laboratories started to evolve together and the university education became a student-centred activity of research (Ponnusami e Pandurangan 2014). From that period on, it was the German system which was responsible for the

1 The University of Berlin, founded in 1810 under the influence of Wilhelm von Humboldt, is traditionally seen as the model institution of the 19th century. In fact, the German system benefited from innovations both before and after 1810. Its features included the unity of teaching and research, the pursuit of higher learning in the philosophy faculty, freedom of study for students (*Lernfreiheit*, in contrast with the prescriptive curricula of the French system), the educational ideal of *Bildung* based on neo-humanist admiration for ancient Greece, corporate autonomy for universities despite their funding by the state, and the notion of academic freedom. The group of reformers in Prussia included philosophers like Fichte and Schleiermacher (as well as Humboldt), and Berlin University was the centre of national cultural revival. The German model had a profound influence throughout central, eastern, and northern Europe (Anderson 2004).

development of the modern research university because it focused on the idea of "freedom of scientific research, teaching and study" (Rüegg 1996). For most of part of the 19th century, though, university education was still absolutely elitist. Only in the early 20th century access to academic education started to become slowly more popular, even though its high costs were the principal obstacle to a generalised opening to the public.

1.1. Post-war research developments: from CERN to PREST

There were also further reasons why the elitism of the academic system could not be easily dismantled. As a matter of fact, in that period international scientific cooperation and international tension were growing simultaneously. The First and the Second World Wars affected deeply the events of the century while, at the same time, individual states shaped the existing university system and its research potential according to their needs. Usually, reconstruction is analysed through the lens of politics and economy, leaving apart those aspects linked to science and technology. Instead, in the aftermath of the Second World War both individual states and the scientific community paid growing attention to the scientific and research activities, although with different purposes. Governments' aims were basically limited to the control of the two most relevant sources of energy: coal, the traditional one, and nuclear energy, one supposed to have a really high potential. On the other hand, the European scientific community was concerned about bridging the technological and scientific gap between Europe and the other superpowers, the United States in particular. Given the high costs, the complexity of research infrastructure and the limited economic resources available, it was soon proposed that national governments should come together to collaborate on given research projects (Guzzetti 1995, p.1). Research became a priority asset both for politicians and for scientists and this union of interests gave

the birth to the first example of scientific organization at the European level: the European Organization for Nuclear Research (CERN).

In those years United States encouraged the political and military strengthening of Western Europe against the Soviet Union block[2]. For this reason science, technology and research were not properly major concern of governments. However, in the eye of some pro-Europeans and scientists' view – and these two categories often coincided – scientific cooperation could make a decisive contribution to both reconstructing and to uniting the continent (Guzzetti 1995, p.2).

The 'collaborative' point of view of the scientific community obtained a first victory in 1952. That year, in fact, saw the foundation of The European Coal and Steal Community, following the initiative of the French Foreign minister Robert Schuman. Inspired by Jean Monnet, in 1950 Mr Schuman created a supranational body with real power in the limited fields of production and commercialisation, which also gathered European interests around coal and steel resources. It was the first time that six sovereign European countries (Belgium, France, Italy, Luxembourg, the Netherlands and the German Federal Republic) officially acknowledged a supranational body appointed as promoter of research into technological and economic aspects of production and growth of coal and steel.

Internationalisation of scientific research was at its beginning. Five years later, after the failure of the Pleven idea – the creation of an army made up of the ECSC member States - the same six countries mentioned above created the European Atomic Energy Community, better known as EURATOM. Again, according to the neofunctionalist theory of the European integration (Haas 1958) (L. Lindberg

[2] NATO was founded in 1949

1963) (Lindberg 1966) (Schmitter 1970), international research activities in the field of nuclear energy were the outcome of a pluralistic political process in which governments' decisions were influenced by pressures from various interest groups and bureaucratic actors. EURATOM's research, though, was much more wide ranging, since, following the proposal of the Spaak report, the Community had to deal with the development of an industry which did not exist before. The first research programme set up by the EURATOM Treaty had a lifespan of 5 years (art. 215). During that time, the Joint Research Centre[3] was founded and external research contracts, better known as "indirect means", were used to purchase research activities from the outside. Indeed, through such contracts the Community (1) entrusted the research to external bodies such as universities or laboratories, or/and (2) participated in national projects with Member States, Non-Member States and International Organisations. A multilevel scheme of collaboration on research was now born.

During the 1960s, another debate arose around the "technological gap" between Europe and United States. Although the post-war period had favoured an extraordinary economic and social growth in Western Europe countries, the Unites States were still leading the progresses on work, market, business, education and training, science and research. Gaps in science and technology had a huge political impact, but the analysis was far more nuanced than it appeared to be in the media or in some intellectuals' prose (B. Godin 2005). In Servan-Schreiber's opinion the technological gap issue had an important impact on the emergence of a European science and technology policy (Servan-Schreiber 1968) whose goal should have been to foster intelligence and stimulate talent. Faced with the commercial and technological offensive of the United States, European governments had proposed and tried out, at the national level, three different policies: first encouraging synergies among American and European companies, second

[3] For more information on Joint Research Centre, visit the web site: https://ec.europa.eu/jrc/

acquiring the technological know-how from the United States, and third implementing a protectionist policy. In the meantime, the same European governments began to draw attention to the seriousness of the situation, and perceived the need for a common European involvement in the area of research and development (Guzzetti 1995). At the beginning of 1964, the Council of Ministers of the EEC set up a Medium-tern Economic Policy Committee, made up of experts from the Member States and representatives of the Commission. In 1965, the Committee set up an internal sub-group with the task of examining scientific research and technology policies (PREST)[4]. PREST's mission was to examine the problems that could arise when developing a coordinated or common policy for scientific and technological research, as well as to propose measures that could enable the setup of such policy while bearing in mind the possibility of cooperating with non-member countries. Their first report aimed at suggesting possible areas where to establish a science and technology policy, the direction such a policy could take and possible ways of encouraging the adoption of this policy by other European countries. In April 1968 the report from the PREST contained 47 proposals for research, divided into seven operative areas: high performance, new software, computer, electronic aid for motor traffic, gas turbine engine, hovercraft, meteorological instruments and water pollution. In order to reinforce PREST efforts to implement an European policy on science and technology, the Council established a permanent committee (COST) made up of senior officials from the fifteen nations that had responded to PREST's invitation – with the addition of Finland, Greece, Yugoslavia and Turkey. The final shape of the

4 The PREST was known also as "The Maréchal group" from the name of André Maréchal (1916-2007) the French optical engineer who served as General delegate tot the scientific research and technology (1961-1968) before becoming the dean of the Ecole Supérieure d'élecricité (1968-1969) and then dean of the Institute d'optique et appliquée et Ecole supérieure d'optique (1968-1984).

programme featured seven "concerted actions" according to which the States agreed to collaborate and exchange information[5]. The research activity progressed well despite some difficulties caused by several countries' different opinions on the implementation of such projects: the Community was laying the foundations of its science and technology policy.

1.2. The dualism between the intergovernmental and the supranational approach. From CREST to the Framework Programmes

In the 1970s, two men played pivotal roles at the European Commission for research science and technology: Altiero Spinelli and Ralf Dahrendorf. As an Italian Communist politician and European federalist, Spinelli was convinced that increasing Community powers and rejecting the intergovernmental approach could benefit the European status of scientific knowledge. On the other hand, Dahrendorf position was more cautious and realistic. In the German-British sociologist's view, European research should still be conducted individually by European States and it should be focused on two great objectives: improving the quality of life and regenerating European industry (Guzzetti 1995, p.50-51). He proposed to set up a long term research programme called "*Europe +30*". This had been thought of as a 'research on research', with the purpose to take a picture on the development of European research in several areas. "*Europe +30*" should determine which actions were to be undertaken by the community in different fields. The Scientific and Technical Research Committee (CREST) was created in the place of PREST, in order to coordinate national policies and Community interests. This new committee was composed by representatives of the Member States and the Commission. A European Science

[5] The seven projects approved by the Commission were in the following fields: 1. Information science 2. Telecommunication 3. Metallurgy 4. Materials 5. Environment: atmosphere 6. Environment: water pollution 7. Environment: effluent

Foundation, shaped after the American National Science Foundation, was also created. During the 1970s, the Community expressed the needs to enlarge its focus on new topics. Agriculture, medicine, molecular biology, and environment and natural resources were the new fields on which Europe-based research began to pay attention. The Commission's focus was drawn on two main issues: coordination, and evaluation of priorities. Working in this direction, with a Resolution of 1974 the Commission defined a set of general criteria to evaluate various aspects of existing programmes, such as the programme's political and legal accordance with Community Treaties, its efficiency, its trans-nationality, the size of the market and the commons requirements. In the late 1970s, some programmes in nuclear fusion were already underway, as well as in biology and radiation protection, applied methodology and Community Bureau of Reference, coal and steel, energy conservation, new sources of energy, plutonium recycling and storage of radioactive waste (L. Georghiou 2001). However, as Kastrinos points out (Kastrinos 1997) the high profile links between research and industrial policies were far from materialising. That is why in the following years, under the supervision of commissioner Etienne Davignon[6], Member States managed to conclude a complex and difficult agreement on Information Technology. This agreement turned into the European Strategic Programme for Research and Development in Information Technology

[6] Born on 4 October 1932 in Budapest, Hungary, Davignon, Doctor of Law joins the Belgian Foreign Ministry (1959). Since, he has been Attaché in the Cabinet of the Belgian Foreign Ministry (1961-1963), Deputy Head of Cabinet of Paul-Henri Spaak, Belgian Foreign Minister (1963-1964), Head of Cabinet of Belgian Foreign Ministers Paul-Henri Spaak (1964-1966) and Pierre Harmel (1966-1969), Director-General for Policy in the Belgian Foreign Ministry (1969-1976), Author of a report on the problems of political unification in Europe (Davignon Report 1970), Chairman of the Executive Committee of the International Energy Agency (1974-1977), Member of the Commission of the European Communities with special responsibility for the Internal Market and Industrial Affairs, the Customs Union, the Information Market and Innovation, Energy,the Euratom Supply Agency and International Nuclear Relations (1977-1981), Vice-President of the Commission of the European Communities with special responsibility for Industrial Affairs, Energy, the Euratom Supply Agency, Research and Science and the Joint Research Centre (1981-1985), Chairman of the Royal Institute of International Relations (since 1987), Chairman of société Géneral dee Belgique (1989-2001), Vice-Chairman od Suez Tractebel (since 2003). (CVCE s.d.)

(ESPRIT). ESPRIT represents a watershed as it marked a new course of intervention in the history of the Community, being fundamentally different from previous initiatives for one thing, because it involved business in the research sector from the very beginning. It was the industry itself which suggested which areas Europe should concentrate its efforts on in order to achieve the long-awaited leap forward that would enable it to compete internationally (Guzzetti 1995, p.76). The kind of research that the ESPRIT programme was intended to finance was known as "precompetitive" or in some cases "prenormative". It is not easy to provide an exact definition of "precompetitive", for it generally indicates a sort of no-man's land between basic and industrial research. It was, indeed, industrial research, but unrelated to marketable outcomes: its results would not be products ready for commercial exploitation. The choice of a "pre-competitive" solution arose from the need to find a complex equilibrium between the various interests involved. Basically, precompetitive research was the typology of research in which industries, at the time when ESPRIT was set up, would agree to undertake together: a kind of communal work which companies – rivals but the day before – thought was not excessively risky inasmuch as the ownership of the joint research results would not put their commercial positions at risk. A kind of research that, furthermore, would not tie them down in the long term. Secondly, "precompetitiveness" seemed to play a part in reassuring governments about the Commission's intentions. Although the research involved industrial policy and economic development in a strategic sector, its "precompetitive" nature guaranteed that the Commission would not gain too much power at the expense of the States. Along with these political and economic reasons, there was a legal one for fostering the idea of "precompetitiveness" (Guzzetti 1995, p.81). ESPRIT was confirmed for two more editions, covering the period 1988-1992 with the second phase and 1993-1997 with the third. Nevertheless, much of the statistical evidence suggests that more than a decade after the launch of ESPRIT, the European information technology industry was not much more competitive than before. While some believed that ESPRIT's own structure left it unable to give adequate support to the development of industry, others defended the programme, pointing out that inadequate funds were made available given the size of the problems ESPRIT was supposed to tackle.

Others still maintain that the economic impact of a research and development programme of this kind can only be judged in the longer term (Guzzetti 1995, p.82). After ESPRIT experience, under the input of the French President, Francois Mitterrand, in 1985 a programme for technological cooperation among European nations (both member and non-member states – were launched. Its name was EUREKA, an acronym which stands for Europe Research Koordination Agency[7]. It was suggested to change the final "A" in Action, instead of Agency, because the previous European experiences in the field of research had demonstrated a lack of effectiveness: the main criticism they had been exposed to was that they had created enormous bureaucratic bodies incapable of achieving the expected results. Again, being prompted by the French, the initiative reflected the intergovernmental point of view, which affirmed that actions in the field of research were to be undertaken by single states without any loss of sovereignty. EUREKA , indeed, was a cooperative agreement that should be interpreted as the European prompt response to the challenge coming from the United States, that meanwhile adopted the Strategic Defence Initiative (SDI) – better known as "Star Wars" programme. In that period, the research policy in Europe was more reactive than proactive (Andrée 2009). Again, the rationale behind these decisions drew on the need to bridge the "technological gap" between Europe and United States – and Japan. Nevertheless, according to Gheorghiou, the history of EUREKA in the 1990s has been somewhat paradoxical. In fact, despite

[7] The European Technology Conference (first EUREKA meeting), held in Paris on 17 July 1985, brought together 17 European countries: the 10 Member States plus Spain and Portugal (which were not yet official members of the Community), and five member countries of the European Free Trade Area (Austria, Finland, Norway, Sweden and Switzerland). The Commission of the European Communities is also a member of EUREKA. France presented a working paper entitled "La renaissance technologique de l'Europe" which put forward five priority activity areas for EUREKA: information technology (Euromatic), robotics (Eurobot), communications (Eurocom), biotechnology (Eurobio) and new materials(Euromat).

the positive evaluations mentioned above, along its entire course of action the Initiative has seen large and accelerating changes in its composition, mostly of a negative nature. Driven mainly by a decline in the national budgets for R&D support (upon which the project depended) and by a shortage on personnel of national agencies available to stimulate projects (always a small number, around 150 people in all Member States), EUREKA saw a dramatic fall on several indicators (L. Georghiou 2001, p.896). This is one of the reasons why, in the late 1990s, the idea to engage a revised strategy at the supranational level seemed to be the right solution to the intergovernmental failures.

Frameworks Programmes became the instrument that not only merged all the active programmes in research and technological development, but also endorsed the Community to play a more complex role than the one of coordinator. The intergovernmental rationale was giving way to new solutions, and a period in which "institutions mattered" (Tsebelis e Garrett 2001) was coming up. Framework Programmes officially started in the 1980s, and the first one covered the period 1984-1987. Being able to manage a complex mechanism in which Member States, non-Member states, single organisations and the European Commission interacted together, Framework Programmes were seen as the multidimensional tool that could best represent the complexity of a process *in fieri*. Nevertheless, the relevance of such a comprehensive programme did not lie as much in the sum of the single economic values of each individual sub-programme, as in the so-called "spillover" generated by the interactions of the participant subjects in the pursuit of the objectives identified by the Commission.

In next part we will run through the seven Framework Programmes set out by the European Commission, going more in depth in the seventh Framework Programme, which is the main objective of our analysis.

2. THE EXPERIENCE OF THE EUROPEAN FRAMEWORK PROGRAMMES

The first European Framework Programme started at the beginning of 80s with the aim of bringing together expertise and scientific excellence across the European Community, as it was called, and make Europe more competitive in the key challenges of technological development. Since then the Framework Programmes have represented the major part of collaborative research in Europe, growing progressively in budget and scope (see Table 1)

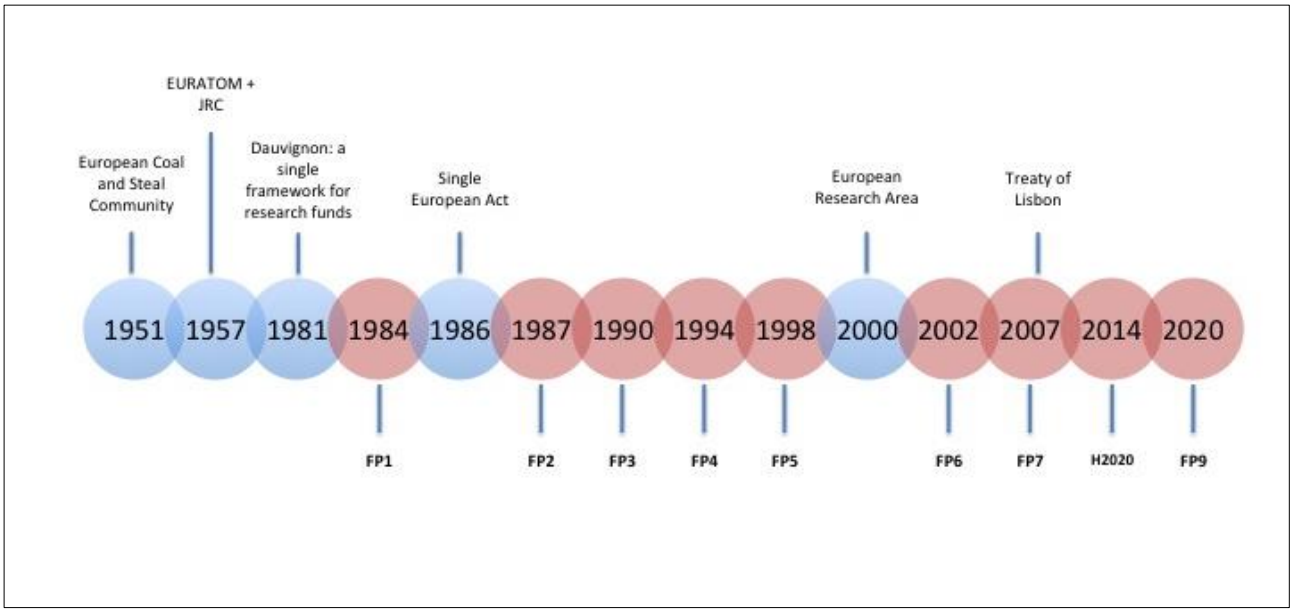
Table 1: EU Framework Programmes breakdown

FPs	YEARS	BUDGET	SCOPE
1st	1983 – 1987	3,7 billion eur	To promote competitiveness in the agricultural and industrial fields, but also improve the management of materials and energy resources, step up the development aid, improve living and working conditions as well as the effectiveness of the Community's scientific and technical potential.
2nd	1987 – 1991	5,4 billion ear	To propose the inclusion of SMEs in the process of strengthening the scientific and technological basis of European Industry and to encourage competitiveness at the international level in the entire industrial sector.
3rd	1990 – 1994	6,6 billion ear	To improve industrial competitiveness; to lead the attitude of industrial operators towards transnational initiatives; to instil a European dimension into the training of research staff; to increase economic and social cohesion while ensuring the scientific and technical excellence of research projects; to take account of safeguarding environment and quality of life.
4th	1994 – 1998	13,2 billion ear	To open the scientific research to the market thanks to the introduction of the concept of demonstration; the introduction of National Contact Points (NCP); To promote researchers mobility all over the world with the foundation of the Marie Curie Fellowship Association
5th	1998 – 2002	14,9 billion ear	To focus on major European challenges, and to improve impact on society and economy. The leitmotif was that science and technology should have been at the service of the citizen. The key research actions were linked to the major economic and social problems, focusing on solutions and deliverables with special attention paid to the user's perspective; its system approach was interdisciplinary and it was based on cooperation.
6th	2002 – 2006	19,3 billion ear	To structure the European Research Area focusing on human resources, research infrastructures, innovation and technology. The programme was also focused on Integration of the Community research, being organised in thematic priorities and cross-cutting research activities.
7th	2007 – 2013	55,9 billion ear	To strengthen the scientific and technological bases of Community industry, thereby ensuring a high level of competitiveness at international level clustering the main objectives into four groups: Cooperation, Ideas, People and Capacities. Moreover, an additional specific programme related to non-nuclear research, with its own budget, was included in the Joint Research Centre's actions.
H2020	2014 – 2020	80 billion ear	To implement the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness; to drive economic growth and create jobs considering the research as an investment in our future and so putting it at the heart of the EU's blueprint for smart, sustainable and inclusive growth and jobs.

The evolution of – at present – eight Framework Programmes has intertwined with the major milestones of the European Union history to reach the European Research Area, the core of the Lisbon

Agenda, that was included in the 2007 Treaty of the European Union (Treaty of Lisbon). Running through the line of Figure 1 we can see how research has been the core of the main milestones of the European Union. Since 1951, the Treaty establishing the European Coal and Steal Community provided the funding of research for the coal and steel. In 1957 the Treaty establishing the European Atomic Energy Community provided both research between countries on nuclear energy and the launch of the Joint Research Centre (JRC) for independent, scientific and technical advice to the European Commission. In 1981, Etienne Dauvignon, commissioner for Industrial Affaires and Energy, decided to rationalise research funding under a single framework with the result of the launching of the first Framework Programme in 1984. In 1986 the European Single Act was signed and it included for the first time in an EU Treaty an entirely dedicated chapter to research. In 1987, 1990, 1994 and 1998 a series of four Framework Programmes was launched raising the budget up to 5 times than it was only ten years before. In 2000 the European Research Area (ERA) was introduced and became the ground for the coming FP6, FP7 and Horizon 2020.

Figure 1: The EU and the FPs milestones



The impact of the Framework Programmes in the European research can be seen as the increase of cross-border collaborations between European scientists and the rise of research activity, not only across Europe but also with the engagement of non-European countries.

In the following paragraphs an overview of the first six framework programmes and a more in depth analysis of the Seventh Framework Programme is provided.

2.1.1. From the First to the Sixth Framework Programme (1983-2006)

During the years 1982 and 1983 the commissioner for research Etienne Davignon and the General Director Paolo Fasella tried to make a reorganisation of individual research and development activities. Their goal was to reunite the work under a global plan that should be used as a solid basis to build an effective policy for science and technology. The underlying idea was to put together all the separate branches of research and development programmes under a comprehensive Multiannual Framework Programme. It should have been a tool for selecting and managing scientific research at European level

and, at the same time, for coordinating both community and national activities in the same field. However, the traditional conflict between national and supranational interests surfaced again at the time to determine competence criteria about different research activities, and the Commission was therefore called to find a definitive solution. In order to solve the problem, the Commission established four specific criteria (known as the Reisenhuber criteria[8]) to decide which interventions were to be taken under the Community umbrella, and which, instead, could have been left under the governments' competencies. These criteria anticipated one of the main principles that will inspire the Maastricht Treaty: the principle of subsidiarity. The criteria were the following:

1. Research conducted on so vast a scale that single Member States either could not provide the necessary financial means and personnel, or could only do so with difficulty;
2. Research which would obviously benefit financially from being carried out jointly, after taking account of the additional costs inherent in all actions involving international co-operation;
3. Research which, owing to the complementary nature of work carried out at national level in a given sector, would achieve significant results in the whole of the Community for problems to which solutions call for research conducted on a vast scale, particularly in a geographic sense;
4. Research which contributes to the cohesion of the common market, and which promotes the unification of European science, and technology; as well as research which leads where necessary to the establishment of uniform laws and standard.

The Council approved the First Framework Programme in 1983. The aim of this first programme was to promote competitiveness in the agricultural and industrial fields, but also improve the management of materials and energy resources, step up the development aid, improve living and working conditions as

8 From the name of the German research Minister who proposed their formulation.

well as the effectiveness of the Community's scientific and technical potential. Since, under the existing law, it was not possible to allocate funds for research and development, the 3,7 billion ECU granted for the First Programme corresponded to the sum of all the separate budgets already approved for single programmes (Guzzetti 1995, p.84). The Single European Act laid the legal basis for the Framework Programme in Article 130 stating: "The Community shall adopt a multi annual framework programme setting out all its activities. The framework programme shall lay down the scientific and technical objectives, defines their respective priorities, set out the main lines of envisaged activities and set the necessary amount, detailed rules of financial participation by the Community in the programme as whole and the breakdown of this sum between the various activities envisaged".

The Second Framework Programme (1987-1991) confirmed the Reisenhuber criteria on which the First Framework Programme was built, adding to the fourth criteria the aspect of social cohesion. Moreover, it proposed the inclusion of SMEs in the process of strengthening the scientific and technological basis of European Industry. It also encouraged competitiveness at the international level in the entire industrial sector. Its budget was 5,4 billion ECU, shared among eight priorities: 1. Quality of life 2. Market and information and communication society 3. Modernisation of the industrial sector, 4. Exploitation and optimum use of biological resources 5. Energy 6. Science and technology development 7. Exploitation of the sea bed and use of marine resources 8. Improvement of European science and technology cooperation.

The Third Framework Programme (1990 - 1994) confirmed the same criteria of FP2, with the addition of six concerns that guided the Council's choices:

1. Improve industrial competitiveness whilst maintaining the pre-competitive nature of Community actions; cope with the challenges for standards linked to the Single Market, thus boosting pre-normative research;

2. modify the attitude of industrial operators, by orienting it towards transnational initiatives;
3. instil a European dimension into the training of staff engaged in scientific research and technological development;
4. increase economic and social cohesion while ensuring the scientific and technical excellence of research projects;
5. take account of safeguarding environment and quality of life.

The Maastricht Treaty came into force on 1 November 1993. Given the major change brought about by the Treaty, an amendment was made to the FP criteria by adding the phrase: "[...] while promoting all the research activities deemed necessary by virtue of other Chapters of this Treaty" - a phrase that widened the scope of the activities. This is probably one of the most important changes ever made, as it opens up the possibility of including almost any topic in the FP, provided its EU interest is accepted (Andrée 2009, p.19). The budget was 6,6 billion ECU and it was articulated in three main priorities:

1. Enabling Technologies, that was divided in two sub priorities: a) Information and Communication, b) Industrial and materials technologies;
2. Management of natural resources, that was divided in three sub priorities: a) environment, b)life science and technologies, c)energy;
3. Management of intellectual resources: human capital and mobility.

The first priority obtained the allocation of 52% of the total budget and the second the allocation of 37%. Only a minor part remained for the third priority. The Programme proposed a new scheme for Small Medium Enterprises (SMEs) participation: the minimum of four SMEs from two different

countries; they could join Universities or Research Centres in order to achieve common industrial or research goals.

The fourth Framework Programme (1994-1998) revised again the criteria of competencies to justify the supranational choice. Such criteria were the following:

1. research on a very large scale for which Member States could not, or could only with difficulty, provide the necessary finance and personnel;
2. research, the joint execution of which would other obvious benefits, even after taking account of the extra costs inherent in all international cooperation;
3. research which, because of the complementary nature of work being done nationally in part of a given field, enables significant results to be obtained in the Community as a whole for problems whose solution requires research on a large scale, particularly geographical;
4. research which contributes to the completion of the internal market and research leading, where the need is felt, to the establishment of uniform norms and standards;
5. research which contributes to the strengthening of the economic and social cohesion of the Community and the promotion of its overall harmonious development, while being consistent with the pursuit of scientific and technical quality;
6. research actions which contribute to the mobilisation or improvement of European scientific and technical potential and actions which improve coordination between national RTD programmes, between national and Community RTD programmes, and between Community programmes and work in other international forms.

Some innovations characterized the Fourth Framework Programmes: the concept of demonstration was introduced together with the technological development. Scientific research was, for the first time, openly applied to market-oriented goals. Furthermore the Programme introduced also a network of National Contact Points (NCP) in order to implement the Community actions and foster information at the national level. A target for the socio-economic research was also set up, through the evaluation of science and technology policy options, the research on education and training, and the conceptualisation of "social integration" and "social exclusion" phenomena. Another relevant point that deserves attention

in this Programme is the foundation of the Marie Curie Fellowship Association: an association that will become one of the main promoter of researchers mobility all over the world.

The Fifth Framework Programme (1998-2002) criteria built again on Fourth Framework Programme: competitiveness and promotion of other activities were deemed necessary according to what foreseen by the treaty. Such criteria were divided in three categories:

1. Criteria related to the Community 'value added' and the subsidiarity principle
2. Criteria related to social objectives
3. Criteria related to economic development and scientific and technological prospects.

The Programme was organized in two main priorities: (1) Thematic Programmes and (2) Horizontal activities. The first, which benefited from 83% of a total budget of 13,1 billion ECU, included quality of life and management of living resources, user friendly information society, competitive and sustainable growth and environment and sustainable development energy. The second, which benefited from 17% of the budget, included: confirming international role of Community research, promotion of innovation and encouragement of participating SMEs, improving human research potential and the socio economic knowledge base. The Programme had two main objectives: focusing on major European challenges, and improving impact on society and economy. The *leitmotif* was that science and technology should have been at the service of the citizen. The key research actions of the Programme were linked to the major economic and social problems, focusing on solutions and deliverables with special attention paid to the user's perspective; its system approach was interdisciplinary and it was based on cooperation. Besides, the Fifth Framework Programme provided means for enabling generic research and technology activities with the intent to widen its reach to promising and visionary areas: the aim was to target future and

emerging technologies in order to support the European technological development. Plans to expand the research in infrastructures were included in the Programme, too.

With the Sixth Framework Programme (2002-2006) the European Commission decided to mark a break from the past. In 1999, the Bologna Process began and the idea of European Research Area (ERA) needed to be supported with concrete actions[9]. Although the Commission recommended, appropriately, to call the new course "The New Framework Programme", the title was changed during the Swedish Presidency to Sixth Framework Programme. Overall criteria were the same that inspired the previous Programmes, but the novelty was a new mention to the Treaty: "in order to contribute to the creation of the European Research Area and to innovation, this programme will be structured around the following three headings, under which the four activities as set out in Article 164 of the Treaty, will be undertaken (...)"; remarkably, this was the first time the European Research Area was mentioned in a Framework Programme. Two out of the three headings were focused on ERA: the first was titled "Structuring the European Research Area" and contained topics such as "human resources", "research infrastructures", "research and innovation" and "science and technology", while the second was titled "Strengthening the foundation of ERA". The last heading, instead, focused on Integration of the Community research, being

[9] More details on the Bologna Process and the ERA will be provided in the following part

organised in thematic priorities and cross-cutting research activities. The budget allocated for the whole Programme was 18,5 million ECU.

Since the Seventh Framework Programme is the main objective of the current analysis, in the following part we will provide a comprehensive overview on its different strands a comparative analysis of its implementation during the lifetime 2007-2013.

2.1.2.The 7th Framework Programme

The Decision N. 2982/2006/EC of the European Commission and of the Council established the legal basis for the Seventh Framework Programme. Some relevant elements can be identified already in the introductory statements, as the following excerpts show:

(a) "The Community has the objective, set out in the Treaty, of strengthening the scientific and technological bases of Community industry, thereby ensuring a high level of competitiveness at international level. To this end, the Community is to promote all the research activities deemed necessary (…). Priority should be given to those areas and projects where European funding and cooperation is of particular importance and provides added value. Through its support for research at the frontiers of knowledge applied research and innovation, the Community seeks to promote synergies in European research and thus provide a more stable foundation for the European Research Area (…)."

(b)"The central role of research was recognised by the Lisbon European Council of 23-24 March 2000 (…)."

(c) "The overriding aim of the Seventh Framework Programme is to contribute to the Union becoming the world's leading research area. This requires the Framework Programme to be strongly

focused on promoting and investing in world-class state-of-the-art research, based primarily upon the principle of excellence in research (...). The objectives (...) should be chosen with a view to building upon the achievements of the Sixth Framework Programme towards the realisation of the European Research Area and carrying them further towards the operation of the European Research Area to underpin the

development of a knowledge-based economy and society in Europe which will meet the goals of the Lisbon strategy in Community policies".

Going beyond previous framework programmes, a new structure[10] was designed to attract a broader range of research activities in the European Union. The objectives were clustered into four groups: Cooperation, Ideas, People and Capacities (

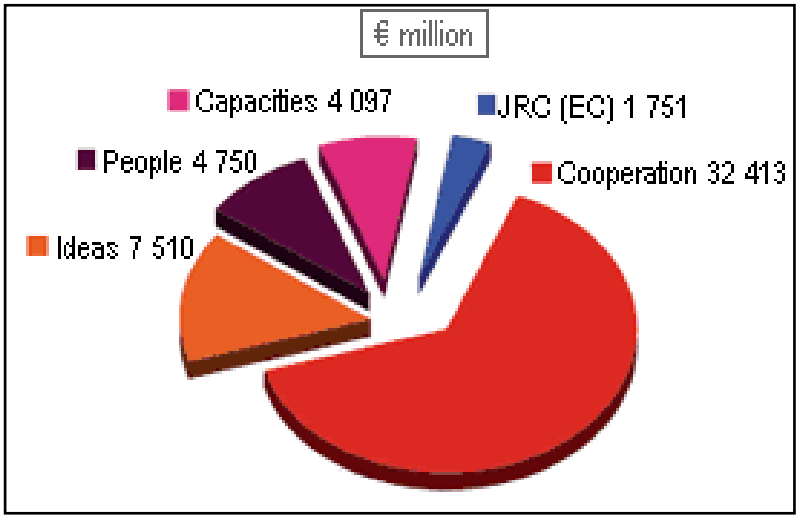
Table 2). For each group of objectives a specific programme corresponded to one of the main areas of EU research policy. Moreover, an additional specific programme related to non-nuclear research, with its own budget, was included in the Joint Research Centre's actions.

Table 2: FP7 structure

Cooperation	Aimed at funding collaborative and transnational research projects. The programme structure, with actions and calls were organised through themes as Energy, Environment, Socio-Economic Sciences and Humanities, Transports etc.…
Ideas	Provided grants for researchers and their teams (starting independent researchers and advanced investigators) engaged in frontier research. The European Research Council (ERC) implemented this programme
People	Supported with grants training, career development and mobility of researchers among both research sectors and countries worldwide. Marie Curie Actions and Specific Actions in support of ERA policies were included.
Capacities	Provided funds for improving research infrastructures and SME's research capacities. It also included actions in support of the potential of the research, international cooperation, development of research policies etc.
JRC	Joint Research Centre and nuclear actions

The budget of FP7 amounted to approximately 50 billion euros (Euratom budget of over 2,7 billion euros over 5 years is not included). The largest part was addressed to Cooperation Specific Programme (€ 32,4 billion euros) and the remaining to, respectively: Ideas 7,5 billion euros, People 4,7 billion euros, Capacities 4,1 billion euros and JRC 1,7 billion euros.

Figure 2: FP7 budget. Source: https://ec.europa.eu/



FP7 development based on results achieved by earlier Framework Programmes thanks to a good deal of continuity both at the operational level and in terms of strategic objectives, However, the innovations that were included in the Seventh Framework gave rise to an even more significant change in respect of the past. A short list of such novelties is proposed hereinafter.

The first was the European Research Centre (ERC). Formally launched in 2007, the Centre has been the most important institution for funding scientific excellence: by supporting scientists, researchers and scholars to be adventurous and take risks in their research, it managed to create a substantial researchers' task force within the European Union that would come from internal countries but also from outside. The second most relevant innovation was the institution of the Joint Technology Initiatives (JTIs), one of the flagships of FP7. JTIs were public/private partnerships set up at the European level in the field of

industrial research. Such initiatives were real legal bodies – called Joint Undertakings – that acted in four areas defined by Council regulations and commission proposals: Innovative Medicines Initiatives (IMI), Embedded Computing System (ARTEMIS), Aeronautics and Air Transport (Clean Sky), Nano electronics Technologies 2020 (ENIAC). The third notable novelty was the redress procedure: that is, a method of evaluation used by the Commission in order to ensure high standards of quality. Furthermore, an interesting change was the introduction of the Guarantee Fund. It was an instrument of mutual benefit that established solidarity among participants in research projects and that covered financial risks – a sort of insurance. Finally, the Risk Sharing Finance Facility (IRSFF) was a new system that allowed private subjects clustered in consortia to get loans or guarantees with a low and sub-investment grade risk profile. IRSFF was an innovative scheme to improve access to debt financing for subjects who promoted activities in the field of research.

Generally speaking, the path of the Framework Programmes has been characterised by a number of shifts and different trends. They can be gathered in three main groups according to, respectively, theme, size of budget and funding instruments. As far as the first group is concerned, the IT connotation featuring in the early FPs became a horizontal topic in the late FPs, while, at the same time, the "distance from the market" became more and more relevant with the expansion of the European Union. From a top down point of view, management of FPs among sub-theme was poorly coordinated at the beginning – while instead strongly connected recently. The size of the budget showed a constant increase of resources, from 3,75 billion ECU (FP1) to 5,4 billion ECU (FP2), then 6,3 billion ECU (FP3), 13 billion ECU (FP4), 14,96 billion Euro (FP5), 16,3 billion Euro (FP6) and finally 51 billion Euro for FP7 – which had a 7 years time span instead of 5 years as the previous FPs. Funding instruments in the early FPs were mostly based on collaborative research projects. With FP3 Human Capital and Mobility Programmes were introduced, extending FPs interest also to the development of human resources in addition to collaborative research. Major innovation took place with FP6, with the introduction of Research

Infrastructures, Networks of Excellence, Technology Platforms (with FP7 Joint Technology Initiatives) and the European Research Council.

2.1.3.The eighth Framework Programme: Horizon 2020

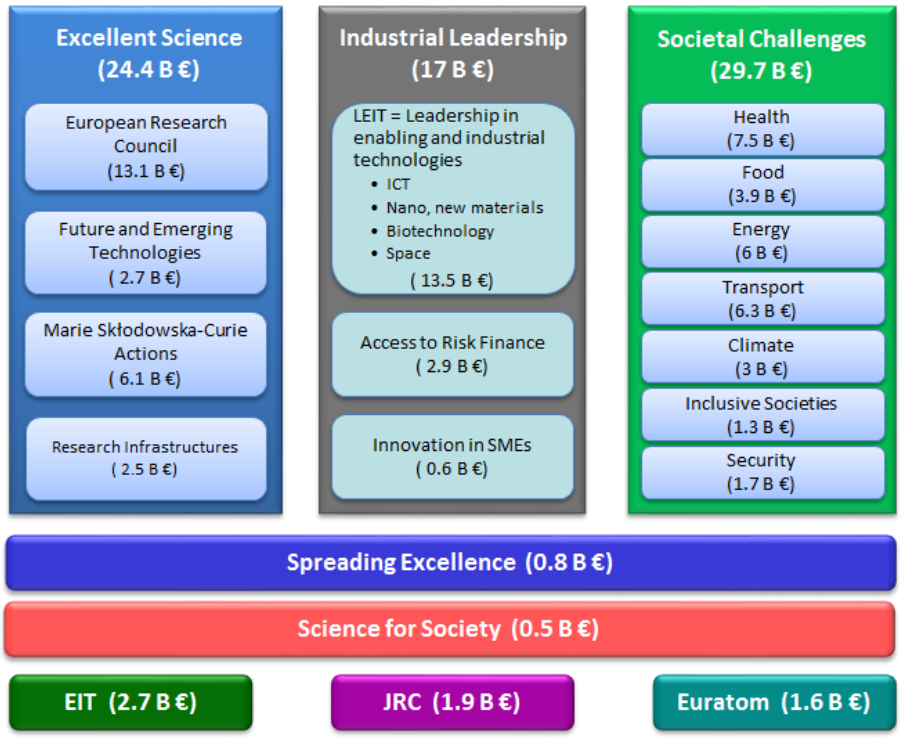
- The eighth Framework Programme launched in 2014 was called Horizon 2020. It covered the seven years 2014-2020 and it has been the biggest EU Research and Innovation programme so far with a total budget of nearly 80 billion euros of funding available. Horizon 2020 is structured in three pillars: Excellent Science (24,4 billion Euros, 31,7% funding), Societal Challenges (17 billion Euros, 38,5% funding) and Industrial leadership (29,7 billion Euros, 22,1% funding)(

Figure 3). It aimed to be a strategic tool for the Innovation Union and the European Research Area by responding to the economic crisis, addressing societies' concerns and strengthening the EU's global position. Horizon 2020 was proposed as a fusion of FP7 because covered the whole "value chain", from blue sky research to market innovation activities. It has also been innovative in respect of FP7 with a specific encouragement for the participation of Small Medium Enterprises (SMEs) as well as the introduction of "close to market" actions and the new instruments such as pre-commercial procurement, prizes and loans. Its main types of actions was the following:

- Research and Innovation Actions (RIA): Standard action, designed to establish new knowledge and to explore the feasibility of a new or improved technology, product, process, or solution;
- Innovation Actions (IA): Designs for new or improved products, processes or services;
- Coordination and Support Actions (CSA): Creation of networks (dissemination, awareness-raising and communication, networking, coordination, policy dialogues, etc.);
- SME instrument: Financial help for companies, centred on innovation;

- ERA-Net Cofund: Public-public partnerships. Joint calls of Member States and European Commission around specific themes.

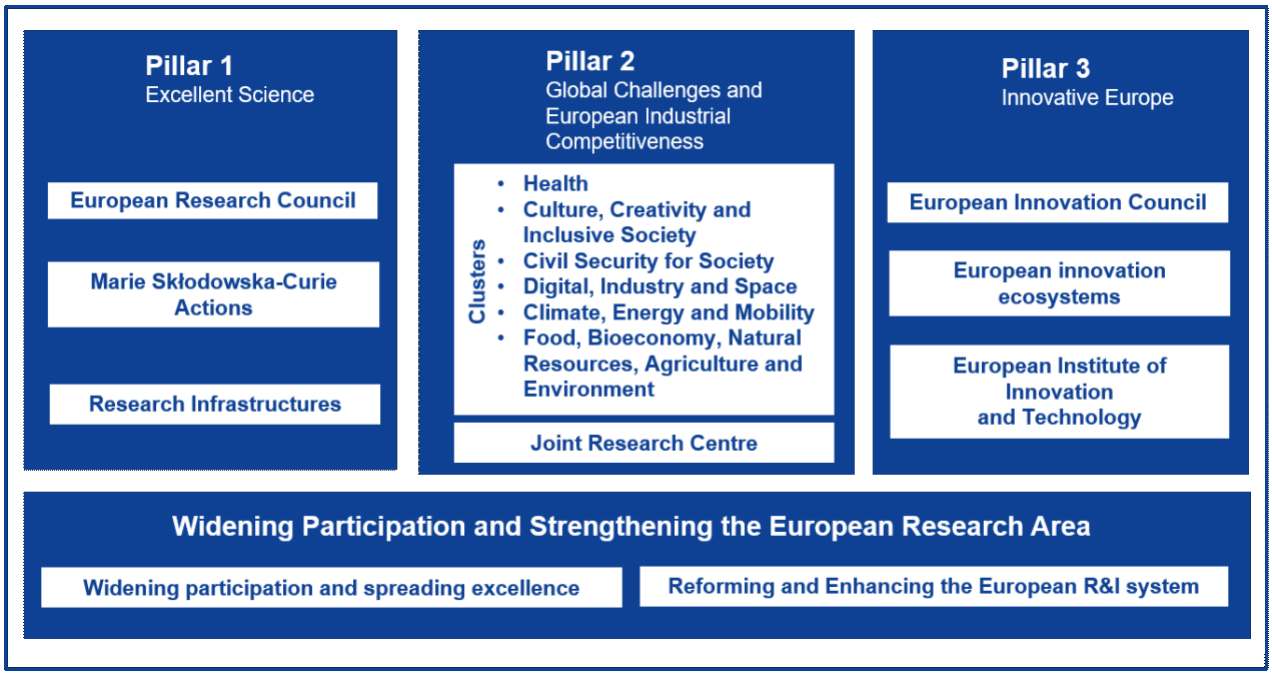
Figure 3: Horizon 2020 structure



At the time we are writing the European Commission is about to launch the new Framework Programme called Horizon Europe. It is planned to cover the period 2021-2027 with an ambitious budget of about 100 billion Euros to be allocated on a competitive basis among research and development organisations. The strategic planning process involving the Parliament and the Council focuses in particular on the "Global Challenges and European Industrial Competitiveness" priority (pillar 2). It will

also cover the Widening Participation and Strengthening the European Research Area part of the programme as well as relevant activities in other pillars.

Figure 4: Horizon Europe structure



Differently from previous Framework Programme, Horizon Europe is designed for being "mission-oriented" in order to increase the effectiveness of funding by pursuing clearly defined targets. At this aim five mission areas have been identified. The missions are: Mission area: Adaptation to climate change including societal transformation, Cancer, Climate-neutral and smart cities, Healthy oceans, seas, coastal

and inland waters and Soil health and food. A process of public and experts consultation is ongoing in order to specify and implement work programs and calls.

2.2. The Lisbon Strategy and the European Research Area

Starting approximately in the same period of the Bologna Process, the European Council, in the Lisbon resolution of 2000, defined one of the most ambitious policy objective of its mandate: to turn the EU into the most competitive knowledge-based society by 2010. This stimulated the European Council in Barcelona in 2002 to commit the EU the goal of raising overall expenditure on research and development to 3% of GDP by 2010. With explicit reference to Lisbon objectives, the commission released the action plan "Investing in Research". Thanks to these documents, higher education in Europe has been recognised as a "key stakeholder" in European research and, at the same time, (1) coherence in research policies, (2) increasing public support and resources for research and (3) improving the framework conditions for research and development in Europe, have been set as the main Lisbon goals. The mid-term review analysis of the achieved results after five years of programme, revealed concerns. With a Communication, the European Commission announced that the Lisbon Agenda would be redefined to focus primarily on the main goals: growth and jobs. After that, in 2005 the Commission launched the 7th Framework Programme (FP7) for funding research in Europe. From that moment universities and research centres became eligible for funding for cooperation initiatives, project based research, research support (Marie Curie scheme) and research structures. In 2007 a new structure of FP7, in respect of previous framework programmes, was designed to attract the broad range of research activities in the European Union. Nevertheless the communication from the commission to the

European Parliament and the Council of 2012[11] asked for a reinforced ERA-Partnership for excellence and Growth. The concept of knowledge as "currency" of the new economy was again at the basis of the strategy for capitalising progresses done so far and for securing Europe's position in the emerging global order. At that time, during the planning of the coming Horizon 2020, the Commission proposed a global budget of 80 billion Euros and asked to Member States to commit themselves to target their investments in research and development on average 3% of EU GDP by 2030. After the analysis of strengths and weakness of Europe Research Systems, the ERA set up its priorities[12]:

1. More effective national research systems,
2. Optimal transnational co-operation and competition,
3. An open labour market for researchers,
4. Gender equality and gender mainstreaming in research,
5. Optimal circulation, access to and transfer of scientific knowledge including via digital ERA.

Member States are asked to make reforms for completing the ERA, but also to monitor and evaluate progress in the implementation of ERA. At the same time research organisations are asked to take responsibilities for their actions and contribute to the achievement of the main ERA priorities. The European Commission ensures an increase in support and in a transparent monitoring.

The ERA is the space where research organisations have moved playing as fund seeker in the Framework Programmes. Many different research systems in as many different countries have been

[11] COM(2012)392 final

[12] COM(2012)392 final

clustered in a sort of competitive environment with common rules, stimulating excellence, innovation and circulation of ideas, researchers and technologies.

The growing quantity of EU budget dedicated to research demonstrates that it is really a priority among the policies of the European Commission. Now the point is what determines the distribution of those resources? How excellence of research, impact in the society and efficient implementation of activities are measured in order to allocate funds among countries, networks and organisations?

Big part of this topic is of great interest for decision makers and leaders of universities and organisations engaged in research and innovation.

In the following chapter we try to better understand it starting from literature and theories, formulating some hypotheses and trying to reach some conclusion through empirical analysis of data.

Chapter II: The Analysis

1. THE NEED TO EXPLORE THIS TOPIC

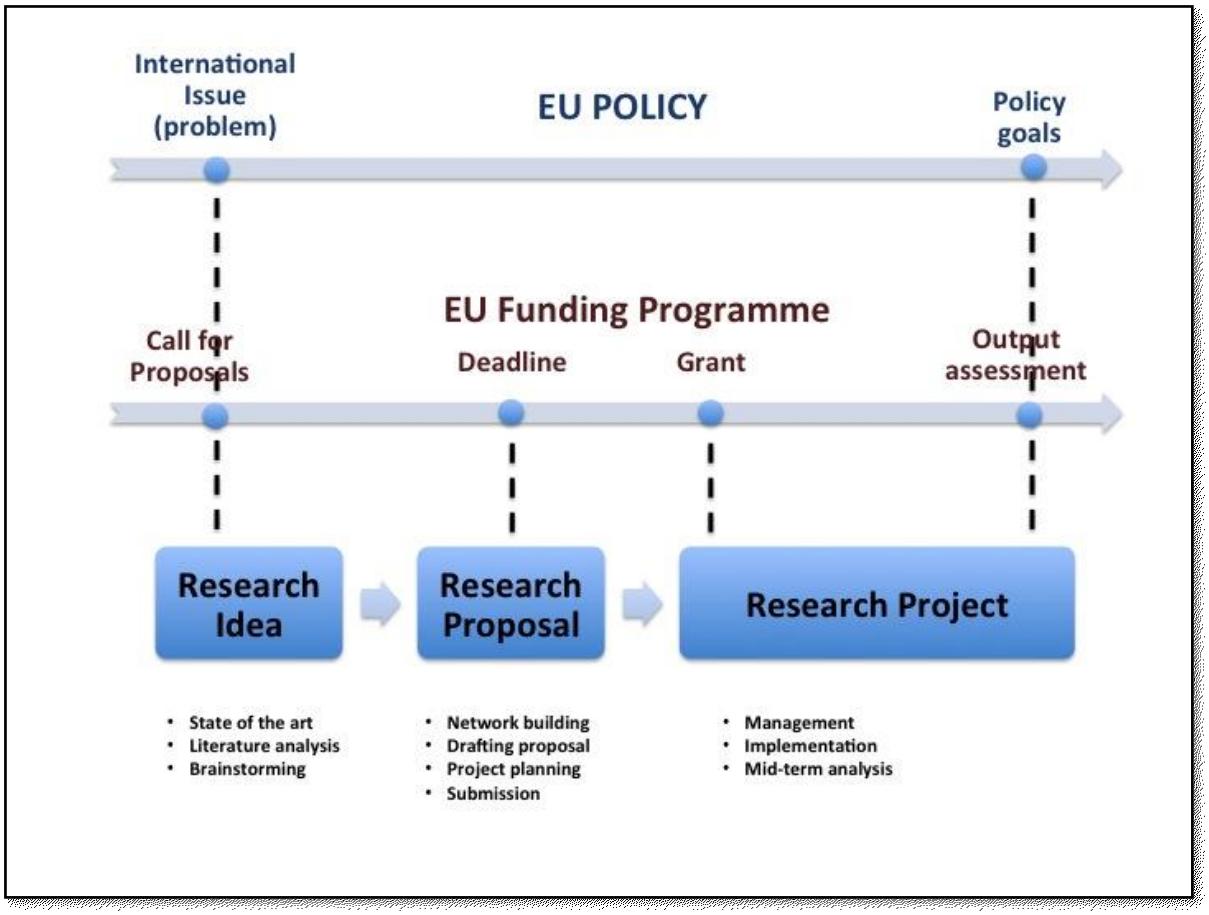
Europe has always played a pivotal role in the development of the whole knowledge society. However, its intervention has become crucial in the last decades, as it has provided the majority of funds devoted to research and innovation, especially if we consider the structural decrease of national funding, severely downsized after the recent economic crises (European Commission 2014). Moreover, positive externalities originating from international collaborations have stimulated participation in Framework Programmes. In fact nowadays all the actors of the scene (from universities to public entities to private enterprises) pay growing attention to this topic. So far literature has explored several aspects and approaches of research collaborations, but a precise analysis of which factors can be relevant for applicants to be granted in research projects, is still lacking. Therefore, the combination of these two elements – the relevance of research funds on the one hand, and the lack of knowledge about success determinants on the other – is what has originated the need of this analysis in the first place.

In order to better visualize the core topic of the current study, a conceptual model showing the wide aspects and steps of a research project life cycle, is proposed below (Figure 5).

We know that the policy agenda of the European Union comprises international issues because national governments attempt to search collective solutions to problems that are increasingly difficult to resolve at the domestic level. Once an issue is accepted as a legitimate item on the policy agenda of the EU, a complex political and bureaucratic process is set in motion – the policy process - that involves a plethora of actors (Bache e George 2006). Since the establishment of the principle of centrally funded research, Framework Programmes (FPs) have been adopted as research funding policies at the international level with the aim to enhance the potential of the European research. FPs are structured in thematic work programmes that defines calls for proposals with relatives budget allocation, deadline,

expected impact and results and final assessment. Participants usually form networks to apply to the calls and submit proposals that will be evaluated by panel of experts and the most valuable will be granted.

Figure 5: Framework of research project life cycle



So what we commonly known as research project has a three phased genesis: is conceived as a research idea, becomes a research proposal and, if granted, begins its real life as project.

The goal of this study is to find an evidence of the determinant of the success of a research proposal. The "Research Idea" phase would be very interesting to examine, and it would be challenging to investigate the environment where ideas are born, or which characteristics of human capital animate the brainstorming and which is the level of contamination among different fields. Nonetheless it is hard to perform an empirical analysis on the issue – because of the lack of data – and the topic is therefore unsuitable for the aims of this study. Thanks to a good availability of data, instead, a wide part of scientific studies relies on the third phase of the life cycle: the "Research Project" phase. Most of the studies

consider the management, the personal and the company's experience as key elements for success, while others analyse the final step focusing on results and goal achievement. The current study focus its attention on the "Research Proposal" phase. In this phase, potential partners interact with one another, put competencies together, plan the work to be carried out during the implementation phase, and submit their proposal. During this stage all the "ingredients" are mixed, and yet the reasons behind a project's success are already identifiable. Traditional wisdom maintains that planning and analysis are vital to any project, and the more planning there is, the more successful the project will be (Gibson e Wang 2004). The practical output of this moment of strategic planning is usually an essay, drafted according to the guidelines provided by the European Commission. After the deadline, the Commission evaluates the submitted proposals by peer reviewing of experts, and defines a ranking of proposals. Following the availability of funds, only very few of them are awarded. From that moment on, funds are allocated to the various partners while the coordinator manages all the procedures, relationships and activities until the end of the implementation phase.

2. THE ACTORS

Who are the actors animating the "Research Proposal" phase? As demonstrated by Lepori and Bonaccorsi in their attempt to build a census of Higher Education Institutions (Lepori e Bonaccorsi 2013), it is quite difficult to conceptualize, categorize and identify *research-active* organizations. The problem is twofold: on one side there is disagreement in literature on whether the PhD (awarding) status should be considered the main criterion for determining the research mandate of an institution; on the other side, different organisations of national higher education systems define the research mission differently: several countries with binary higher education systems (i.e. Austria, Switzerland, Finland and the Netherlands) recognise a research mission even to non-university institutions, whereas other countries exclude, for instance, colleges, art schools and business schools from that category (Lepori e Bonaccorsi 2013). It is not our intention to enter in such a debate; we would rather explore our interest in research-engaged organisations. Consistently with this point of view, we will observe ex-post the list of participants in research consortia that have applied proposals under FP7 calls. We consider participation as the minimum criterion to be defined 'partner of a research project', and we retrieve the classification scheme adopted by the European Commission (European Commission 2015) where groups are organised in five categories: Higher – or secondary – Education Institutions (HES), Private for Profit (excluding research and education institutions) (PRC), Public Bodies (excluding research and education institutions) (PUB), Research Organizations (REC) and Others (OTH).

As defined by the Lisbon resolution of the European Council in 2000, the main objective that the European Union was expected to achieve by 2010 was to build a competitive and knowledge-based society. "Competition" and "knowledge-based" are therefore key words when performing an analysis of the European Research Area development. Even though some authors claimed that the technological gap between USA, Japan and Europe has turned out to be imaginary rather than real, great efforts have

been made by the European Union to integrate European research and technological development in order to bring them at the same level (Luukkonen e Nedeva 2010). Framework programmes, together with "open methods of coordination", "networks of excellence", "joint programmes" and other measures have been the most relevant / some relevant initiatives undertaken to reach ERA goals. At its beginning, ERA represented only an empty frame of reference, promoted by the acknowledgement that a federal model of EU policies was not endorsed by National States; however, an intergovernmental model was not any more feasible, given the number of countries that needed to be involved in negotiating the agreements (Lepori, Reale e Laredo 2014). The context where these actors play is well described by the neo-institutional theory, that considers social institutions to be central to policy processes in shaping the actors' behaviour (March e Olsen 1984) and driving resistance to change and path dependency (Banchoff 2002). In our case European Union institutions, member states, associated and third countries are conceived as social institutions whereas partners of research projects – in all the eligible structures – are conceived as actors. Ultimately, what this study lingers on and observes – by means of an empirical analysis – is the actors' interactions, collaborations and behaviours in the field of research. Still within the institutional framework above described, typical research collaborations are mechanisms of interaction stemming from the convergence of actions of three different actors: funding agencies, universities and industries. Funding agencies act as regulator bodies that develop policies and research objectives, that propose research topics, assess quality and fund ideas and results. Universities are historically the main performers of research as it is known that their traditional mission was mainly focused on teaching, research and communities' engagement. Industries, on the other hand, are responsible for the technological development and innovation (of a given country), as well as having a central role in the international market. This Triple Helix – following the definition coined in the mid-1990s by Etzkowitz and Leydesdorff – is a model for studying both knowledge-based and developing economies (Etzkowitz e Leydesdorff 1995). According to its configuration, State, Academia and Industry generate a knowledge infrastructure formed by overlapping institutional spheres, with each taking the role of the other and with

hybrid organisations emerging at the interface (Etzkowitz e Leydesdorff 2000). In our case, the State role can be absolved by the European Union, the supranational body that (partially) regulates and finances the knowledge-based society. Hence, research networks appear as trilateral configurations with the common objective of realising an innovative environment for knowledge-based economic development. These three types of actors do not fit together in a predetermined order though: instead, they generate puzzles of participants according to both the requests of the funding agency (usually the European Commission or linked agencies) and the preferences of the leading actors. The Triple Helix model generates trilateral networks for resolving social and economic crises through research collaborations. Etzkowitz and Leyesdorff analysed dynamics of innovation on a continuum going from original national systems to the Triple Helix system.

3. THE LITERATURE

In order to define the theoretical framework of our analysis, and the concept of success in research projects, four fields of literature have been considered: (1) we have analysed the most relevant reports and studies of the European Commission and some author on Framework Programmes and broadly on the European Research Area, (2) the literature on networks and specifically on research networks composed by different organisations joined for participating to European Calls for proposals, (3) the literature on Higher Education and research evaluation, since Academies and Research Centres represent the largest group of actors (4) and finally the literature on project management and project success, even if usually referred to big projects conducted in the commercial or construction sectors.

The most relevant official reports by the European Commission on FP7 are the "Sixth FP7 Monitoring Report (European Commission 2015), the "Ex-Post Evaluation of the 7th Framework Programme (2007-2013) (European Commission 2015) and the DG RTD Annual Report on Programme Evaluation Activities 2013 (European Commission 2014). These documents provide us a comprehensive and exhaustive picture of the participants to the programme, the allocation of funds, statistics about grants and overall success rate. The main findings demonstrate the effectiveness of FP7 in boosting excellence in science and the strengthening in Europe's industrial competitiveness, contributing to

growth and jobs in Europe[13]. Nevertheless, it is difficult to gather the determinants of such results in terms of successful proposal, composition of networks, organisations' characteristics.

Peter Viola in the "Evaluation Report of the FP7 Cooperation Specific Programme" (Peter 2016) assumes that the size of the states' research systems affects the participation rates and the resources distribution. At the same time, she claims, other factors such as reputation, openness and - not well defined - "economic drivers", play a role for the overall success of partners of winning consortia. But any further explanation of the relationships between these factors with the success.

3.1. EU official reports

Official interim or final reports of Framework Programmes mainly tend to highlight the participation, the amount of allocated founds among states and organisations and the impacts recorded after the – partial or total – achievement of objectives. Nevertheless, the "Ex-Post Evaluation of the 7th Framework Programme (2007-2013) (European Commission 2015) raises the issue of "concentration effects". According to the report there are three different groups of organizations that received different three different amounts – per group – of budget. In particular "the A-Group contains the group of top-500 organisations, which were awarded the highest amounts of EC funding in FP7; ranging from around 800 million euro to around 13 million euro per organisation. This group includes large research organisations (such as the Centre National de la Recherche Scientifique, the Fraunhofer Gesellschaft and the Max Planck Gesellschaft), leading universities (such as Oxford, Cambridge, University College London, ETH Zürich and Leuven) as well as some industry organisations (such as SAP, Thales, Siemens and

[13] European Commission fac sheet – press release (http://europa.eu/press-release_MEMO-16-146_en.htm)

Telefonica). While the A - Group contains only 1,7% of organisations that participated in FP7, it received about 60% of total funding (more than 27 billion euro in total). On average, each A - Group organisation participated in 120 FP7 projects and was awarded a share of about 460.000 euro per project. The A - Group contains a relatively large share of universities (62%), which received a relatively large share of funding (57% of EC funding for the A-Group in total). This can be interpreted as an effect of the specific programme FP7 - IDEAS, which was primarily targeted at top universities. Comparing this group of organisations by country shows that organisations from the UK were significantly over-represented, while there were few organisations from Mediterranean countries and hardly any from the EU-13. The degree of concentration for the A-Group was highest in sub programmes FP7-IDEAS, Infrastructures (FP7-CAPACITIES), ITN (FP7-PEOPLE) as well as ICT and HEALTH (FP7-COOPERATION).

The B-Group contains about 4.000 organisations that euro received more than 100.000 annual EC contribution in FP7. They account for 19% of organisations that participated in FP7 and were awarded 29% of EC funding (about 13 billion euro in total). On average, each B-Group organisation participated in eight FP7 projects, was awarded about 2,4 million euro in total and a share of about 312.000 euro per project. This group includes similar shares of research organisations, large companies, and SMEs; while universities were underrepresented. A comparison by country shows that Italy, Spain and Portugal were over-represented in this group, while the share of organisations from the UK was significantly smaller.

The C-Group contains all organisations that received less than 100.000 euro annual EC contribution in FP7. While this includes about 80% of all organisations that participated in FP7 (about 23.000 organisations in total), the C - Group received only about 10% of total EC contribution (about 4,8 billion euro in total). In this group, private organisations were awarded the largest funding shares: SMEs received about 50% of total EC funding for this group (about 2,4 billion euro in total) and large companies received about 21% (about 1 billion euro in total). A comparison by country shows that organisations

from Mediterranean countries and the EU - 13 were slightly better represented than on average across all three groups" (European Commission 2015 - pp.29-30).

3.2. Networks, a new unit of analysis

There is no agreement in literature on which should be the actors with a leading role in innovation for a knowledge-based society. Someone observed that Universities can play a better role in innovation (Etzkowitz e Leydesdorff 2000), others consider firms to be the principal innovators because they have to compete in markets (Andersen 1994). There is enough space to make various hypotheses on the different roles of the actors in the spiral, the rationality of their behaviour or the permeability of the sphere of decision and/or competence; however, what is most interesting for our purpose is the fact that we can consider networks as a new unit of analysis (in addition to national systems and single organizations) led by Universities, research centres, public bodies or industries. Networks, thanks to their semi-autonomous dynamic, can be seen as a single actor competing for research funds at the international level. They have a proper identity, reputation and financial autonomy, and contributing to the evolution of the knowledge-based society. Thus, network features will be put under a special lens of analysis in order to evaluate whether determinants for success in research projects derive from this kind of actor.

The "Study on Network Analysis of the 7th Framework Programme Participation-Final Report" (European Commission 2015) shows the effects of the Framework Programmes on research collaborations among Universities, research centres and other organizations. The main findings relate with the achievements of FPs and the general scope of ERA in terms of participation and improvement

of capacity of research organization to collaborate. Any evidence on success and effectiveness in terms of funding and grants.

3.3. Higher Education Institutions: a fundamental actor for collaborative research

As theorized by some authors (Etzkowitz e Leydesdorff 2000, Godin e Gingras 2000) universities have a salient role in making a knowledge-based society thrive. This assumption is confirmed by the FP7 monitoring report (European Commission 2015) hat states that Higher Education Institutions, in the period 2007-2013 have been the main beneficiaries of FP7, both in terms of both applicants (39%) and of requested funds (31%). Given this fact we wish to focus our analysis on University participation to research networks, because we reckon that its pivotal role and the evolution of the relationships with the other partners (State/EU and Industry) could reveal an interesting pathway for understanding success. In the modern era, universities are far from the traditional model of teaching-research universities. A rapid transition, that went through at least two revolutions, shaped academies in "entrepreneurial universities": these institutions have the ability to generate a carefully targeted strategy both in formulating academic goals and in translating knowledge produced within the University into economic and social utility (Etzkovits 2003). Vincent-Lacrin describes the scenario in which academic research has evolved from 1980s to 2000s as a bi-dimensional space: administration versus market forces (horizontal axes) and national focus versus international focus (vertical axes) (Vincent-Lacrin 2006). Academia has become increasingly similar to an entrepreneur in its internal dynamics and in its external relationships, organising its structure in terms of efficiency and effectiveness, searching for research contracts with industries, following research lines dictated by funding agencies, and competing in international rankings for gaining an ever better reputation. The first experiences of entrepreneurial university saw the light during 19th century in the United States. With a bottom-up process, grants were allocated to individual and collective initiatives with the purpose to obtain resources supporting original investigations. Following a contrary approach, the model has been later on introduced also in Europe as a top-down

normative response to the technological gap between Europe and its main competitors, USA and Japan. Anyway, both approaches demonstrated how the entrepreneurial attitude had definitively acquired credibility in American and European Universities. The relevant aspect for our research goal is the twofold dimension of the entrepreneurship of university: the internal organisation and the external behaviour. The latter can be better exemplified by the growing interest for fundraising efforts in research activity, in reinforcing connections with the enterprises and in the new inclination towards marketization and technology transfer. Instead, the internal dimension deals with a novelty in the structure of human resources: research groups operate as "quasi-firms" entities, that lack only a direct profit motive to be associated to companies. In this new role, professors are expected to be team leaders and team members at the same time. They often have the feeling to run a small business, and it becomes extremely difficult to be functional again as individual researchers (Etzkovits 2003). According to this view, researchers with an entrepreneurial attitude are supposed to be more likely to have good performances in collaborative research. National higher education systems are still perceived as relevant, despite a general agreement about how the knowledge-based society has shifted towards a competitive model that in turn produced a centrifugal force able to push single organisations from the local to the international dimension. Again, still admitting that globalisation is – and will be – a challenge and a great opportunity for higher education that will lead to collaboration and competition, Vincent and Lacrin claims that the national – or regional – mission of higher education systems are still important, and may become more important in the future (Vincent-Lacrin 2006). This field of literature suggests that we structure our analysis on a multilevel perspective: from the national level to the network level. It might be really interesting also considering the research-group level, but the available data are insufficient to cover such a detailed level. A survey on the topic might be a natural future implementation to this work.

The scientific community is also engaged in building indicators to assess the scientific power and value of research results, usually related to Higher Education performances and international rankings (Lepori

et al., 2014; Nokkala et al.,2011; Bonaccorsi et al., 2008). Other scholars debate on university participation to European research programs (Geuna, 1996; Geuna, 1998) and on the degree of excellence produced by collaborative participation, defined as "collaborative excellence" in EU Framework Programmes at the country level (Albrecht, 2011). A further line of analysis relies on the factors that affect the connections between Higher Education Institutions (Seeber et al., 2012) and more in general network analysis approach try to understand how groups of research actors join and collaborate. Often collaboration, especially within higher education systems, is analysed together with competition. These two opposite interactions between actors in the field of research and innovation are particularly interesting for us because they reproduce the environment of the European Framework Programmes where universities, research centres but also private companies, cluster to merge competencies and forces, in order to compete against other groups thanks to science based performances. Lepori (Lepori, et al. 2011) observes that higher education institutions, as multiproduct organizations, compete on different markets (better defined as quasi-markets for the public nature of the majority of the competitors), which are highly differentiated in terms of the characteristics of the product and their spatial location. Local markets host competitions for bachelor and master students whereas international markets for PhD students, academic reputation and financial resources. Some authors support the idea that being national funding allocated in a "non competitive" manner, universities do not compete, at least in the national arena (Deiaco, Homén e McKelvey 2008). Nevertheless the metaphor of competition is being used more often several opinions support the idea that universities are struggling with accountability and trust (Mc Kelvey 2013) and it is happening a real shift for universities from the model of social institution to the new configuration of knowledge business (McKelvey e Holmén 2010). Nokkala (Nokkala, Heller-Schuh e Paier 2011) argue that the performance of a university in a Framework Programme can be measured and quantified in various way: by the number of participations, by the number of partners, by the ability to initiate projects and form consortia or by the amount of acquired projects funding. Hence by exploring whether established university rankings predicts universities' performances in Framework Programmes,

he found that a good position in international rankings have only a small influence on FP overall participation of universities. While an interesting difference is highlighted between the role of coordinator and the role of participant. Scientific excellence and good reputation is beneficial for a university to become a frequent project coordinator.

Eventually, it is worth mentioning a related theory – usually applied to science – named the "Matthew effect" (Merton, 1968) that is, the typical enhancement of the position of already eminent scientists who are given disproportionate credit in cases of collaboration or of independent multiple discoveries. All these strands of literature, though, are only marginally linked to the core argument of this research. The lack of scientific contributions arguing on what success is and how can be defined in collaborative research projects is one of the reasons why we are focusing on this topic.

3.4. The success in research projects: conceptualization

Most of the literature on projects refers to the field of architecture, engineering, technology etc. Usually though, research is not the main objective of such projects, contrarily of what happens with research projects. It is important to bear in mind this difference to avoid considering research projects identical to "big projects". However, several aspects can be abstracted and compared applying the same model in both cases. This is the reason why a conceptual framework for success definition is a valid analytical tool. Indeed after having defined what a project is, we will start from what literature assumes, to conceptualise "our" success and the relative methodology to make it operational (later on). As we have seen above, a panel of experts evaluates the research proposal submitted under a Framework Programme call and, if it scores in the very top position of the ranking, it is awarded with a contribution form the EU

budget. Hence, for a research proposal regularly submitted under an FP7 call, the first and unavoidable step towards – what literature usually considers – "success" is to be labelled as "retained"[14] for grant.

But how is "project success" defined in literature? This is the first question that we encounter on the path through scholars' contributions and research evidence. Freeman and Beale noticed that success means different things to different people: an architect may consider success in terms of aesthetic appearance, an engineer in terms of technical competence and an accountant in terms of budget, whereas chief executive officers rate their success in the stock of market (Freeman e Beale 1992). Nevertheless project management literature is quite fragmented on the notion of success and there is still neither accepted definition nor defined methods of assessment and classification. Nevertheless, project management literature is divided on the notion of success, and there is neither an accepted definition nor any clear-cut method of assessment and classification yet. Prabhakar, with a play on words, observes that the only agreement seems to be the disagreement on what constitutes project success (Prabhakar 2008). De Wit and others, instead, distinguish project success from project management success, signalling a difference between the achievement of project objectives and the measures of performances – as cost time and quality (De Wit 1988). Rockart propose a three-step method in order to determine how organisations gain success. The three-step sequence is: (1) to generate critical success factors, (2) to refine such factors into objectives, (3) to identify measures of performance. The result is a matrix with seven critical success factors declined in eleven measures (Rockart 1979). In Verma's opinion communication, teamwork and leadership are vital components of effective project management of human resources and all three are necessary to accomplish objectives successfully (Verma 1995). Cleland instead observes

[14] With "retained" European Commission means that the proposal has passed through the evaluation procedure and it has been selected for granting. From that moment a further procedure of operational capacity assessment of the network partners starts before the signiture of the grant agreement.

success from the organisation's point of view, stressing on two aspects: (1) the degree of achievement of the project's general objectives in time and within budget, and (2) the contribution given to the strategic mission of the organisation (Cleland 1986). Freeman and Bale identify seven main criteria for measuring success in projects: technical performances, efficiency of execution, customer satisfaction, personal growth and manufacturability and business performance (Freeman e Beale 1992). The variety of measures used to assess organisational success led some researchers to group them into common dimensions. Usually these dimension are related to both the internal efficiency of the project execution (i.e. financial performance, implementation process, technical achievements etc.) and the external effectiveness and impact (i.e. market impact, perceived value, customer satisfaction). From another angle, Baccardini underlines the difference between 'project management success' and 'product success'. The first focuses upon the project process, particularly minding the successful accomplishment of cost time and quality objectives, and the manner in which project management is conducted. The second deals with the effects of the project's final product (Baccardini 1999). In order to overcome the overlapping of these two separate components, whose relative status is often unclear in literature, Baccardini proposes the use of a Logical Framework Method (LFM). According to him, projects are formed to accomplish objectives and success is measured in terms of how well these objectives have been met. In fact each project has a hierarchy of objectives that can be identified and structured by the use of the LFM through a top-down approach. Low level objectives have a cause-effect relationship with higher level objectives (Baccardini 1999).

As the above-mentioned studies demonstrate, the conceptual understanding of a project has advanced significantly during the last decade. Instead of simply "jobs to get done", projects should be perceived as significant vehicles of organisational and societal prosperity. This is indeed what Shenhar, Levy and Dvir assumed in their first attempt to map the dimensions of Project success (Shenhar, Levy e Dvir 1997). In a broader analysis, they define projects as "weapons" triggered to create economic value and

competitive advantage; they also identify project managers as new strategic leaders (Shenhar, et al. 2001). The originality in their analysis is the alignment of project efforts with the short/long term goals of the organization. By adhering to this new perspective, that introduces a more complex definition of success within a multidimensional framework, it is finally possible to overcome the traditional view – which literature agreed upon for a long time – according to which projects were perceived as successful once they had met budget and performance goals. Four main success dimensions, ranked in a growing time-frame scale, are defined as: (1) project efficiency, that is a short-term dimension revealing how the project meets its resources constraint, finish on time and within the budget; (2) impact on the customer, that addresses the importance placed on customer requirements and on meeting their needs; (3) business and direct success, that address the immediate and direct impact the project may have on the organisation; (4) preparing for the future, that is the long term dimension exploring opportunities for future markets, ideas, innovations and products. Time is the new element on which project success assessment is based on: the longer it takes to attain the project completion, the higher its relative importance is. Finally, the study also demonstrates how project success depends also on the project type. Authors use different levels of technological uncertainty to distinguish between the projects, and claim that the relative importance of success is project-type dependent (Shenhar, et al. 2001).

4. RESEARCH QUESTIONS

The main objective of this research is to find empirical evidence on what determines success in research project proposals, submitted within European Framework Programmes. The analysis is at the country level and the unit of analysis is the single organisation that took part to research consortia in FP7. The observation framework is the sub-programme Cooperation of the Seventh Framework Programme.

According to our literature and to the concept of success, the overarching research question that leads this work is the following:

(Q1) What does success (in terms of attractivity of funds) in competitive research depend on?

In order to provide empirical evidence of such determinants we investigate on two main dimensions that literature considers as strategic for achieving good results in research: (1) the competitiveness as system for allocating resources and (2) the quality and the reputation of the research system at the national level. Accordingly, the hypotheses are the following:

H0: funds are randomly allocated by the EU, according a competitive allocation system based on peer-review mechanism which grants the quality and excellence of each single research proposal (no factors at the national level affect the allocation of EU research funds)

H1: the higher the quality of national research systems, the greater the amount of funds on research and development, countries are able to attract.

This study is conceived as a cross-sectional research design. Multiple observations of almost the totality of the proposals submitted for FP7 constitute the sample on which this study builds on. The

data used in the present study have been taken from CORDA, the data warehouse of the European Commission where FP7 information was stored. They have been obtained thanks to the endorsement of the Italian Ministry of the University and Research. This source demonstrates the high value of the present study in terms of validity, reliability and replicability of data.

At the country level, the study proposes a descriptive analysis supported by frequency tables and graphs showing the participation rate to the calls for proposals, and the success rate of applicant organisations. At the proposal level the study analyses empirically how the success depends on specific variables. After the definition of working hypotheses, we will carry out a detailed description of the sample, and a descriptive analysis of the dependent and independent variables. Variations in the dependent variable (Success) will be measured through regression analysis, creating a model whose results will be examined and discussed. At the end of the study we expect to observe some evidence that highlights the determinants of success in research project proposals - that would explain the disproportionate allocation of resources at the European level among states, network and single organizations - or confirm that there are no variables affecting the allocation of EU funds to be taken into consideration by Universities and Research Centres as well as by policy makers in order to put forward policies aiming to attract more European funds.

5. A DESCRIPTIVE ANALYSIS AT THE COUNTRY LEVEL

5.1. Descriptive analysis of participation and success in FP7

When it comes to evaluate the potential and the outcomes of research strategies in Europe, a large part of literature focuses on assessing the impact of the cooperative projects funded by the EU (Georghiou e al 1996, Laredo 1995) concentrating on their industrial implications; besides, some attention has been devoted to define the determinants for University participation in cooperative projects (A. Geuna 1988, A. Geuna 1995, Lepori, et al. 2014). For this reason, investigating the participation patterns of Higher Education Institutions in the FPs and, in general, identifying determinants affecting the engagement of networks' partners, has become an important question both in the European policy context and at the organisation level. The present study, drawing on these issues, aims at providing some empirical results. This is why the first step in our analysis focuses on the aspect of participation to FP7. According to this type of analysis, FP7 can be observed by different points of view. In our case[15] we chose to consider

15 Data extraction was carried out on October 6th, 2014. CORDA data warehouse, the source of data, contains information on call for proposals. Validated evaluation and selection data are available centrally, and have already been communicated to the respective FP7 Programme Committee Configurations. Summary statistics on proposals, applicants, success rates, applicant activity type and nationality are based on (i) eligible proposal and participants data submitted to single stage calls for proposals and (ii) second stage eligible proposals and participants data involving two-stage proposal submission and evaluation procedures, without taking into account data from proposals submitted to the first stage of this kind of calls. Limitations on applicants' data in proposals submitted under "Ideas"(ERC) and "People" (Marie Curie Actions) need to be carefully considered too. In fact they refer to hosting organizations rather than individual applicants. Moreover, in proposals submitted under "People", data on total cost and requested EU contribution are generally not provided (European Commission 2015).

participation first and then the success rate, in order to have a general overview of the whole framework programme. After that, we will analyse FP7 by organization type of participants, distribution of resources and geographical path. In synthesis, the object of this part is the quantitative descriptive analysis of FP7.

Table 3: Participation and success of proposals in FP7 sub-programme

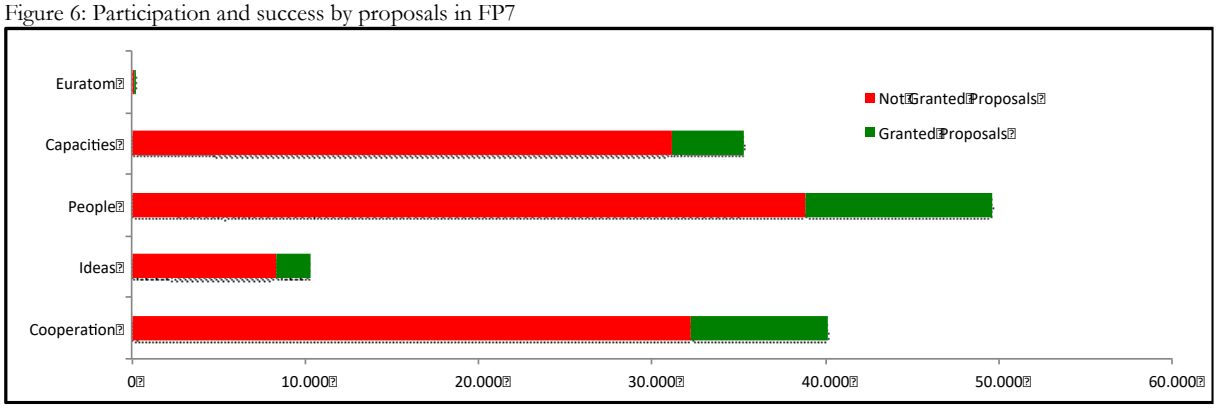
	Submitted Proposals	Granted Proposals	Applicants in Submitted Proposals	Applicants in Granted Proposals	Applicants per Submitted Proposal (n°)	Applicants per Granted Proposal (n°)	Proposal Success Rate	Applicant Success Rate
Cooperation	40.158	7.942	376.519	84.330	9,4	10,6	20%	22%
Ideas	10.296	2.005	75.483	18.079	7,3	9,0	19%	24%
People	49.639	10.838	103.700	21.916	2,1	2,0	22%	21%
Capacities	35.335	4.210	41.970	4.646	1,2	1,1	12%	11%
Euratom	288	132	3.352	1.830	11,6	13,9	46%	55%
TOTAL	*135.716*	*25.127*	*601.024*	*130.801*	*4,4*	*5,2*	*19%*	*22%*

Data: source E-CORDA data warehouse. Last extraction was carried out on 6 October 2014. (European Commission 2015)

As Table 3 shows "Cooperation", "Ideas" and "People" sub-programmes, with more than 100.000 submitted proposals, represent the largest part of the entire FP7, which counts a total of more than 135.000 submitted proposals. Only 25.127 (19%) of these programmes have been granted. Responding to the call's structure, which varies according to each programme, proposals under "Cooperation", "Ideas" and "Euratom" were submitted by a consortium of partners whereas single researchers or small group of them submitted proposals under "People" and "Capacities". This is demonstrated by the average shown in the "Applicants per Submitted Proposal" column: networks operating under "Cooperation" are composed by 9 partners on average, while those operating under "Ideas" and "Euratom" are made of 7 and 11 partners respectively. While "Euratom" calls for proposals attract a specific target, "Ideas" is devoted to the frontier research performed through "Individual projects" with an investigator-driven approach, and "Cooperation" offers a really wide participation opportunity to many different kinds of organizations. This is the reason why, out of a total of 601.024 applicants competing for European funds, more than 60% (376.519) of them belongs to the "Cooperation" sub-

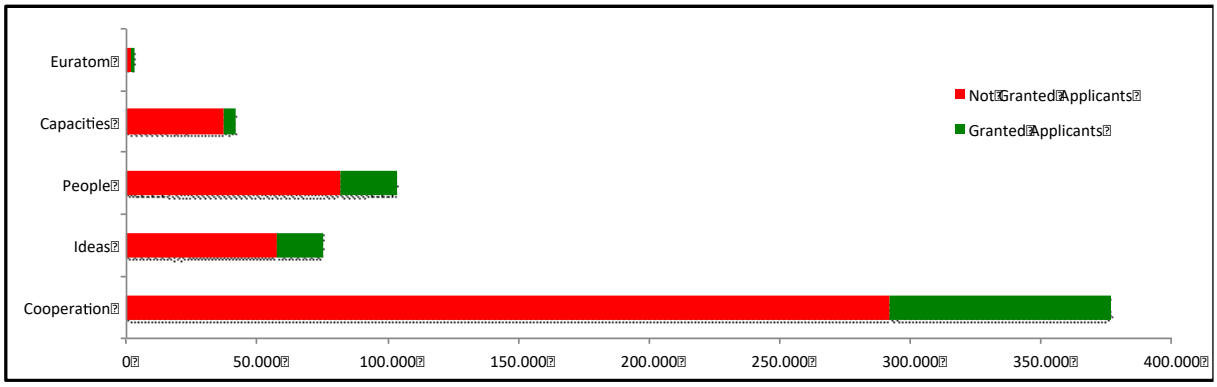
programme. The "Cooperation" success rate, calculated as percentage of both proposals and applicants granted by the European Commission, reaches 20% for the first and 22% for the second. Those scores reflect the overall trend of the whole FP7: in fact, its score is 19% for proposals and 22% for applicants. In Figure 6 we can observe that the participation rate in terms of proposal registers high scores in three sub-programmes (Capacities, People and Cooperation), whereas in terms of applicants it shows an overwhelming majority of participants in "Cooperation". This confirm that a typical network applying to "Cooperation" sub-programme is composed by 9-10 partners. According to the above observations, the "Cooperation" sub-programme should be considered the most interesting object for the purposes of this study, for several reasons: first, it involves the highest number of applicants in respect of the other sub-programmes; second, it has a similar score in success rates compared to the whole FP7's success rate (22%); and third, it has a "vocational" scope to attract collaborative research networks as applicants, which is one of our main topic of interest.

Figure 6: Participation and success by proposals in FP7



Data: Data: source E-CORDA data warehouse. Last extraction was carried out on 6 October 2014. (European Commission 2015)

Figure 7: Participation and Success by applicants in FP7



Data: Data: source E-CORDA data warehouse. Last extraction was carried out on 6 October 2014. (European Commission 2015)

We can observe the Seventh Framework Programme by different points of view. The participation (by proposals and by applicants) and success rates are not the only interesting dimensions to evaluate in order to understand and interpret it: it is worth also considering its financial aspect, the types of organization involved in consortia, and the geographical distribution of participants.

Table 4: Grant Agreements, Grant Holders and EC Contribution of FP7

	Number of Signed Grant Agreement	Number of Grant Holders	Granted EC Funding (EUR million)	EC Contribution per Grant (EUR million)	EC Contribution per Grant Holder (EUR million)
Cooperation	7.779	86.854	28.078	3,61	0,32
Ideas	2.009	18.853	3.753	1,87	0,21
People	10.683	19.438	4.758	0,45	0,29
Capacities	4.445	5.245	7.418	1,67	1,67
Euratom	137	2.002	357	2,61	0,16
TOTAL	*25.053*	*132.392*	*44.364*	-	-

Data: source E-CORDA data warehouse. Last extraction was carried out on 6 October 2014. (European Commission 2015)

The "Cooperation" sub-programme, with 7.779 grant agreements, funded more than half of the total participants (65,6% of grant holders, 86.854 out of 132.392), allocating nearly 28 EUR billion which represents the 63.29% of the global allocated budget. Even under this perspective "Cooperation" proves to be the most relevant FP7 sub-programme for our study, confirming to be very interesting for studying success in research project proposals within the competitive European arena.

As we have seen above, consortia of - usually - several partners are invited to join their forces in order to submit research proposals. This leads to a series of questions: what types of organization participated in FP7 research consortia? Is there a predominance of organization type both in the attitude towards participation and in funds attraction? As Figure 8 shows Higher Education organizations [HES] (most of which are Universities) submitted the highest number of proposals. At the second place we find Private Bodies (Companies, Small Medium Enterprises etc.) and at the third one Research Organizations. Applicants to European Research Council (ERC) call for proposals represent the host institutions where Marie Curie and ERC researchers decide to spend their secondment. Usually they are Universities or Research Organizations, but in those cases the research sector is a data not available at this stage. This is why, in the following part of our analysis, both applicants and proposals of Ideas and Capacities sub-

programmes have not been considered. Public Bodies (Universities are not included) are the smallest cluster of partners competing for European research funds.

Figure 8: Participation, funds and Success rate by Organisation Type in FP7

	Higher Education	Private Bodies	Public Bodies (Excl. Education)	Research Organisations	Other types	European Research Council	TOTAL FP7
Total Applicants	223.389	156.686	22.274	113.197	43.613	41.865	*601.024*
Not Granted	178.104	120.278	15.517	84.547	34.523	37.254	*470.223*
Granted	45.285	36.408	6.757	28.650	9.090	4.611	*130.801*
Allocated funds (million)	10.996,0 €	10.827,0 €	1.345,0 €	8.814,0 €	1.959,0 €	7.718,0 €	*41.659,0 €*
Success Rate	20,3%	23,2%	30,3%	25,3%	20,8%	11,0%	

Data: source E-CORDA data warehouse. Last extraction was carried out on 6 October 2014. (European Commission 2015)

Higher Education applicants are the greatest group, in absolute values. Private Bodies and Research Organizations follow. Instead, the success rate is lower when participation is higher, and, on the contrary it is high when participation is low, with the pic of 30% for public bodies which represents the category with lower rate of participation. (

). Therefore, observing FP7 in terms of categories of participants we can argue that in general a high success rate (in terms of share of granted organisations) is not a result of a high level of participation and this seems not to confirm the popular feeling *the more you participate, the more you gain*. This effect can be explained by the fact that European Framework Programmes are competitive and market-oriented environments where reputational capital can play a relevant role in determining both the value of research and the success. In fact – and this is true in research, as well as for individuals – According to Moore ((Moore, Robert e Turnbull 2001) reputational capital derives from quality in publishing, rather than quantity. Therefore, the reputational capital – of the organisation, or of the State – can be a relevant factor, rather than participation, for having success in European research projects.

What about the geographical distribution of organisations who received funds through FP7? Is there a relationship between participation and success rate across Europe and beyond? Figure 9 shows a picture with some useful elements for approaching the issue. European Member States are ranked from left to right according to the number of applicants that have been granted in FP7 (green bars). Similarly, non-

granted applicants per country are displayed (red bars). By observing Figure 9, in particular comparing the best performer countries on the left with the others on the right, we could argue that in general high levels of participation correspond to a greater number of granted organizations, nevertheless some relevant cases do not confirm this rule: Germany and UK for example have numbers of applicant organisations higher than France, which though has a higher success rate. Similarly Italy and Spain win with Netherlands Belgium and Sweden in terms of absolute numbers of applicant organisations but their success rate is lower. In fact, the "Applicant Success Rate" (the blue line, traced in Figure 9) is worth of consideration. It shows the share of granted on total applicants per EU Member State, and it ranges from 14,6% (Romania) to 26,3% (Belgium) with the mean at 21.6%. Observing the "Applicant Success rate" some interesting aspects emerge. First of all, it presents some peaks and falls, independently from the number of granted organizations and the number of applicants (Country size). Although its trend slightly declines with the decrease of the number of granted organisations, several EU Member States with very poor participations mark a good score. Therefore, we could say again that the success rate does not always - and not only - depend on participation.

Another interesting aspect is the relationship between participation and success rate.

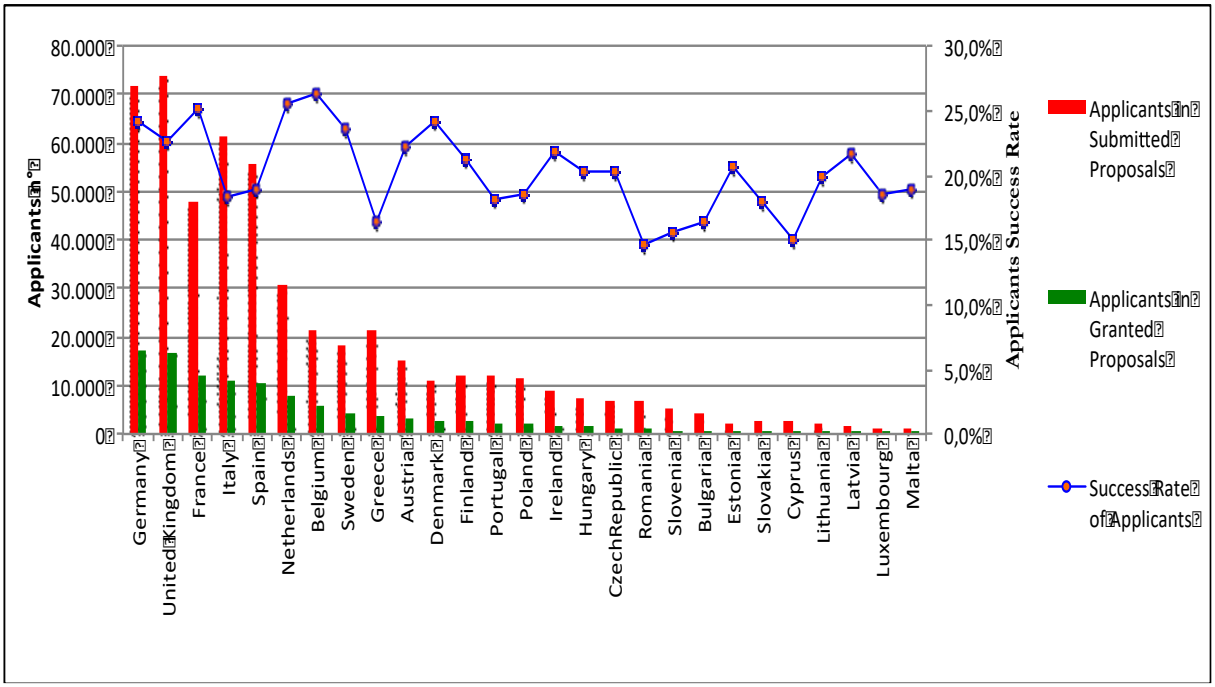
Figure 10 shows the variable of success from an economic point of view: the column on the left measures the amount of funds allocated by the European Commission to the granted organizations (Million Euros per Country), while the column on the right measures the "Economic Success Rate" defined as the share of allocated funds to granted organisations on the total of budget of submitted

proposals[16]. Values of Economic Success Rate" range from 9% (Romania) to 24,7% (France). In Figure 10 Countries are ranked from left to right according to the amount of funds received for granted projects. Germany, UK, France, Italy and Netherlands are in the top 5 positions, nevertheless their "Economic Success Rate" does not follow this order. UK and Italy for example have an Economic Success Rate lower than France and Netherlands respectively although they account more funded organisations than the others. There are also the examples of Estonia, Latvia and Ireland, three countries with few granted

[16] As an example: if the amount of funds allocated to granted organisations of a Country are 100 million Euros and the total amount of the budget of all the proposal submitted from that countries are 500 million euros, the economic success rate is 20%

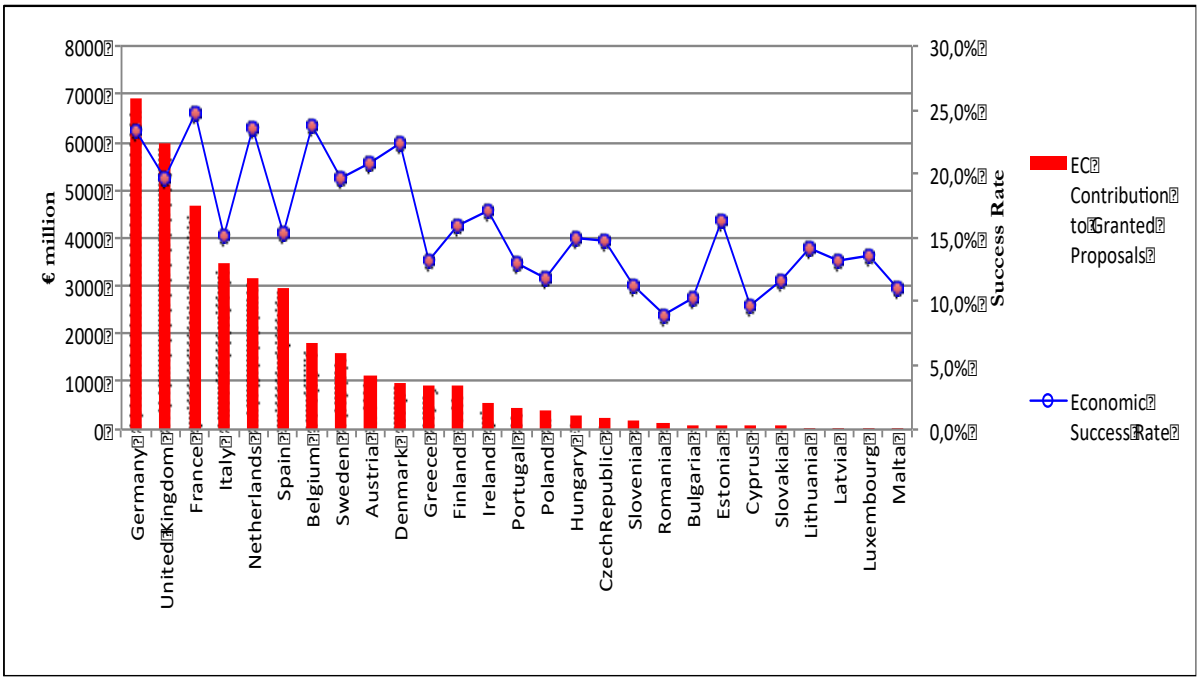
organisations but in terms of "Economic Success Rate" they perform better than Italy and Spain (which have more granted organisations).

Figure 9: Participation and success in FP7 – EU Member States



Data: source E-CORDA data warehouse. Last extraction was carried out on 6 October 2014. (European Commission 2015)

Figure 10: Research funds and economic success rate in FP7 – Member States



Data: source E-CORDA data warehouse. Last extraction was carried out on 6 October 2014. (European Commission 2015)

Participation per se does not always mean success. Variations in success are expected to depend from other variables. Moreover, it could be interesting to investigate this aspect more in depth in order to understand how this phenomenon is linked to the relationship between participation, grants and "size" of the State, where for size we mean not only geographical dimension or the number of inhabitants, but

in particular the number of universities, research centres, SMEs and human resources involved in research activities.

The following figures show data that are similar those described so far but they refer to Candidate and Associate Countries[17] (Figure 11 and

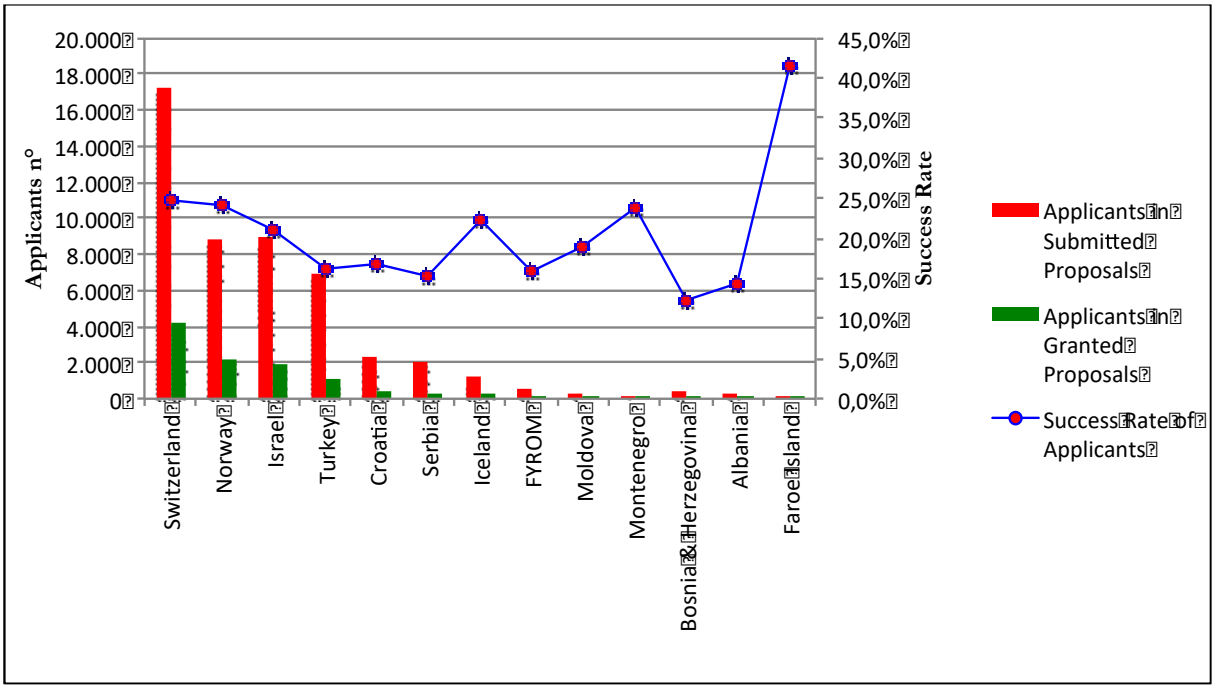
Figure 12) and Third Countries (

Figure 13 and

Figure 13) engaged in research proposals under FP7. Similarly to EU Member States, even for these categories of countries, in some cases their success rate does not reflect participation. This becomes evident when observing the irregular path of the blue line of both "Success rate of Applicants" and "Economic Success Rate". While Switzerland, Norway, Israel and Turkey show a good engagement, "Ex Yugoslavian" countries with Moldova and Iceland join EU research consortia very poorly. These two groups behave similarly also when analysing from an economic point of view (

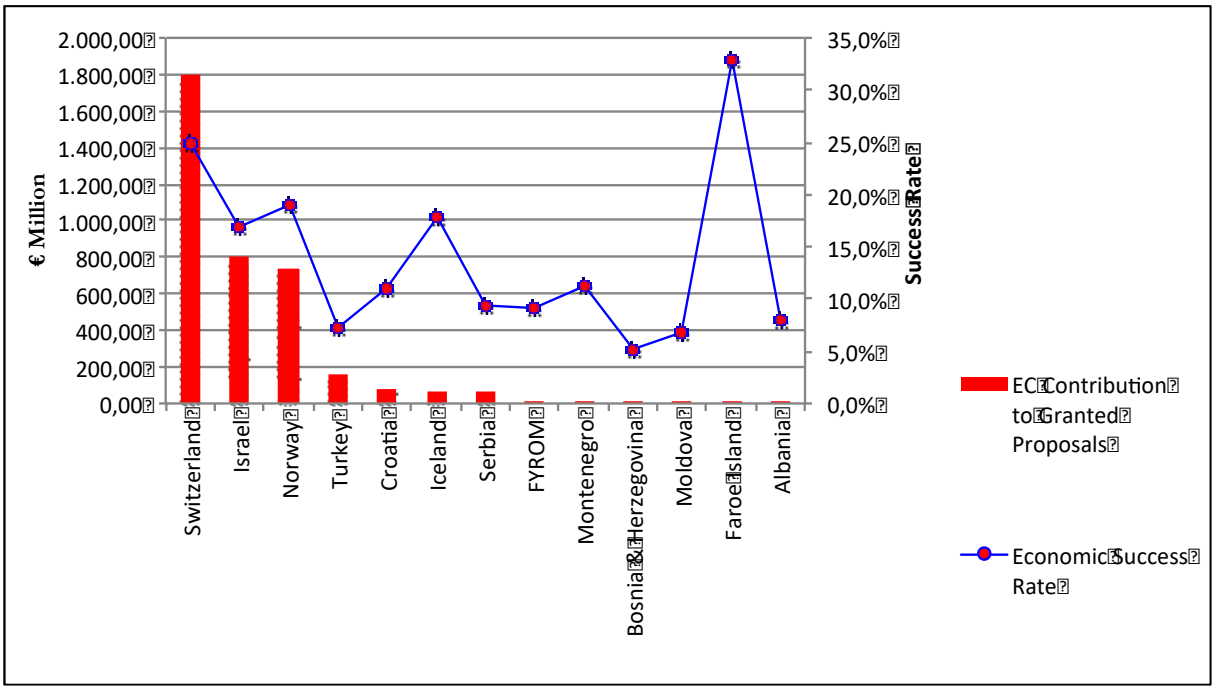
Figure 12).

Figure 11: Participation and success in FP7 – Candidate and Associated Countries



Data: source E-CORDA data warehouse. Last extraction was carried out on 6 October 2014. (European Commission 2015)

Figure 12: Research funds and economic success rate in FP7 – Candidate and Associated Countries



Data: source E-CORDA data warehouse. Last extraction was carried out on 6 October 2014. (European Commission 2015)

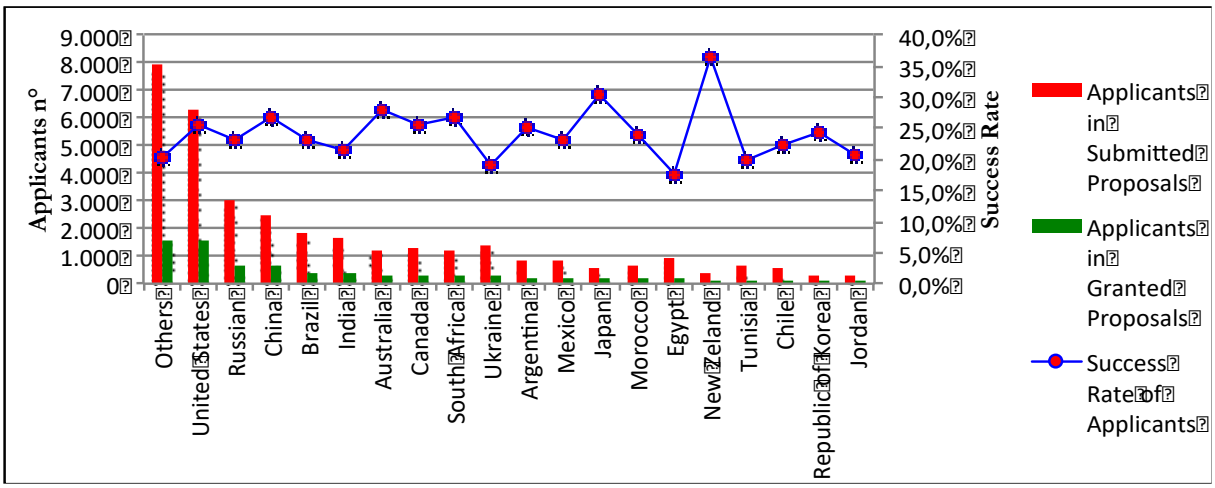
Figure 13 and (European Commission 2015)

Figure 14 show participation, granted organizations, amounts of grants and success rates of Third Countries as defined by FP7 rules. Their engagement was very marginal. Only United States, Russian

[17] Croatia is listed among Candidate and Associated Countries because during most of the life of Seventh Framework Programme was not a EU Member State. It officially joined the EU on the 1/7/2013

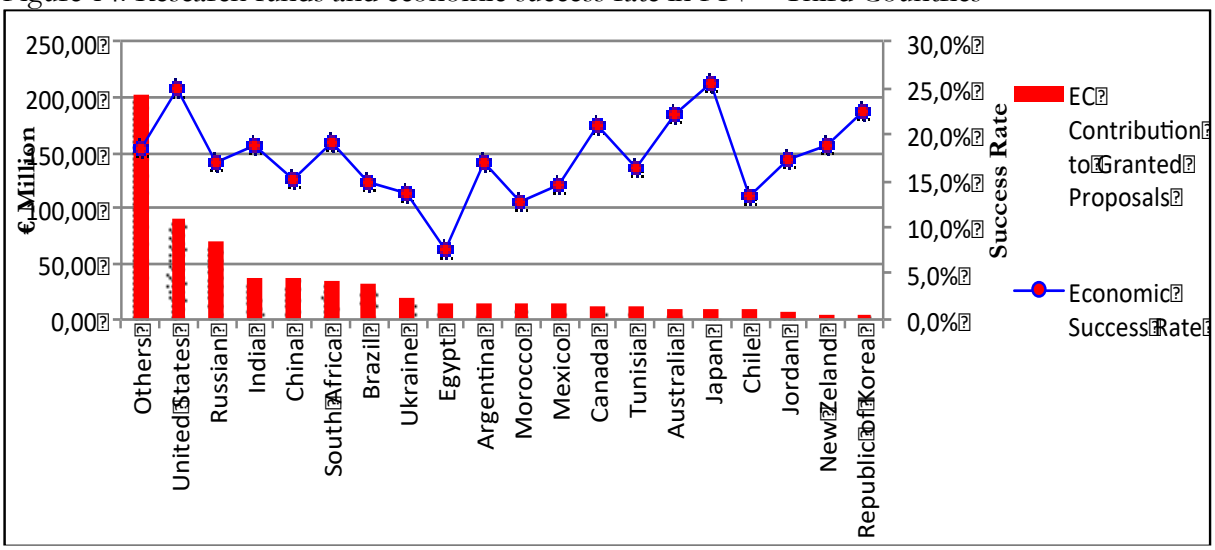
Federation and China show some collaboration in the EU research scenario; however, what is worth noticing is the irregular trend of success rate, both in the number of applicants and for EC contribution.

Figure 13: Participation and success in FP7 – Third Countries



Data: source E-CORDA data warehouse. Last extraction was carried out on 6 October 2014. (European Commission 2015)

Figure 14: Research funds and economic success rate in FP7 – Third Countries



Data: source E-CORDA data warehouse. Last extraction was carried out on 6 October 2014. (European Commission 2015)

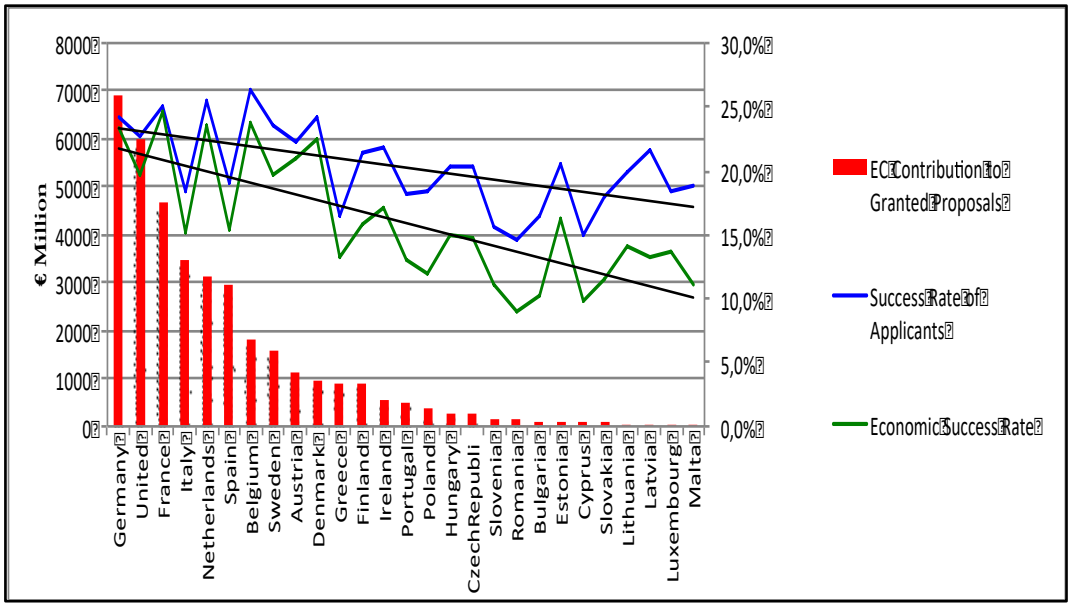
In order to introduce an analysis that explains the dimension of success in the following chapters, we propose three Figures. They show a comparison between the success rates calculated as share of granted

organization on applicants (blue line) and as share of allocated funds (green line). In Figure 15 only EU Member States are listed, while Figure 16 is for Candidate and Associated Countries and

Figure 17 for Third Countries. In all the three figures countries are ranked from left to right according to the amount of EU Funds received (Million Euros). For all three groups of countries, the economic success rate of each country is lower than the applicant success rate, but while the difference between the wo rates is small for countries that receive great funds, it is larger for countries that receive less funds. This means that the share of budget obtained by all the granted organizations of a country is lower than the share of granted organisations on the total of participant organizations. The case of Belgium can be taken as example. Belgium declares 5.664 granted applicants, which represent the 26,3% of its overall number of applicant organizations in FP7. The funds obtained for those successful projects amounts to 1806,3 Euro Million, that corresponds to 23,8% of the funds requested by all the Belgian applicant organisations (included those who failed). That might depend on the role that organizations play in a research partnership. Usually coordinators have a larger part budget than partners, because of their central role and the management tasks. Also, some of the partners are pivotal while others are marginal, and they receive their budgets accordingly. In EU Member States (Figure 15) the distance between the two success lines grows with the decline of the success. Those countries with a good performance in EU-awarded funds have an applicant success rate which is very close to the economic success rate. The more EU-funded activities decline, the more the distance between applicant and economic success rates grows. The concept of success in research is often misused, or used with different meanings, according to the analyst. The European Institution (EC in particular) considers it as an indicator of the evaluation of the achievement of public policies priorities. On the contrary, the individual States – through ministers, with their politicians or technicians – usually privilege the economic aspect of success in research. They tend to make a balance between the national contribution to the EU budget, and the budget regained in the form of projects funds (including funds for other sectors, such as structural funds). At the end of the

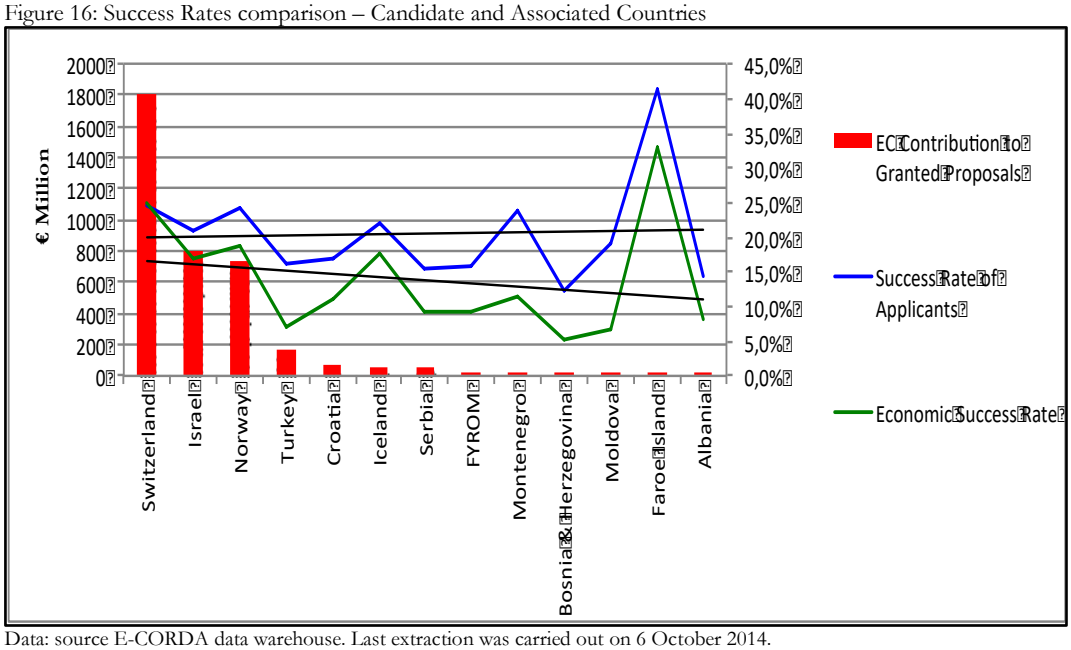
day, those States that have regained an equal or higher amount of money with respect to the initial funds committed are generally considered good performers. Moreover, success for applicants can be examined analysing several aspects: first of all, the economic one. Funds are relevant in order to implement activities, recruit personnel, get financial independence and implement an international dimension. At the same time, though, success means reputation, accountability, and opportunity to enhance the "capital" of scientific publications that are fundamental indicators for international rankings in the academic and research fields. (In addition to this,) if we consider private organizations as participants to research consortia, we see that their concept of success is obviously related to the economic aspects, but also to new market disclosures, business opportunities, patents and business development.

Figure 15: Success Rates comparison – EU Member States



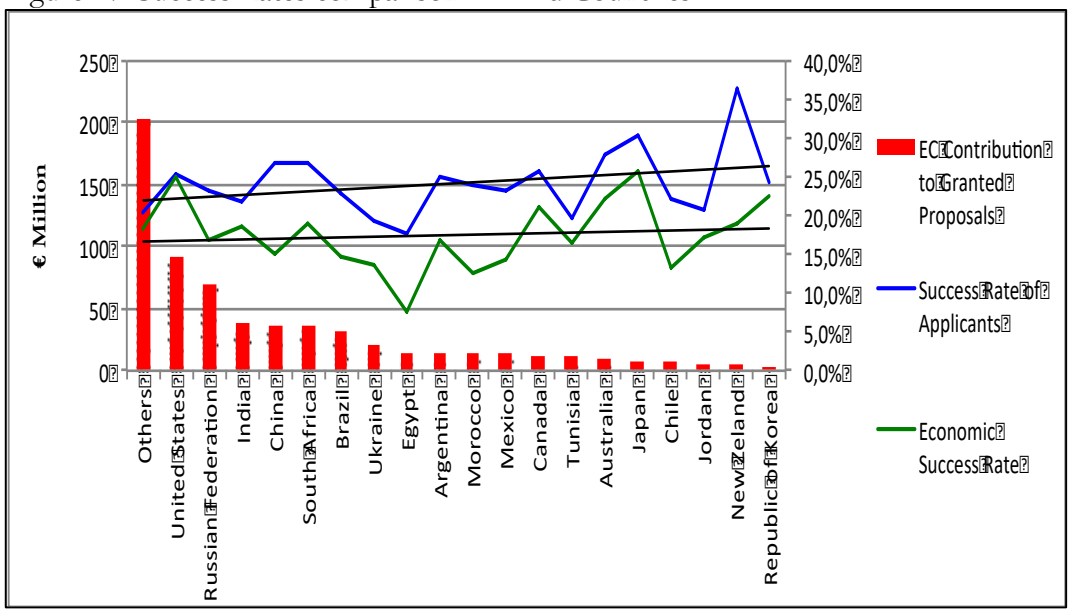
Data: source E-CORDA data warehouse. Last extraction was carried out on 6 October 2014. (European Commission 2015)

Figure 16: Success Rates comparison – Candidate and Associated Countries



Data: source E-CORDA data warehouse. Last extraction was carried out on 6 October 2014.

Figure 17: Success Rates comparison – Third Countries



Data: source E-CORDA data warehouse. Last extraction was carried out on 6 October 2014. (European Commission 2015)

In conclusion these data well confirm what already argeud in Ch. 3.4: the definition of what 'success' is in the field of research projects would need a wider analysis and, as several authors claim, such analysis would require a multidimensional approach. Nevertheless, we think that the economic aspect in the preliminary phase of the proposal should be seen as one of the most important factors in determining

the success of the project. This is the reason why we focus on the determinants that allow research organisations to attract funds successfully.

5.2. Participation, EU membership and Euro Area

Research activity can be carried out both by individuals or and by a team. Obviously, it depends on the tasks to be performed: (i) the topic to be investigated, (ii) the data at the disposal of - or to be gathered by - the researcher / research group and, (iii) ambitions and goals of the research project. One of the principles at the basis of the EU funding rationale is the so-called "European dimension" of research project proposals. The aim is simple: the whole European Union must benefit of the results of the research that it has financed. It means that – usually – several countries unite in a consortium, exploiting their synergy to achieve the research goals. As a result, actors from different countries work together in a multi-annual cooperation project, following the classical scheme coordinator-partners. Usually the coordinator launches the project idea, and then asks the partners to embark the project by taking the responsibility of parts of the project, called "work packages". This scheme allows the Coordinator to lead the project by addressing tasks, organising schedules and defining milestones that function as checkpoints to monitor whether the obtained results are in line with the prevision. Besides, the coordinator enforces a communication system for sharing documents and information. This is the reason why coordinators are the only members that the European Commission recognises as interlocutors. Playing the role of

representatives of the consortium, they stipulate a Grant Agreement with the European Commission, that is the legal basis of the funding.

In this part we analyse the participation of countries in FP7 collaborative proposals submitted within Cooperation sub-programme, by observing whether their organisations act as coordinators or partners[18]. As shown in Figure 18 the overwhelming majority of participants, both among coordinators (87,94%) and among partners (76,07%) are organisations belonging to "old member" States[19] . Countries that are not member state represent a very little percentage of participants in Framework Programmes (12.24%) but they are more than organisations from "new member" states[20] (9.67%) and candidate countries (2.02%). This phenomenon can be observed from a double point of view. On the one hand, from a state perspective, it discloses the difficulties that research organisations of recent member states meet in getting in touch with the core of European research networks; on the other hand, from a EU perspective, it confirms the weak results achieved by the integration policies after the enlargements. The latter aspect connects the general objective of this study with one of the most relevant topics of EU political studies: the assessment of European public policies made through the lens of the results of EU funded research.

[18] Data source: Seventh FP7 Monitoring Framework Programme (European Commission 2015) Annex B, Tab.B1, pag. 96.

[19] Countries that became members of the European Union before 1986, included the enlargement to Spain and Portugal.

[20] Countries that became members of the European Union after 1986.

Figure 18 - Participation to research consortia by EU membership

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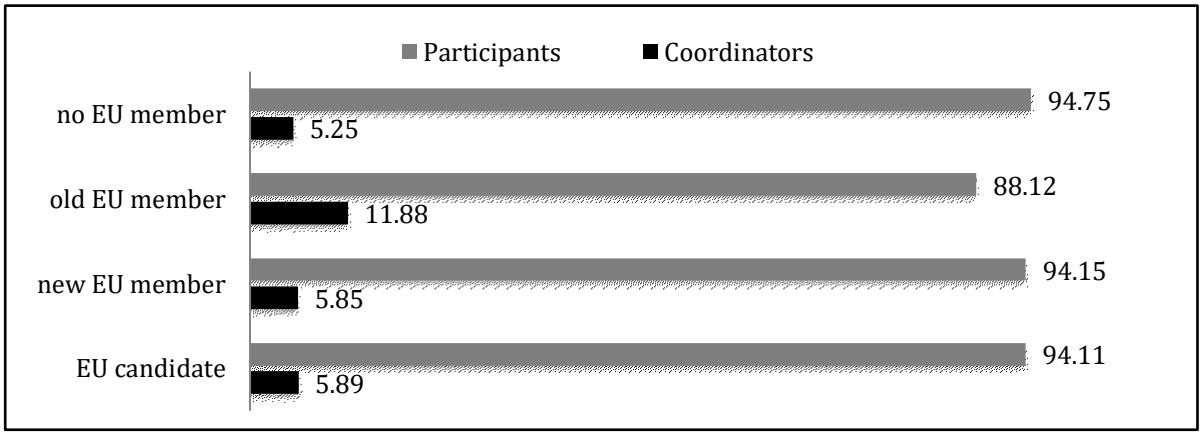
Figure 19 shows a more regular pattern. The attitude to participate to research projects as partner, instead of Coordinator, does not vary according to EU membership status, even if old member states provide twice as many coordinators (in terms of percentage) in respect of the others.

Figure 19: Coordinators and participants by EU membership



States which are not members of the European Union are invited to participate to research programmes through specific agreements. Therefore, organisations from those countries can be beneficiaries of funds and participate both in the role of coordinators and partners. The reason of such involvement is twofold: on one side, the European Union wishes to benefit from the research quality of

top-level organisations from such countries; on the other side, states that are not EU members wish to be part of a scientific community with no borders and no political constrains. More than one third of participants of this category comes from Switzerland and Norway (**Error! Reference source not found.**).

Figure 20: Non EU member states participation ranking

Top 10 "no members"	%	n.
Switzerland	24.47	10.289
Norway	12.81	5.389
Israel	12.18	5.124
Russia	5.05	2.124
United States	4.72	1.984
China	3.81	1.601
Brazil	3.02	1.272
India	2.78	1.170
South Africa	2.03	854
Ukraine	1.90	799

As Figure 19 shows, Switzerland, Norway and Israel have a high participation rate in research consortia although no EU members. Their geographical and political engagement with the EU Member States is one reason that justifies these performances, but also to the neighbouring policies implemented by the European Commission should be taken into account. This figure show also how networks sometimes expand their borders including USA, China, Brazil and South Africa. Specific motivations detailed in the calls or the need for coordinators to involve particularly skilled research organisations are the main reasons at the basis of such a wide extension of networks. Among candidate countries to join the EU (Figure 21), Turkey has almost half of the organisations that participate in FP7 cooperative research proposals. Also Croatia, Serbia, Bosnia and Montenegro increase in terms of participation to research networks, even though, in some cases, absolute numbers are quite small.

Figure 21 – EU candidate countries participation ranking

Participants from candidate countries	%	n.
Turkey	49,07	3.424
Croatia	18,42	1.285
Serbia	16,97	1.184
Iceland	9,17	640
Macedonia	4,96	346
Montenegro	1,42	99
	100	*6.978*

Another interesting topic is the evaluation of if and how the Euro Area affects the participation of countries according to the fact that they belong or not to the monetary union. In fact, probably the presence of a national currency is not the only factor affecting participation; rather, it's more likely that participation is strongly linked to the effects of monetary policies implemented by the European Union in the last decades, which, in some aspects, facilitated the integration among members of Euro Area and also simplified mechanisms, market and monetary relationships. In order to compare the effectiveness of the two roles of coordinator and partner, both in the Euro Area and outside it, we have elaborated an appropriate indicator. Such indicator is a mean obtained dividing the total number of applicants per role of each zone (Euro /No-Euro) by the number of countries belonging to the zone. As a consequence, the indicator can be read as the mean of organisations that in a state has operated as coordinators/partners, in each zone. The situation reproduced by the model is similar for both the Euro Area and the No-Euro Area (

Figure 22) and shows again an overwhelming majority of applicants in the role of partners. As we have seen before, the motivations of this phenomenon can be several: firstly, the fact that only one coordinator per consortium is required, and usually an average of ten members compose research networks, so it is obvious that partners are more numerous than coordinators; secondly, one of the parameters to evaluate the quality of the proposal is how the management is structured and the ability of

the coordinator to drive a complex work, therefore often organisations prefer not to accept a role of such responsibility unless they are quite experienced in that; finally, the practical consideration that the effort (time and resources) required by the planning phase is unlikely to be reimbursed, if proposal is not granted.

Figure 22 – Coordinator and Partner indicator in Euro and No Euro areas, per state

	Coordinators Indicator	Partners Indicator
Euro	1504,3	11388,9
no Euro	1170,9	13646,0

However, a little difference between the two compared zones is still noticeable. The "coordinators Indicator" is higher in Euro Area than in the No-Euro Area. This means that in countries with Euro as national currency the average of applicants in the role of coordinator is higher than in countries with their own national currency. Differently it is not the case of partners: in countries without Euro the mean of organisations in the role of partner is higher than in countries with Euro. It is important to remind in fact that in FP7 the ICT topic accounts for the majority of the submitted proposals, therefore, since ICT projects are highly market-oriented, it is quite plausible that the harmonisation effect of monetary policies within the Euro Area could have had an impact on the prevalence of coordination activities proposed by applicants-coordinators from Euro Area countries.

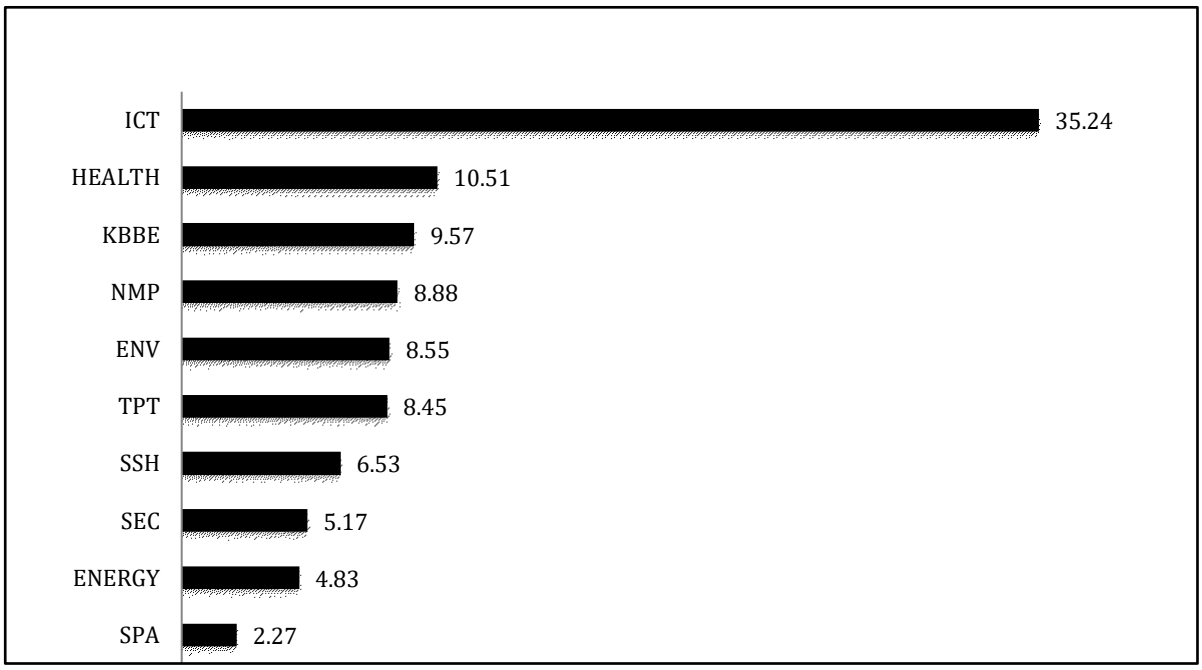
5.3. Cooperation sub-programme

As we already know, FP7 has been structured into four "regular" sub-programmes (Cooperation, Ideas, People and Capacities) and two "special" sub-programmes, one in the field of nuclear research (Euratom) and one for the Joint Research Centre's direct actions. The Cooperation sub-programme, as argued, is the main objective of this study. This programme is in turn divided into ten Specific sub-programmes depending on the scientific sector: Information and Communication Technology (ICT),

Health, Food Agriculture and Fisheries Biotechnologies (KBBE), Nanosciences Nanotechnologies Materials and New Production Technologies (NMP), Environment (including Climate Change) (ENV), Transport (including Aeronautics) (TPT), Socio-Economic Sciences and Humanities (SSH), Security (SEC), Energy and Space (SPA).

Figure 23 shows that more than one third of submitted proposals comes from the scientific sector ICT (35,24%) followed by Health (10,51%).

Figure 23 – Percentage of participants by scientific sector



In

Figure 24 data on country participation by Specific sub-Programme (only the top 10 positions) are displayed. Following a general observation of such data, it is clear that Germany, United Kingdom, France, Italy and Spain occupy – alternatively – the first five places of each ranking. Three out of five (Germany, France and Italy) are among the so-called founding father countries; however, perhaps the

most relevant point is that they are the countries with the highest rate of population in EU[21]. This observation stimulate a question: does the participation rate depend on the size of the country, then? Later on, we will try to understand if there is any relationship of causality between these variables, but at this stage we will just assume that in a densely populated country the number of research institutions and universities is higher than in a less-populated country. As a consequence, it will be important to test the correlation between these variables.

Figure 24- Country participation by scientific sector - Top 10 countries. (Values %)

	ENERGY		ENV		HEALTH		ICT		KBBE
Germany	15,68	Germany	12,83	Germany	16,34	Germany	16,03	Spain	12,05
Spain	11,22	Italy	12,45	United Kingdom	15,52	Italy	13,21	Italy	11,88
United Kingdom	10,78	United Kingdom	12	Italy	12,37	United Kingdom	12,6	Germany	11,54
Italy	10,59	Spain	10,44	France	10,03	Spain	10,83	United Kingdom	11,19
France	7,39	France	7,47	Netherlands	8,1	France	9,05	France	8,45
Netherlands	6,43	Netherlands	7,26	Spain	6,8	Greece	6,05	Netherlands	7,46
Belgium	4,45	Greece	4,86	Belgium	4,86	Netherlands	4,87	Belgium	4,71
Greece	4,18	Belgium	4,56	Sweden	4,6	Belgium	3,82	Greece	3,82
Sweden	3,89	Sweden	3,53	Austria	2,9	Austria	3,45	Denmark	3,65
Austria	3,61	Austria	3,49	Denmark	2,66	Sweden	3,24	Sweden	3,23

	NMP		SEC		SPA		SSH		TPT
Germany	18,8	United Kingdom	12,75	Italy	15,7	United Kingdom	12,78	Germany	15,08
Italy	12,33	Italy	12,67	Germany	13,04	Italy	10,98	Italy	12,42
Spain	11,53	Germany	11,01	France	12,62	Germany	9,66	United Kingdom	11,85
United Kingdom	11,47	Spain	10,72	United Kingdom	12,14	Spain	7,95	France	11,53
France	8,21	France	9,08	Spain	9,21	France	6,24	Spain	9,43
Netherlands	4,87	Greece	5,72	Belgium	5,13	Netherlands	5,72	Belgium	6,02
Belgium	4,54	Netherlands	5,69	Netherlands	4,75	Belgium	4,78	Netherlands	5,97
Sweden	4,25	Belgium	4,6	Greece	3,58	Poland	4,26	Greece	4,63
Finland	2,92	Sweden	3,78	Austria	3,27	Austria	3,61	Sweden	4,07
Greece	2,68	Poland	2,95	Portugal	2,73	Hungary	3,53	Poland	2,84

The majority of both Coordinators and Participants come from the five "top class" countries, those with the highest numbers of organisations that participates to EU research projects. It is clear that

[21] Source: Eurostat Dataset Population. Mean 2007-2013: Germany 81.562.943,43 France 64.643.820,14 United Kingdom 62.517.228,29 Italy 59.073.067,43 Spain 46.198.968,57

countries with a large percentage of participations as partners confirm also a high participation rate as coordinator and vice-versa (Figure 25).

Figure 25 – Coordinator/Participant rankings by EU Member state

	Coordinators (%)		Participants (%)
Italy	15,59	Germany	14,81
Germany	14,90	United Kingdom	12,35
United Kingdom	13,42	Italy	12,17
Spain	12,58	Spain	9,94
France	7,83	France	9,08
Netherlands	5,82	Netherlands	5,90
Greece	5,30	Belgium	4,55
Belgium	3,97	Greece	4,48
Sweden	3,44	Sweden	3,63
Austria	3,35	Austria	3,12
Finland	2,37	Portugal	2,42
Portugal	2,00	Finland	2,40
Denmark	1,90	Poland	2,39
Ireland	1,75	Denmark	2,01
Poland	1,30	Ireland	1,59
Hungary	0,87	Romania	1,54
Slovenia	0,72	Hungary	1,52
Romania	0,65	Czech Republic	1,37
Czech Republic	0,58	Slovenia	1,16
Slovakia	0,33	Bulgaria	0,88
Cyprus	0,28	Cyprus	0,56
Luxembourg	0,25	Slovakia	0,56
Estonia	0,24	Estonia	0,44
Bulgaria	0,24	Lithuania	0,41
Latvia	0,15	Latvia	0,29
Lithuania	0,12	Luxembourg	0,25
Malta	0,05	Malta	0,18
	100,00		*100,00*

Figure 26 and

Figure 27 show a comparison of the positions of the top five ranked countries considering the number of coordinators and participants (Italy, Germany, United Kingdom, Spain and France) among different areas. The trends of all five countries are quite regular, except for a couple of peaks. Germany

excels in coordinators for Nanosciences and Nanotechnologies (NMP), whereas Italy coordinates more proposals in Space (SPA). On the opposite side, France records low performances in coordination in Social and Socio-Economic Sciences (SSH), while Spain in Health.

In

Figure 27 participants only are considered. The Nanosciences and Nanotechnologies sector (NMP) is again dominated by Germany, while similarly France and Spain lack respectively in Socio-

Economic Sciences and Health (SSH). Strengths and weaknesses in participation of the top five countries appear to be similar for both coordinators and partners.

Figure 26 – Participation of top five coordinators by scientific sector (%)

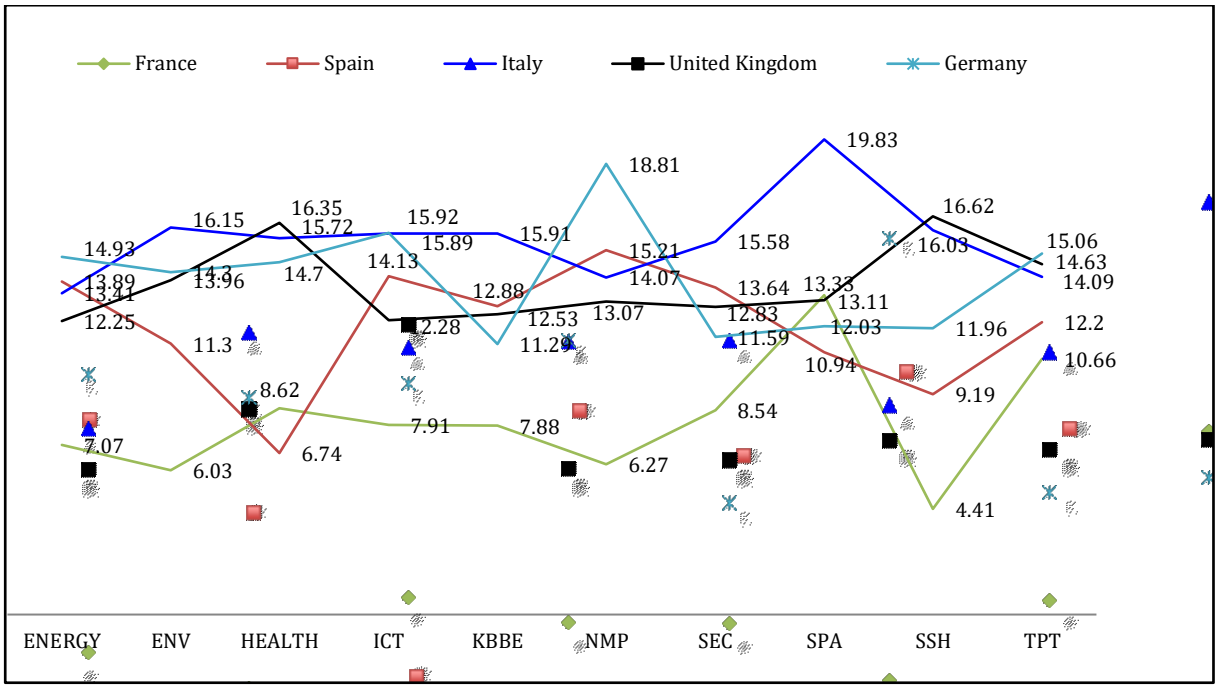
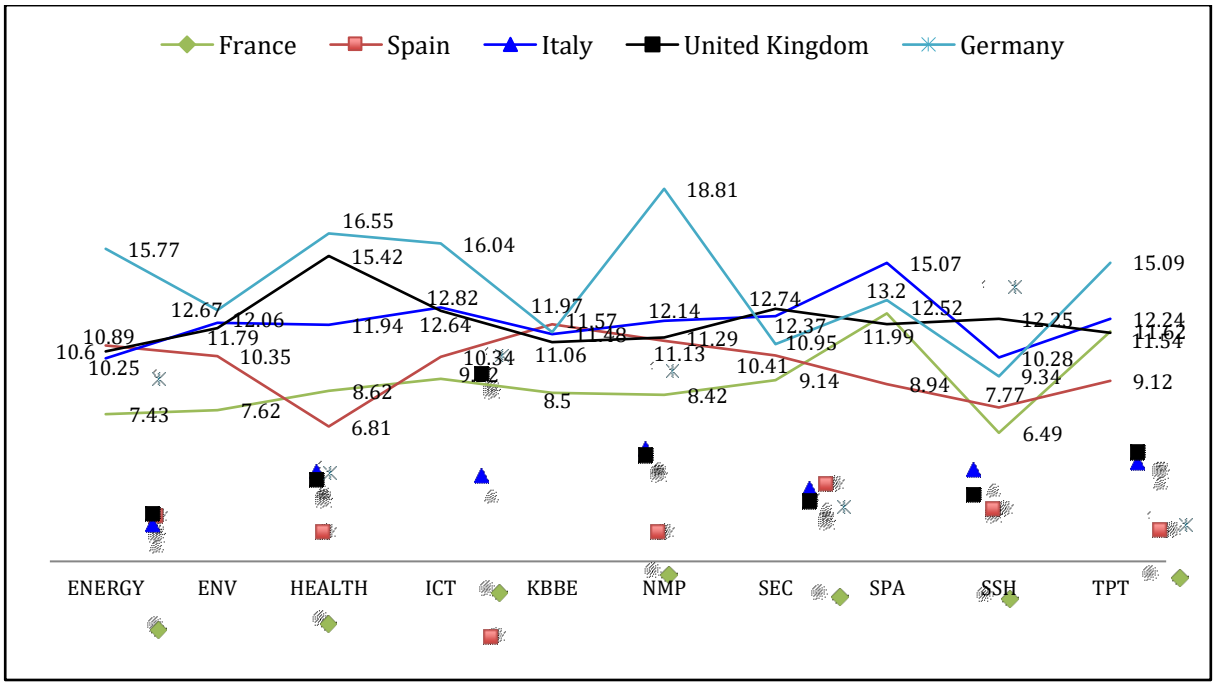


Figure 27 – Participation of top five participants by scientific sector (%)



5.4. Organization types

In this part we will analyse the organisations that compose research consortia and compete for EU funds. After a general observation, we focus on (1) their role in the network, (2) the EU country they are based in and (3) the scientific sector they apply for. At the end of the analysis, we concentrate on the top five countries in terms of number of applicants, crossing all the type of organisations and their scientific sectors in order to see if some pattern arises.

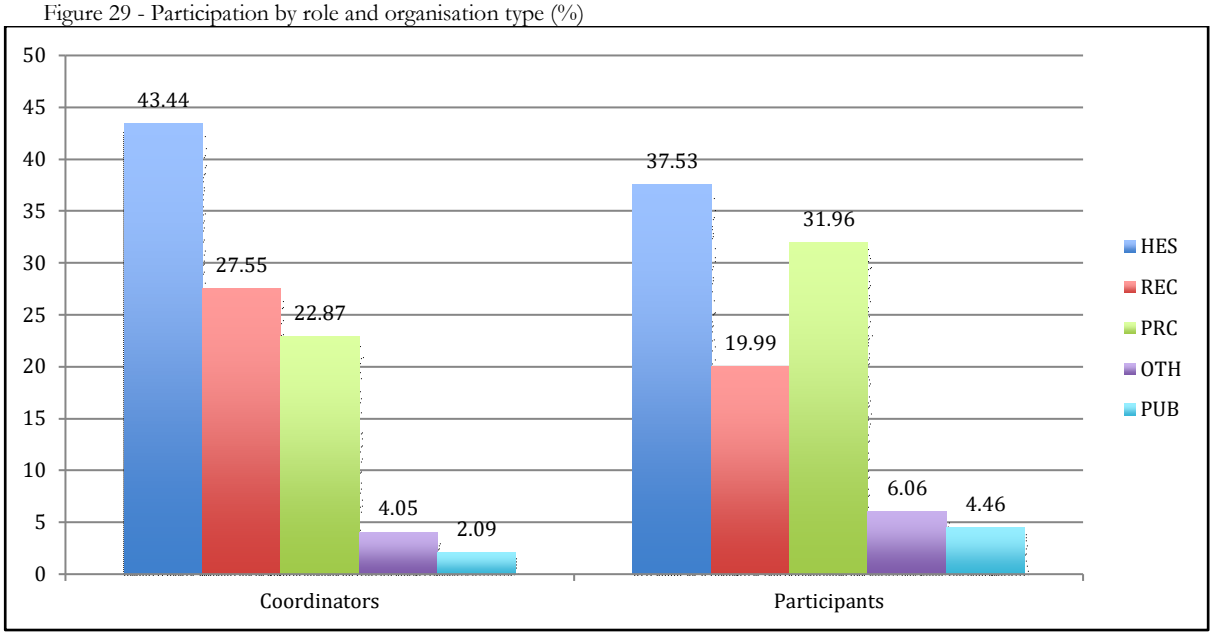
Focusing on the organisation types, we can estimate that more than 38% of participants are Universities (

Figure 28), 31% are Private Commercial organisations and 20% are Research Institutions. Other types of organisations and Public Bodies close the ranking with little participation. The interesting aspect is that Private organisations are considerably research-oriented in Europe, and this reflects the general objective of Framework Programmes to create a natural link between the world of scientific research and the private sector. These data show that some results in that direction have already been reached.

Figure 28 - Participation by Organisation type

	n.	%
Higher Education	138667	38,15
Private Commercial	112731	31,01
Research Institutions	75539	20,78
Others	2126	5,85
Public Bodies	15309	4,21
	363506	*100.00*

Figure 29 - Participation by role and organisation type (%)



Universities are the organisations that represents almost the 43% of the research project coordinators in FP7

Figure 29). They have personnel, administrative structures and enough experience to coordinate a project and this is due to the fact that EU, since the beginning, has tailored Framework Programmes to their features and skills. Private companies represent the third ring of the circle (22,87%) and public bodies and other types close the ranking with low rates of coordination. Focusing instead on the role of participant, we can see that something changes at the top of the model. Academia confirms its leadership, but enterprises hold on to second place, overcoming research centres. Between the two roles, the participant appears more appropriate for privates than the coordinator, considering that usually only big organisations have researchers and research management bodies within their workforce. They are also more likely to be engaged in operative Work Programmes (testing, developing, marketing etc.) as WP leaders, but under the supervision of the coordinator. In analogy with the coordinators, the participant group features public and other types of bodies in the last two places. In

Figure 30 we see how participants are distributed and if the country they are based in is member or not of the EU. European funding policies in research have had the aim of enhancing and developing research-oriented organisations, thus it is interesting to investigate the EU membership of a state affect

participation or success in research projects. The overwhelming majority (74,89%) of Higher Education Institutions (HES) that applied to the call for proposals in FP7 belongs to "old EU member states", and, similarly, large percentages of research centres (78,75%) and private organisations (81,43%) come from the same countries.

Figure 30 - Participation by EU membership status and type (%)

	candidate	mem new	mem old	no memb	Total
HES	2,19	9,26	74,89	13,66	*100*
	43,61	38,4	36,95	45,03	*38,15*
PRC	1,83	8,5	81,43	8,25	*100*
	29,52	28,65	32,66	22,11	*31,01*
REC	1,22	8,48	78,75	11,55	*100*
	13,18	19,17	21,17	20,75	*20,78*
OTH	1,8	12,41	72,29	13,5	*100*
	5,47	7,89	5,47	6,83	*5,85*
PUB	3,74	12,86	68,87	14,53	*100*
	8,21	5,89	3,75	5,29	*4,21*
Total	*1,92*	*9,2*	*77,31*	*11,57*	*100*
	100	*100*	*100*	*100*	*100*

If we exclude the few applicants come from both no EU Members and candidates there is a gap of participation between old and new member states, regardless of the participant type. This conclusion can be used as starting point for a new research line aimed at assessing the results of European public policies and funding policies in research, in particular in terms of European integration and spreading of research results, but it's not the case of the present work where we continue to focus on success.

5.5. Success: general observation at the aggregate level

As already defined in 3.4 success in research is a multidimensional concept. For the purposes of this study we start from the traditional definition of project success, conceived as the achievement of budget and performance goals in time. As we are actually dealing with research proposals and not with finalised

projects[22], the budgetary aspect is at the core of our analysis, and in particular the early stage of the budget life which consist of the moment in which it is granted from the European Commission to the research organisations partner of the selected project proposal. Therefore, in this research, we define a proposal as successful when the European Commission awards it with funds. By following this criterium, the variable we will be using in next chapters will be a dichotomous variable: value 1 indicates granted proposals, and value 0 non-granted proposals. When the grant agreement enters into force, the status of "proposal" ends and the real project begins.

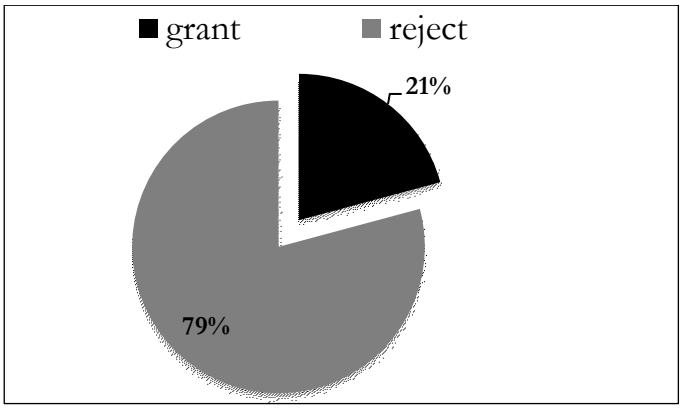
From a general overview of the FP7 success rate (

Figure 31), we can understand how highly competitive the research ground is in Europe. Only about one fifth (21%) of participating organisations has been granted. From this picture we start our attempt

[22] By others, the transition from proposal to real project is considered complete when the project is prepared by a project planner – who could be seen also as a project manager of the proposal – thanks to the collaboration of a network of partners, hypothesizing a reliable estimate of costs, with the time constrain of the submission deadline.

to decrypt the portion of granted organization with the aim at investigating on the determinants of their success.

Figure 31 - Overall Success rate (%)

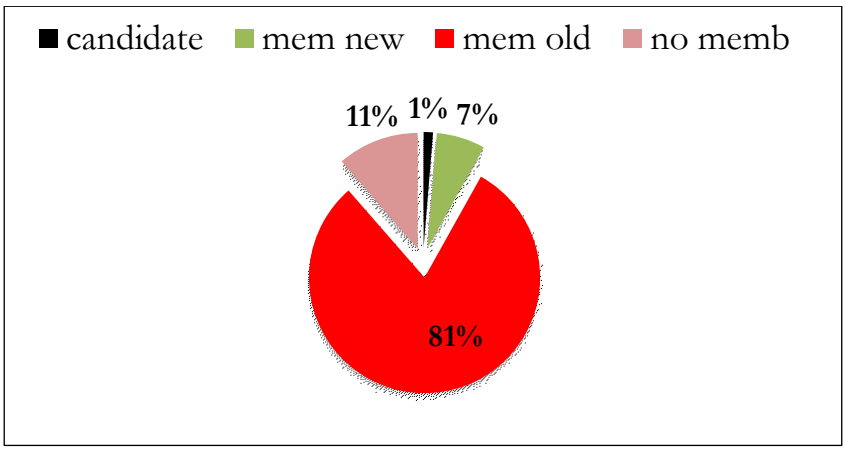


Trying to go more in depth in this framework, we observe how organisations are distributed for granted and rejected proposals, taking into consideration the same variables employed in the analysis of participation: the European membership of the state of the organisation, the role (coordinator or participant) the organisation apply for, the scientific area, and the legal status of the organisation. According to the participation scheme, European "old" member states collect the majority of the successful organisations (

Figure 32). In second place come organisations from countries with no member status (11%), followed in third place by "new" member states' participants (7%). Once again the same observation arises:

countries from outside the European Union benefit of grants for research – and at the same time collaborate with organisations from EU countries – more than countries with a recent membership.

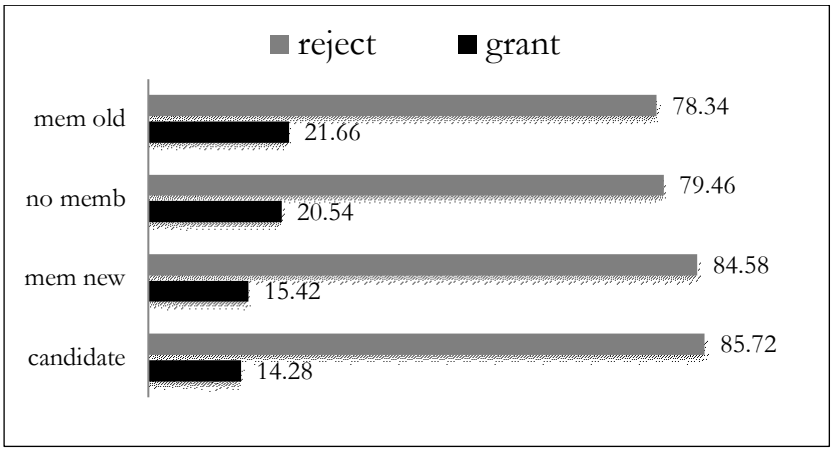
Figure 32 - Granted organizations per state by EU membership (%)



Taking into account the categories of state (by EU membership), we can see that organisations bases in "old member states" and in "Non-member states" are in line with the overall European trend of

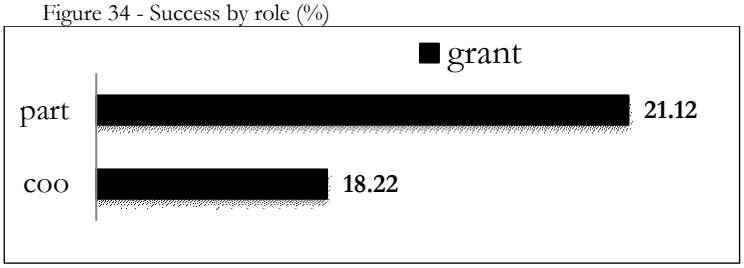
success (21,66% and 20,54%). Whereas organisations bases in "Candidates" and "New" member states are lower than the EU mean.

Figure 33 - Success by EU membership status (%)



If we consider the role of the organisation in the project, we observe that 21% of participant have been granted, whereas only the 18,22% of coordinators have been funded. This picture is not likely to interfere with an organisation's decision of engaging in a proposal as one or the other role. Admittedly, it will depend on previous experiences, coordination skills, the amount of resources at the network's disposal, and the affinity of the core activity of the organisation with the main scope of the project. Moreover, the predominance of granted participants over granted coordinators is clearly influenced by the size of the category, being the participants' group much larger than the coordinators' one.

Figure 34 - Success by role (%)



Again, the Euro Area collects the largest percentages of granted participants in research projects in respect of countries without Euro.

Figure 35 - Success in Euro area countries (%)

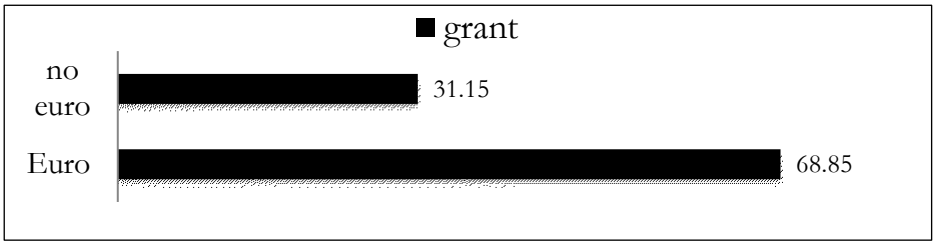
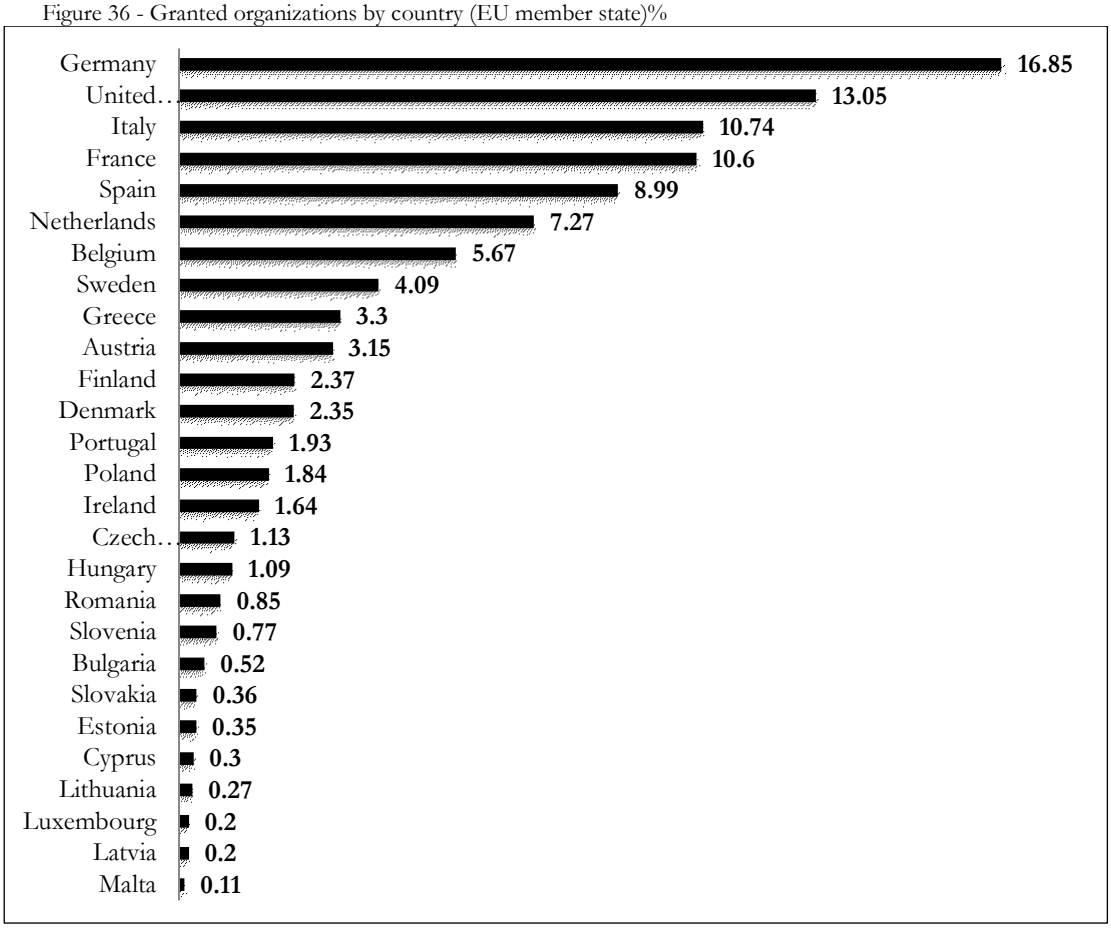


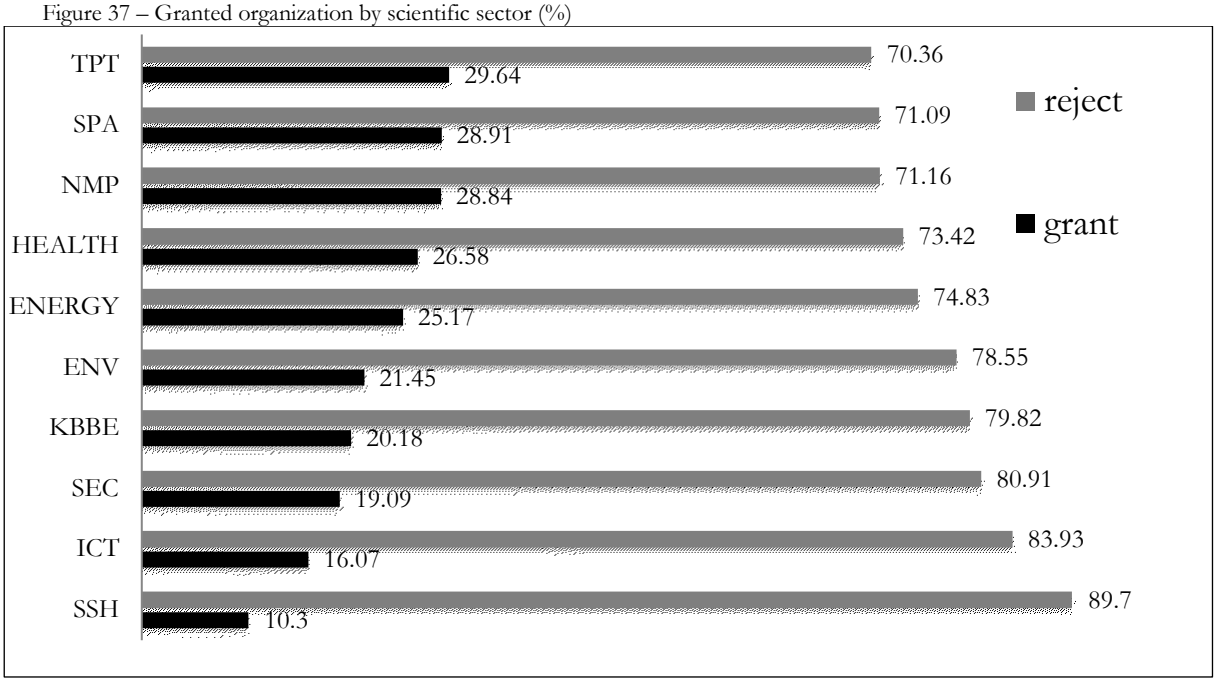
Figure 36 shows a ranking by country (EU member states) of granted organisations participating in research projects. The distribution among the top five countries that we have seen in the participation analysis is confirmed here. Germany, United Kingdom, Italy, France and Spain collect almost 60% of the funded research actors.

Figure 36 - Granted organizations by country (EU member state)%



The analysis of the success by scientific sector (Figure 37) shows a range of almost 20 percentage points between the lowest and the highest success rates. One out of three organisations participating in Transport proposals (29,64%) have been granted whereas only one out of ten in the Socio-Economic Sciences and Humanities (10,3%).

Figure 37 – Granted organization by scientific sector (%)



For the same reason explained above, given the strong ICT characterization of FP7, 27,15% of granted organisations belong to ICT sector and a lower number to health (13,52%) and Nanotechnologies (12,39%). The good performance of the Transport category in terms of success probability, is not confirmed by the share of funded participants, which is not impressive: indeed only the 12% belongs to this sector.

Figure 38 – Granted organizations by thema (%)

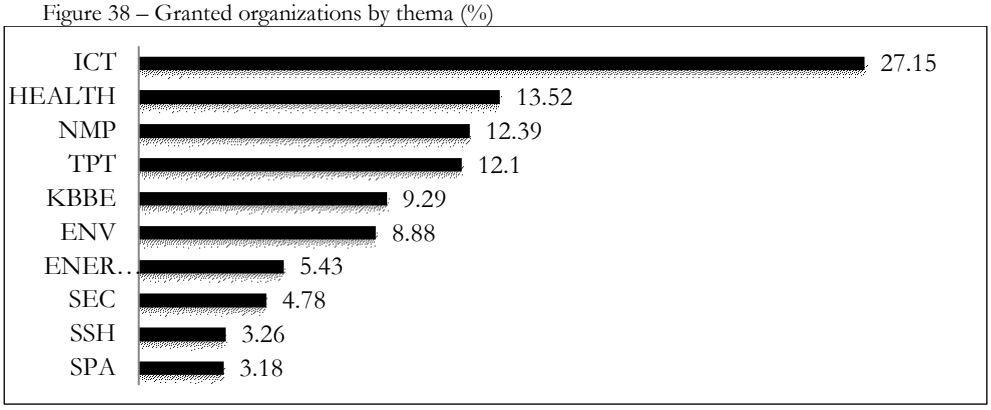
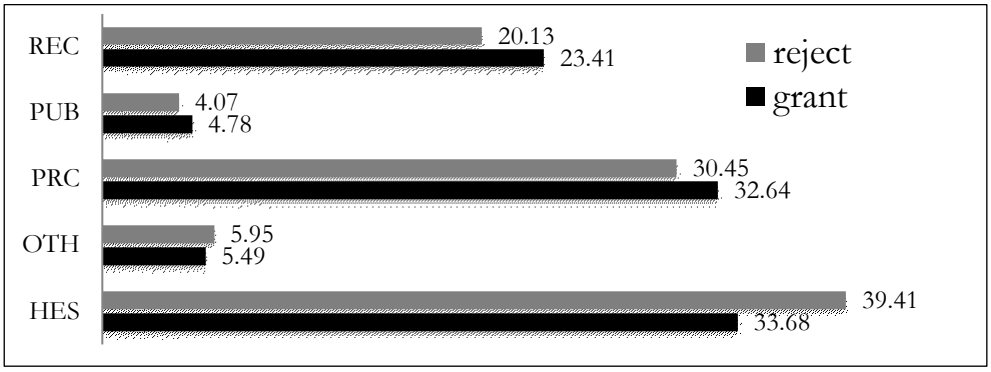


Figure 39 - Share of granted among types (%)



6. OPERATIONAL HYPOTHESES

Literature analysed so far and the experiences in the field of European projects suggest thinking to the planning phase as the strategic moment in which the project success takes origins. We have also observed that research players behave rationally, aiming at maximising their performances in research and innovation activities and competing for funds. They join in consortia with the aim to perform collaborative research in a competitive framework. The European Commission, in the role of referee, sets the rules, evaluates the proposals and awards the winners. The European Commission, as Institution of the European Union aims to stimulate EU member States to find solutions for the major challenges preventing social development, economic growth, health improvement and integration within the EU. This is why in this study research proposals has been analysed at the State level. Member states contribute to the EU budget proportionally to their own Gross National Income and keep receive back money according to EU Policies and relative multiannual financial framework. That's why governments pay growing attention to the national "operating budgetary balance"[23] trying to reduce their deficit or improve their income. For this reason, they adopt policies and invest resources to keep national research systems at high levels. In terms of rule for participation and evaluation of research proposals, there are no evidences that some variables at the national level drive the decisions of the European Commission to grant one proposal or another. Therefore the null hypotheses foresees that the more a proposals meet the requirements of the call and demonstrate the excellence of the research, the higher the possibility to

[23] The operating budgetary balance of each Member State is calculated as the difference between the operating expenditure (excluding administration) allocated to each Member State and the adjusted 'national contribution

be granted. No other variables neither at the national level, nor at the network and organisation levels are relevant for the success of a research proposal.

Nonetheless, some authors argue that states, through public policies on education and research, have an impact on the competition for the allocation of European Budget in the research sector. The weight of a State could be expressed in terms of financial commitment allocated to the research sector.

At the country level we propose the following operational hypotheses:

The annual investments of a State in Research and Development activities (Gross Expenditure on Research and Development - GERD) are considered to be strategic for the competitiveness of the research and development sector. Therefore, we hypothesize that (H1) the higher the amount of resources invested in R&D, the higher success rates competitive research of a State.

Since research activities belong to the tertiary education, we consider people graduated from Universities as the basin of the sector, from where human resources come. Therefore, the percentage of graduated from the tertiary education is considered to be strategic for a state. (H2) The higher the percentage of graduated students from the tertiary education, the greater the opportunity to select and employ valuable resources in the research sector is, with a clear impact on competitiveness of the whole system at the national level and success in research proposals.

The level of technology transfer related to the link between research and the market is an indicator of development of research and a clear achievement of one of the main goals of the research activity. At the state level it can be measured by the number of patent applications submitted to the European Patent Office (EPO) under the European Patent Convention. Since the development of a patent is often included in the research proposal, we hypothesize that States with a high number of patent applications

from R&D organisations, might have a high capacity to attract research funds, especially related to those calls where an high Technology Readiness Level (TRL) is requested. (H3) So the higher the number of patents, the more competitive the national research sector is.

Theories on networks claim that dimensions of networks and distance among the nodes account in the quality and quantity of relationships. Accordingly, we think that the geographical position of a member state within the EU might be relevant. Therefore, we consider the distance of each Member State's capital from Brussels as a proxy of the distance from the core of European Institutions and all the related formal and informal activities. (H4) The closer a state to the centre of the EU affaires, the higher the possibility of developing relationships, lobbing and join powerful research networks.

Another aspect related to the European dimension is the age of membership to the EU of a state. It is measured by the number of years since the State became member of the European Union. We suppose that States with "older" membership have developed stronger capacity to understand the mechanisms of the EU and the related allocation dynamics of funds for research. In a certain sense the age of membership means "expertise" at the state level played through institutional figures acting in the name of the national interest at the EU level. (H5) The longer a country is EU member, the more funds it is able to attract.

Framework Programmes, as well as funding programmes in general, have a bulk of rules and procedures to be followed and respected by all applicants and third parties. This aspect is often seen as a limit for the participation and the success of non-experts and new applicants. Therefore, the experience in managing applications, in consortia formation and in dealing with all the technical aspects of the

Programmes is supposed to be an important issue for the final result. This hypothesis claims that the longer experience organisations of a state have, the more successful their research proposals (H6).

Good performances in research depend on quality of the higher education systems but also on the quality of the secondary school system. Good students have more opportunity to learn the research basis and then to apply for a doctoral course. We suppose that research quality, then research success, depends on students' skills. The more skilled the students are, the best research performances are at the state level (H7).

We assume that scientific citations might be a good indicator of the strength of an Higher Education System (HES). So we use citations of the CWUR international ranking for measuring the impact of a HES. The more a Higher Education System has impact at the international level, the more successful their research proposal (H8).

(H9) According to the previous hypotheses, scientific collaboration and participation to research networks facilitate the achievement of excellence in research for Higher Education Institutions. Therefore we suppose that the more collaborative in research the more successful a state is.

In the following part we describe the variables, the data and indicators in order to develop the analysis for testing the hypotheses.

7. DATA AND METHODS

7.1. Evaluation of the Framework Programmes. Different methods for different aims

As defined by the European Commission "evaluation is a key Smart Regulation tool, helping the Commission to assess whether EU actions are actually delivering the expected results and ultimately improving conditions for European citizens and businesses and contributing to the EU's global role" (European Commission 2013). Evaluation is therefore an *ex-post* assessment, looking for causality. Depending on the timing two types of evaluations are distinguished: interim (or mid-term) evaluation, or final evaluation. The first is conducted whilst the intervention is on-going whereas the second on its conclusion. In some cases evaluation can be carried out several months (or years) after the end of the intervention. The term "evaluation" in the European Commission terminology, is used to designate a number of different concepts. More specifically in the research evaluation context the concepts of programme and proposal evaluation should be distinguished. Proposal evaluation describes the process of selecting proposals amongst those submitted for competitive funding whereas programme evaluation describes the activities used to assess the impact, the effects and the level of achievement of the objectives of a whole program..

In general terms the European Commission uses the definition of "evaluation" referring to policies and including procedures of assessment of legislation both during the legislative proposal lifetime (known as "impact assessment") and during the application of the law (achievement of policy objectives). Thanks to these assessment methodologies two reports explain very well the impact of the Framework Programmes: the EPEC report "Understanding the Long Term Impact of the Framework Programme" (European Policy Evaluation Consortium, 2011) and the "Manual for the evaluation of research in Innovation Programmes" (European Commission, 2015). The two documents analyse through indicators

and targets to what extent a whole program has met its general objectives: it's the field of policy analysis in terms of impact.

Our exercise instead, focuses more on the prodromal phase of a project that is the process leading to the selection of a proposal as relevant for achieving the specific objective of a single call.

7.2. The sample

Data used to analyse the success of research proposals in FP7 derive from CORDA, the data warehouse managed by the Research and Innovation Department of the European Commission. The software gathers all the data submitted by the applicants in FP7 proposals. A sample of about 37.000 proposals and 363.000 participants has been selected. Since collaborative research is implemented by research networks, the selection of the sample starts from a popular definition of networks: "a network consists of a set of actors or nodes along with a set of ties of a specified type that link them" (Borgatti e Halgin 2011). Accordingly, proposals with a single applicant[24] have not been included in the sample. As first step in the sample building, we have selected only proposals submitted under "cooperation" sub-programme, which was, by definition, the sub-programme in which collaborative projects were required and networks composed by different organizations merged to pursue common research goals. The second reason why Cooperation sub-programme has been chosen, is a financial aspect: it is the best mean representing the funding scheme of European research inasmuch the European Commission devoted to it the highest share of the overall FP7 budget (32 out of the global 50 billion euros). Third, the

[24] e.g. proposals submitted under the Ideas (ERC) and People (Marie Curie Actions) specific programmes refers to a single applicant, which is normally the hosting organisations rather than the individual applicant.

participation aspect: the number of calls for proposals launched under this sub-programme has been the overwhelming majority out of the total FP7. Accordingly, the number of applicants engaged in competition for getting funds through "Cooperation" reached more than 376.000 out of the total 601.024[25]. These numbers say that "Cooperation" has been the core of collaborative and transnational research activities funded by the European Commission in the period 2007-2013. As second step toward the sample definition we have excluded proposals submitted within specific calls labelled as "General Activities" (GA), "Joint Technology Initiatives" (JTI) and "Eranet" scheme. GA calls were tailored for ministries, regions, lands and more in general public authorities acting as national coordinators of research policies. Also participants of "Eranet" scheme were "programme owners", typically ministries or regional authorities defining research programmes, or "programme managers" such as research councils or other research funding agencies managing research programmes (as defined in the Cordis web site). Whereas JTI calls required, as eligibility criteria, a predetermined public-private network structure to be admitted. Therefore, since the competitive environment is one of the assumptions standing at the basis of our analysis and demonstrated by the literature (McKelvey e Holmén 2009), the reason why these three categories have been excluded is because they are not completely open to competition. Moreover, eligibility criteria for applicants are very restricting and the structure of the network were usually *a priori* defined thus within such calls, allocation of resources logics did not respect the same rationale as "Cooperation" calls. The third step of the selection deals with particular cases, which are proposals submitted by only one participant. This kind of proposals has been considered not interesting for our purpose for lack of network logic. Finally, considerations on lacking of conditions for proposals to be accepted at the first formal evaluation step, led us to exclude them from the sample because first they never effectively entered in competition with the others, second they never got the

[25] Data source: Seventh FP7 Monitoring Report (European Commission 2015).

final status of "granted" or "rejected" that is the discriminant condition to pertain to one of the two categories of our dichotomized dependent variable. According to this, proposals labelled as "non eligible" and "not invited at the second stage" (regarding calls where a two stage submission procedure was planned) have been excluded from the sample.

Figure 40 shows the size of the sample we use for our analysis. The entire FP7 and its sub-programme Cooperation are the basis for comparison. The sample includes, on average, the 91% of sub-programme "Cooperation" cases, which represent the 27% of the entire FP7 (compared with 29% of Cooperation) as proposals number and the 60% of participating organizations (compared with 62% of Cooperation). This size denotes a high representativeness of the sample and confirms that collaborative research is the core activity of the European Framework Programme and consortia are the main actors.

Figure 40 – Size and proportion of the sample

	FP7	COOPERATION Sub-Programme		COOPERATION SAMPLE		
		n°	% su FP7	n°	% su FP7	% su Coop
Submitted proposals	135.716	40.158	29,59%	37.949	27,96%	94,50%
Granted proposals	25.127	7.942	31,61%	6.833	27,19%	86,04%
Participating Organizations	601.024	376.519	62,65%	363.517	60,48%	96,55%
Coordinators	135.716	40.158	29,59%	37.949	27,96%	94,50%
Partners	465.308	336.361	72,29%	325.562	69,97%	96,79%
Granted organizations	130.801	84.330	64,47%	75.077	57,40%	89,03%
Granted coordinators	25.127	7.942	31,61%	6.833	27,19%	86,04%
Granted partners	105.674	76.388	72,29%	68.244	64,58%	89,34%

The sample is organized in a dataset with 363.517 records representing single participating organization per proposal (rows). Obviously each participant is repeated as many times as the number of proposals it has submitted within FP7, both as coordinator and as partner. Columns report variables about the proposal, the organization, the call, the network and the evaluation procedure. Description of single variables will be provided in the following parts, according to those used in the analysis.

7.3. Variables

At the beginning of the analysis we define the Dependent and Independent variables and after that we test if they meet the assumptions for multiple regressions. Then we will propose a regression analysis in order to test the hypotheses at the country level.

The dataset we use for the analysis at the country level is composed by 28 rows that represent 27 European countries (Croatia is not included, since its membership started from 1st July 2013) and a

general row labelled with "Others", reporting data related to all non-EU members countries. Columns represent variables reporting aggregated values per country from the original CORDA dataset.

DEPENDENT VARIABLE

The goal of the research is to find what determines the success. Therefore success is the dependent variable. We consider it as a dichotomous variable operationalized with the two conditions granted or rejected, according to the result of the evaluation procedure by the European Commission. The CORDA original database presents the variable "EVALUATION STATUS" with the following labels:

- "MAINLIST" – It means "proposal included in the main list for funding", so it is granted;
- "REJECTED" – It means proposal not granted;
- "RESERVE" - It means "reserve list". A small number of proposals, with high score but out of the awarding threshold, are usually labelled as proposals in the reserve list. They could be granted in case proposals in the "mainlist", for some reasons, cannot be granted[26]. Such event could happen several months later after the end of evaluation procedure. Accordingly, for the aims of this study, proposals in the reserve list are considered as rejected (that is what happen for most of them).

The three labels have been re-coded in numbers, as follows:

- MAINLIST = 1
- REJECTED and RESERVE = 0

[26] Reasons for not signing the grant Agreement by awarded networks consist of occurred opting out of partners or difficulties in the financial viability check from the Research Executive Agency (REA) or lack of some eligibility criteria.

In the original dataset each row is referred to a single partner organization, so the EVALUATION STATUS variable shows with value 1 successful organizations (those partners of consortia whose proposals have been granted) and with value 0 losers organizations (those partners of consortia whose proposals have been rejected). In order to measure and describe the overall success of a state we propose the following method. We consider the success of a state, according to three dimensions: 1. "internal" dimension 2. "external gross" dimension and 3."external net" dimension. Taking into consideration these three dimensions we can define the SUCCESS at the country level as follows:

INTERNAL SUCCESS is the ratio between the number of granted organization of a country and the number of all participant organizations of that state. It gives an internal dimension of the success of a state as no comparisons are made with other states. The formula for this variable is:

$$\text{IS} = \frac{\text{Country's number of granted organizations}}{\text{Country's number of participating organizations}}$$

EXTERNAL GROSS SUCCESS is the ratio between the number of granted organization of a country and the number of all EU member states' participant organizations. It gives an international dimension of the success of a state highlighting the share of successful organizations of a state in respect of the overall number of EU participants. The formula for this variable is:

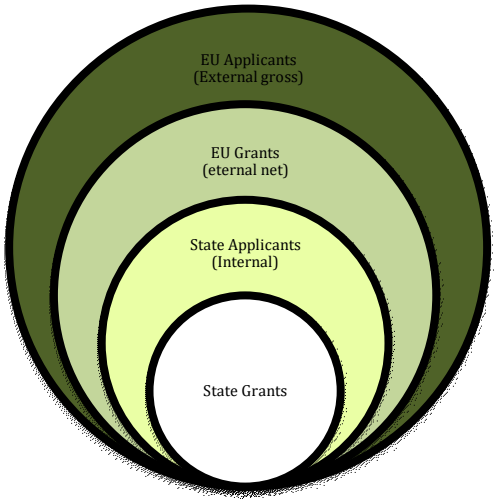
$$\text{EGS} = \frac{\text{Country's number of granted organizations}}{\text{EU number of participating organizations}}$$

EXTERNAL NET SUCCESS is the ratio between the number of granted organization of a country and the number of EU member states' granted organizations. Also this variable gives an international

dimension to the success of a state, but it puts in relations only successful organizations. The formula for this variable is:

$$\text{ENS} = \frac{\text{Country's number of granted organizations}}{\text{EU number of granted organizations}}$$

Figure 41: The three dimensions of the success of a State in EU projects



If we consider these organizations both as coordinators and as partners, we have six further sub-groups through which we can test if and how the role is relevant. The new variables are the following:

INTERNAL SUCCESS as PARTNER is the ratio between the number of granted organization of a country among those who have applied only as partners and the overall number of participant

organizations, that have applied only as partners. It gives an internal dimension of the success of a state related to the capacity to be partner in a research project. The formula for this variable is:

$$ISp = \frac{\text{Country's number of granted organizations as partner}}{\text{Country's number of participating organizations as partner}}$$

EXTERNAL GROSS SUCCESS as PARTNER: is the ratio between the number of granted organization of a country that have applied as partners and the overall number of all EU member states' participant organizations that have applied as partners. It gives an international dimension of the success of a state highlighting the share of successful research partners of a state in respect of the overall number of EU partners. The formula for this variable is:

$$\text{EGSp} = \frac{\text{Country's number of granted organizations as partner}}{\text{EU number of granted organizations as partner}}$$

EXTERNAL NET SUCCESS as PARTNER: is the percentage between the number of granted organization of a country that have applied as partners in FP7 proposals and the overall number of EU member states' granted organizations that have applied as partners in FP7 proposals. Also this variable gives an international dimension to the success of a state, but it puts in relations only successful partner organizations. The formula for this variable is:

$$\text{ENSp} = \frac{\text{Country's number of granted organizations as partner}}{\text{EU number of granted organizations as partner}}$$

INTERNAL SUCCESS as COORDINATOR is the ratio between the number of granted organization of a country that have applied as coordinator in FP7 proposals and the number of all participant organizations, that have applied as coordinators in FP7 proposals, of that state. It gives an

internal dimension of the success of a state related to the capacity to be coordinator in a research project. The formula for this variable is:

$$ISc = \frac{\text{Country's number of granted organizations as coordinator}}{\text{Country's number of participating organizations as coordinator}}$$

EXTERNAL GROSS SUCCESS as COORDINATOR: is the ratio between the number of granted organization of a country that have applied as coordinators in FP7 proposals and the number of all EU member states' participant organizations that have applied as coordinators in FP7 proposals. It gives an international dimension of the success of a state highlighting the share of successful organizations of a state, participating as coordinators in a consortia, in respect of the overall number of EU coordinators. The formula for this variable is:

$$\text{EGSc} = \frac{\text{Country's number of granted organizations as coordinator}}{\text{EU number of participating organizations as coordinator}}$$

EXTERNAL NET SUCCESS as COORDINATOR is the ratio between the number of granted organization of a country that have applied as coordinators and the number of all EU member states' participant organizations that have been granted as coordinators. Also this variable gives an international

dimension to the success of a state, but it puts in relations only successful coordinators. The formula for this variable is:

$$\text{ENSc} = \frac{\text{Country's number of granted organizations as coordinator}}{\text{EU number of granted organizations as coordinator}}$$

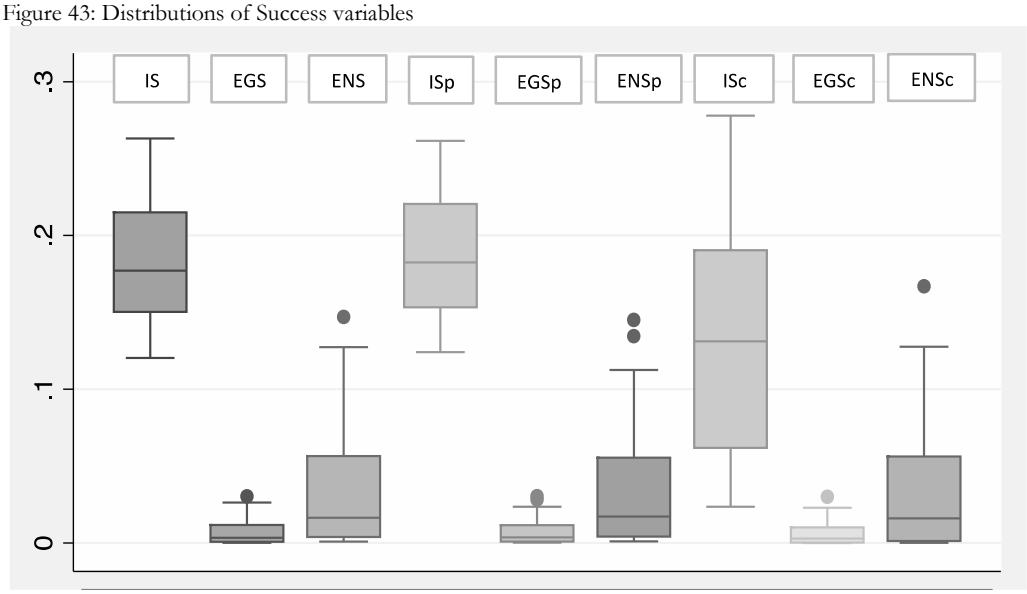
In light of running a multiple regression analysis using the variables above defined as dependent variables, we explore if our data meet the assumptions of linearity and normality.

Figure 42 and Figure 43 provide a summary statistic and a graph distribution of the variables. The three variables related to the internal dimension of the success (IS, ISp and ISc) have a quite symmetric distribution, except for the internal success coordinator that is slightly right skewed. All the others are not regularly distributed with a negative skewness and some outliers.

Figure 42: Descriptive statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
INTERNAL SUCCESS	28	.1845187	.0423738	.1203872	.2631504
EXTERNAL GROSS SUCCESS	28	.0073759	.0088766	.0001926	.0303755
EXTERNAL NET SUCCESS	28	.0357133	.04298	.0009324	.1470757
INTERNAL SUCCESS PARTNER	28	.1888337	.041803	.1241158	.261513
EXTERNAL GROSS SUCCESS PARTNER	28	.0074862	.0090018	.0002119	.030412
EXTERNAL NET SUCCESS PARTNER	28	.0357132	.0429438	.0010111	.1450824
INTERNAL SUCCESS COORDINATOR	28	.1332773	.0736113	.0235294	.2779758
EXTERNAL GROSS SUCCESS COORDINATOR	28	.0064306	.0084145	.0000264	.0300667
EXTERNAL NET SUCCESS COORDINATOR	28	.0357143	.0467326	.0001463	.1669838

Figure 43: Distributions of Success variables



The lack of normality of the six "external" success variables could represent a problem for the analysis. Moreover, considering the performance at the European level, the international dimension expressed by these six variables is one of the most relevant. As Peter claims (Peter 2016) this kind of data could be biased by the size of the countries. In fact, absolute values, in which numbers of participations are expressed, depend on the size of the state. Big states have a lot of organizations doing research and engaged in research activities and relationships, instead little states have smaller quantity of research organisations; accordingly, big states participate – and supposedly are awarded - more than little states etc. So that, as for the external dimensions, when data at the state level are put in relation with data at the European level – referred to both the role of partners and coordinators – that ratio is biased by the size of that state. In order to overcome this problem, we normalize the variables referred to each external dimension, by the size of the personnel employed in the research and development sector, by each state[27]. Obviously, normalization of the "Internal Success" variables does not provide any changes in results,

[27] Source: Eurostat. R&D Personnel % of total employment (mean 2007-2013)

given the fact that both numerator and denominator are divided by the same value. Whereas ENS and EGS are normalized by dividing the number of participants and coordinators at the EU level by the mean of the years 2007.2013 of the "R&D Personnel as percentage of total employed". The formula for the normalization is the following:

$$\mathrm{EGSnorm} = \frac{\text{Country's number of granted organizations/Country \% R\&D Pers.}}{\text{EU number of participating org./EU [mean } 2007 - 2013\text{] \% R\&D Pers.}}$$

Accordingly, EGSp, EGSc, ENSp and ENSc will be normalized with the same formula. After normalization Standard Deviations show an improvement of variance, which is good for estimating

determinants. Moreover, although some skewness and some outliers persist, normality of the distributions for the variables related to the external dimensions, is improved).

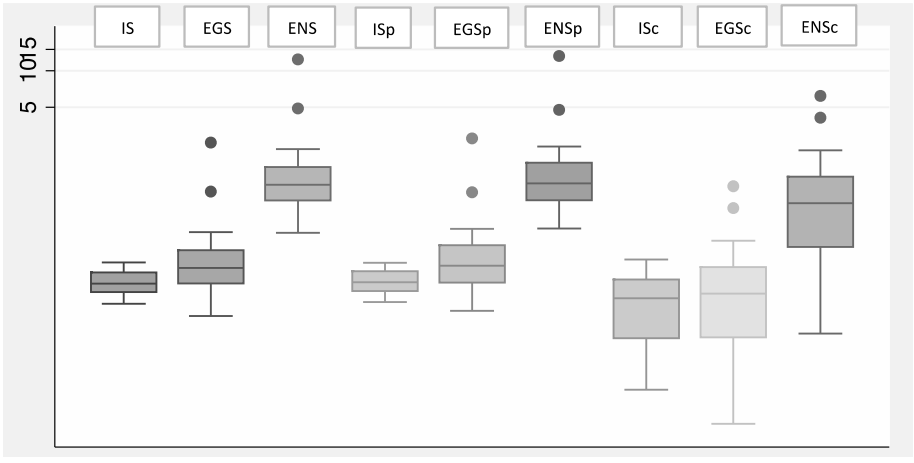
Figure 44 and

Figure 45).

Figure 44: Descriptive statistics of normalized variables

Variable	Obs	Mean	Std.Dev.	Min	Max
INTERNAL SUCCESS NORMALIZED	27	.1841322	.0431306	.1203872	.2631504
EXTERNAL GROSS SUCCESS NORMALIZED	27	.3625883	.4730534	.0953978	2.556131
EXTERNAL NET SUCCESS NORMALIZED	27	1.755624	2.290488	.4619087	12.37659
INTERNAL SUCCESS PARTNER NORMALIZED	27	.1877418	.0421905	.1241158	.261513
EXTERNAL GROSS SUCCESS PARTNER NORMALIZED	27	.3803762	.5097755	.105084	2.768078
EXTERNAL NET SUCCESS PARTNER NORMALIZED	27	1.814607	2.431914	.5013093	13.20528
INTERNAL SUCCESS COORDINATOR NORMALIZED	27	.1362072	.0733309	.0235294	.2779758
EXTERNAL GROSS SUCCESS COORDINATOR NORMALIZED	27	.2100442	.2365365	.0123157	1.116473
EXTERNAL NET SUCCESS COORDINATOR NORMALIZED	27	1.16654	1.313672	.0683987	6.20065

Figure 45: Distribution of normalized success variable (log transformation)



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INDEPENDENT VARIABLES

According to the literature we analysed before, the quality and the performances of the research system at the country level could be affected by several variables related to socio-economic issues, to European Union policies and to collaborative attitude of doing scientific research collaborating with other subjects and institutions. Referring to this framework we propose three groups of Independent Variables. The first group relates to economic and social capital invested in research at the state level and it is composed by (1) the Gross Expenditure in Research and Development [GERD] measured as share of the Gross Domestic Product of a country, (2) the number of graduated students of a country [GRADUATED], the number of Patents registered at the European Patent Register [PATENT] and the quality of the education system of a country measured through the OECD's Programme for International Student Assessment in 2012 [PISA,2012]. The second group includes variables related to the relationships with the European Union: the distance in kilometres of each Capital city to Brussels as proxy of closeness to the heart of the EU [BXL-DISTANCE], for how long a country has been member of the European Union [AGE of EU-MEMBERSHIP] and the administrative and technical experience a state has with the rules and procedures of EU Framework Programmes [STATE EXPERIENCE IN FPs]. The third group deal with the relevance of the higher education system of a State in terms of quality of research and scientific collaboration capacity and it is measures trough the citations of books, articles and scientific products [UNIV-IMPACT: CITATION] and the publications as a proxy of scientific collaboration of an authors at the country level [UNIV-COLLABORATION: PUBBLICATIONS]. A detailed description of each independent variable is provided below and a statistic description is provided in

Table 5.

GROSS EXPENDITURE ON RESEARCH AND DEVELOPMENT [GERD] - It represents the annual investments of a State in Research and Development activities. As defined in the Frascati Manual "Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications". It is calculated as the mean 2007-2013 (both included), which is the period corresponding to FP7[28] and relates to all sectors of performances. It

[28] except for 2014 of which data was not available at the moment of this work

is expressed as percentage of Gross Domestic Product (GDP) of the State. Data source is Eurostat and it has been extracted on the 19/12/2014.

GRADUATED – [GRADU] – It represents the share of graduated from tertiary education[29] on total population (no sex and fields distinctions) aged 20-29. It is calculated as the mean of the years 2007-2012 (both included) which is the period, with available data, that better fits with FP7. Data source is Eurostat and it has been extracted on the 19/12/2014.

PATENTS [PATENTS] – Data refers to the mean of patent applications to the European Patent Office from 2007 to 2012. The variable is a proxy for measuring the third mission of the Universities and Research Centres and their attitude to link with the private sector and the enterprises. Data source is Eurostat. Data extraction is 19/12/2014.

DISTANCE FROM BRUSSELLES [BXL DISTANCE] – It is the distance expressed in kilometres from the capital of a State to Brussels. This value is a proxy for closeness to the decision centre of the European Union. We assume that the more a state is close to the core of the decisions the highest is the legitimacy for policies for research and researchers. This assumption builds on the theory of Berezin and Diez-Medrano (Berezin e Diez-Medrano 2005) arguing for the importance of physical distance as it

[29] according to the definition of International Standard Classification of Education 1997

relates to issues of political legitimacy, therefore benefits for organisations in terms of quality of information, quality and quantity of relationships and networking, power of lobbing.

YEARS OF EU MEMBERSHIP [AGE OF EU MEMBERSHIP] – It is the number of years a State is officially member of the European Union. This value is a proxy for experience and expertise of dealing with EU affaires and policies, included funding for research. We assume the longer a country is member of the EU, the more its policies are in line with the European policies and this could positively affect the capacity to attract Funds in the research and development sector.

EXPERIENCE IN FRAMEWORK PROGRAMMES [STATE EXPERIENCE IN FPs]: Experience in Framework Programmes for a State is not only an issue of number of years. Also the number of research projects submitted by organisations of that state within EU Framework programmes matter. Moreover, the role each organization has in the network gives a salience to the experience. In fact, we assume that coordinators stay more in contacts than partners with the European Commission and other related bodies or agencies, improving their experience and knowledge. This is why we measure the State experience as the mean of the number of submitted proposals of all the organizations of that state. We obtain the value by weighting 1 proposals submitted as partner by an organization from that country and 1,5 proposals submitted as coordinator. This different value is justified by the need to give evidence to the greater experience a coordinator gain by leading the submission phase of a proposal with partners and EU related documents and practices.

QUALITY OF EDUCATION SYSTEM [PISA 2012] – This variable meaasures "the extent to which 15 year-old students have acquired key knowledge and skills that are essential for full participation in modern societies. The assessment, which focuses on reading, mathematics, science and problem-solving, does not just ascertain whether students can reproduce what they have learned; it also examines how well they can extrapolate from what they have learned and apply that knowledge in unfamiliar settings, both

in and outside of school" (OECD 2014) . For our purposes PISA is a proxy for the quality of the education system of a State that can be relevant for the quality of the skills of the academic students and then for young researchers. Obviously, this can have a great impact on the quality of the research and consequently to the achievements in research projects.

IMPACT OF THE HIGHER EDUCATION SYSTEM [UNIVERSITY IMPACT: CITATIONS] – This variable aims to measure the scientific impact of the Research System of the state at the international level. We use the Citation Indicator of the "Leiden Ranking" (labelled as Mean Citations)[30] measuring the average number of citations of the publications of a university, counted until the end of 2014 (author self-citations are excluded).

COLLABORATION CAPACITY [UNIVERSTY COLLABORATIONS: CO-AUTHORED PUBBLICATIONS] – It represents the share of university's publications that have been co-authored by two or more countries. We use the Citation Indicator of the "Leiden Ranking" (labelled as "PP-intcollab")

[30] Source at: http://www.leidenranking.com/methodology/indicators#sthash.WLHPavQ8.dpuf

[31] as a proxy for the strengths of collaborative research of a State. The higher the number of co-authored publications the bigger the capacity of a state to establish scientific collaborations with other states.

Table 5 provides a statistic description of the independent variables.

Table 5: Independent variables, statistic description

Variable	Obs	Mean	Std. Dev.	Min	Max
GERD	27	1.54	0.89	0.43	3.54
GRADU	27	6.17	1.72	2.05	9.72
PATENT	27	86.16	96.36	1.64	293.09
BXLdistance	27	1143.70	670.73	0	2.902
AGEOFMEMBE~P	27	26.96	21.33	6	61
ST_EXPERIE~E	27	2804.35	442.25	2190.60	3579.83
PISA2012	26	492.24	24.467	440.33	529.33
CIT_UNIV_I~T	18	1.14	.21	.76	1.42
PUB_UNIV_C~B	18	.46	.06	.36	.54

Although 6 out of 9 Independent Variables have 27 observations, one has them 26 and two (those related to the Higher Education System: publications and citations indexes) have only 18 observations. This is quite relevant in particular for what concerns the "small-n" problems related to the multiple regression analysis. There is not agreement in literature on the minimum size of the sample using the multiple regression analysis as method for predicting a phenomenon. Many rules-of-thumb have been proposed for determining the minimum number of predictors but any specification of some constant (e.g., 100 subjects) as the minimum number of subjects, or a minimum ratio between number of subjects and number of predictors, received general support. Green introduces a slightly more complex rule-of

[31] Source at: http://www.leidenranking.com/methodology/indicators#sthash.WLHPavQ8.dpuf

thumb that estimates minimum sample size as function of effect size as well as the number of predictors (Green 1991).

In this analysis we will check if the main assumptions for the multiple regression analysis are met.

7.4. Regression analysis

This part proposes a data analysis based on the linear regression (OLS regression). The goal is to find empirical evidence on the dependence of research project proposals' success from three groups of predictors: (1) state level determinants like the economic performances, (2) the quality of the education system and (3) the engagement with the European Union.

The model we propose comprises three levels: first we try to estimate the success for Universities and Research centres applying to EU call for proposals both in the role of Coordinators and Partners; at the second stage we consider them applying only as partners and finally we consider them applying only as coordinators. Each level shows results of the three dependent variables: the success rate at the national level (defined "Internal Success" - DV1) and the two success rates at the European level, one considering all the organisations that have applied to call for proposals (defined "External Gross Success – DV2) and the other considering only the "successful" organisations that have been granted by the European Commission (defined "External Net Success" - DV3).

We proceed with the same order from Level 1 (all applicants without any distinction between coordinators and partners) to Level 2 (only applicants) and finally to Level 3 (only coordinators). Preliminary tests in Level 1, checking if our data meet the regression assumptions (these tests are descripted in Methodological Note in the Appendix) suggest excluding three independent variables

among the nine proposed. In particular, the independent variables that do not meet the assumptions are Graduated, Patents and State Experience. We explain the reasons for such exclusions:

Independent Variable "Graduated" - At the Levels 1 to 3 of the analysis this variable shows lack of linearity with all the three dependent variables "Internal Success", "External Gross Success" and "External Net Success". But, more important, it is narrow correlated both with the three dependent variables at the three levels (sometimes it is also negative) and with the rest of independent variables (all Pearsons' r values < |0.272|). It is reasonable that the share of graduated from Universities on the total populations cannot be observed to estimate the value of a national research system at the European level.

Patents – Although some linearity with "Internal Success", this variable shows lack of linearity with both "External Gross Success" and "Net Success" at all the three Levels. Also the Pearson's r test confirms a high correlation with "Internal Success" ($r = 0.7640$ with $p<.05$ level of significance) but a low correlation with the other two dependent variables ($r = 0.2931$ both). The main reason for the exclusion of this variable is the collinearity detected by the Variance of Inflation (VIF) test. The VIF values for Patents, after regressing the three dependent variables with all the independent variables, are all three greater then 10. According to the rule of thumbs this is a clear signal of collinearity. Probably the prevalence in the Framework Programme of ICT sector, where patents are at the core, means that the variable is redundant in respect of other variables already included.

State Experience - Similarly to Patents, this variable shows linearity with the three dependent variables and high values of correlations with almost all the dependent variables at all the three Levels. Nonetheless its Variances of Inflation appear too high (16.63) suggesting excluding it for collinearity

problems. Indeed a new check of Variance of Inflation, after having excluded these three variables, shows regular values of the other variables.

After the exclusion of the three Independent Variables we try to predict the success. In Table 6 are shown data of applicants regardless the role in the proposal, in Table 7 are shown data only for applicants in the role of paricipants and in Table 8 only in the role of coordinators. For each of the three we take into account three different types of success: (1) internal success explains how successful an organisation is compared with all the organisations, from the same country, that submitted a proposal in the same Framework Programme; (2) external-gross success explains how successful an organisation is compared with all the other organisations from the EU that have submitted a proposal and (3) external-net success

explains how successful an organisation is compared with all the other organisation from the EU that have been granted from the European Commission.

Table 6: Success of organizations as participants (both coordinators and partners)

	INTERNAL SUCCESS APPLICANT	EXTERNAL GROSS SUCCESS APPLICANT	EXTERNAL NET SUCCESS APPLICANT
Gross Domestic Expenditure on R&D (% GDP)	.013 (2.15)*	-.000 (-0.23)	-.002 (-0.23)
PISA 2012	.000 (0.45)	-.000 (-0.12)	-.000 (-0.12)
Bruxelles distance	-.000 (-1.81)	-.000 (-0.84)	-.000 (-0.84)
Age of EU Membership	.001 (1.86)	.000 (1.40)	.001 (1.40)
University Impact: citations	.054 (1.59)	.004 (0.32)	.02 (0.32)
University Collaborations: pubblications	.099 (1.14)	-.067 (-2.03)	-.323 (-2.03)
Cons	.007 (0.05)	.039 (0.69)	.191 (0.69)
N	18	18	18
Adj R-squared	0.840	0.423	0.423

Table 7: Success of partners

	INTERNAL SUCCESS PARTNER	EXTERNAL GROSS SUCCESS PARTNER	EXTERNAL NET SUCCESS PARTNER
Gross Domestic Expenditure on R&D (% GDP)	.014 (2.26)*	-.000 (-0.23)	-.003 (-0.23)
PISA 2012	.000 (0.36)	-.000 (-0.09)	-.000 (-0.09)
Bruxelles distance	-.000 (-1.85)	-.000 (-0.84)	-.000 (-0.84)
Age of EU Membership	.000 (1.64)	.000 (1.38)	.000 (1.38)
University Impact: citations	.051 (1.50)	.003 (0.27)	.017 (0.27)
University Collaborations: pubblications	.079 (0.90)	-.065 (-1.98)	-.312 (-1.98)
Cons	.036 (0.24)	.038 (0.66)	.181 (0.66)
N	18	18	18
Adj R-squared	0.824	0.410	0.410

Table 8: Success of Coordinators

	INTERNAL SUCCESS COORDINATOR	EXTERNAL GROSS SUCCESS COORDINATOR	EXTERNAL NET SUCCESS COORDINATOR
Gross Domestic Expenditure on R&D (% GDP)	.007 (0.54)	-.000 (-0.19)	-.002 (-0.19)
PISA 2012	.000 (0.34)	-.000 (-0.41)	-.000 (-0.41)
Bruxelles distance	.000 (0.34)	-.000 (-0.79)	-.000 (-0.79)
Age of EU Membership	.002 (2.35)*	.000 (1.45)	.001 (1.45)
University Impact: citations	.147 (2.01)	.009 (0.73)	.051 (0.73)
University Collaborations: pubblications	.210 (1.12)	-.078 (-2.39)*	-.433 (-2.39)*
Cons	-.272 (-0.83)	.052 (0.373)	.291 (0.373)
N	18	18	18
Adj R-squared	0.7611	0.5145	0.5145

The share of Gross Domestic Product invested by countries on Research and Development is the variable that deserve more attention. If we look at the internal dimension of success, the more Countries invest in Research and Development the greater the share of Universities and research centres granted from the European Commission, in respect of those which fail their application from the same country. This is true both for applicants (regardless their role in the project) and for partners (Table 6 and Table 7), but not for coordinators (Table 8). It means that investments in R&D are somehow relevant for the success at least at the national level. Still at the national level "seniority" of a country in the European Union, measured as the age of the membership to the EU (Table 8), is relevant in order to have success as coordinator. Indeed, it confirms the operational hypotheses H4 that claims "the closer a state is to the centre of the EU affaires, the higher the possibility of developing relationships, lobbing and join powerful research networks". The same is not true for the general condition of participant and the role of partner. This make sense indeed: as we said, coordinators are well structured, highly skilled and experienced organisations, which attract European Commission's trust. It's quite straightforward that organisations from countries with a long history as founders of the European Union well know the rules and the bureaucracy more than others as well as sharing and supporting the same strategic objectives and priorities. Both the Expenditure on R&D and the age of EU membership helps to predict the success of research organisation at the national level but do not do the same when we upscale at the European level. Indeed, the regression tables do not show any significant variable for predicting success in the wider scenario composed by all the other European organisations competitors, neither in the generic role of applicant, nor as partner nor as coordinator ("Publications" is negative therefore has not meaning). The other variables included in the model are not good predictors of success for organisations in European Research Projects.

For what concerns the "External" aspect, considering all the applicants from the 27 European Countries (column 2 and 3 of Table 6, Table 7 and Table 8), the success of research organisation is not

predictable neither for participants nor only for partners or only for coordinators, therefore we cannot infer that European Countries which attract more EU funds for research and development than others, build their success on a specific strategy based on economic policies (investments), quality of education system (PISA results), performances of Higher Education Systems (citations and publications) and EU-related factors. Whereas at the national level, as we said, it is possible to say that investments on Research and Development as well as the "seniority" as member of the EU, are variable useful to predict how a state is able to attract funds through the participation of its research organisation to collaborative research actions promoted through EU Framework Programmes.

7.5. Success and State contribution to the EU Budget

In this last paragraph we propose to define the success of a state through a ratio between successful organisations and the contribution to the state to the European Budget. Then we replicate the regression analysis predicting success through the same Independent Variables we have described above.

More precisely success is calculated as a ratio between two percentages: at the numerator the share of granted organisation of a state over the total number of granted organisations of the EU; at the denominator the share of national contribution to the EU budget over the total EU Budget.

The formula of the "Success by Budget" (SB) is the following:

$$SB = \frac{State's\ number\ of\ granted\ organizations/EU\ number\ of\ granted\ organisations}{State\ contribution\ to\ EU\ Budge/total\ EU\ \ Budget}$$

The number of granted organisation of each state and the number of total EU granted organisations are absolute values (with origin from the same E-Corda Database) and their ratio has values ranging from

0 to 1. Similarly, the contribution of a state and the EU budget are expressed in Euro[32] and their ratio ranges from 0 to 1. For values of SB>1 we can consider the state as a good performer, indeed what it has received in terms of research funds from the EU (measured through the share of granted organisations as a proxy) is greater than what the state payed to the EU. On the other hand, when SB<1 the state is a bad performer. We assume the "Success by Budget" as the Dependent Variable.

Similarly to the previous analysis, we have checked if our data have met the assumptions for OLS regressions (See Appendix). This check demonstrates some issues of linearity between the Dependent

[32] Source: Operating Budgetary Balace, European Commission: https://ec.europa.eu/info/publications/operating-budgetary-balance-gni_en

Variable and the Independent Variables and also issues of correlations. Obviously, these problems affect the regression, in fact the results of Table 9 do not show any significance.

Table 9: Success by Budget

	Economic Success
Gross Domestic Expenditure on R&D (% GDP)	.07 (0.45)
PISA 2012	-.005 (-0.74)
Bruxelles distance	.000 (0.02)
Age of EU Membership	-.009 (-1.07)
University Impact: citations	.565 (0.64)
University Collaborations: pubblications	.823 (-0.37)
Cons	3.688 0.94
N	18
Adj R-squared	-0.186

Again, we can not conclude that the success at the national level, defined as a ratio between successful organisations and the contribution to the state to the European Budget, can be predicted by any of the independent variables above described.

8. CONCLUSIONS

The research in Europe has a long history that has been going hand in hand with the pathways of the oldest Universities. For a long period scientific research has been conceived as an activity to be carried on by single scholars but at the beginning of nineteenth Century, the German system, thanks to the Von Humboldt approach, reformed such concept by pushing scientists to discover new things while teaching students the fundamental laws of science. Nonetheless, elitism characterized Universities and research since the mid of twentieth Century. Starting with the European Coal and Steal Community (1952) six European Countries promoted research as main driver to boost coal and steel production and some years later research activities in the field of nuclear energy became strategic for several states: internationalization of scientific research was beginning in Europe. In 1984 the European Community, with the launch of the first Framework Programme (1984-1987) for research and innovation, started to play a more complex role than merely a coordinator. In fact, through the funding of research and innovation, the European Community become actually a policy actor. This role has become more and more important in the last decades, given the structural decrease of national funding systems for research and education. Universities and Research Centers rely more and more on European funds for research and development but, at the same time, there is a narrow understanding on what determines the allocation of such funds. We are not referring to the rules of participation and the evaluation procedures of research proposals. They are clear elements of the complex system based on a competitive approach: funds are allocated according to the relevance of the research proposal, the excellence of the research team, the impact on the society and the good management of the process (called implementation). Nevertheless, these parameters are not enough in order to better understand for a University, a research group or a single researcher, how to attract funds. Research proposals submitted by a consortium of organisations (Universities, Research Centers, Public bodies, private companies etc.) need to meet all the criteria asked

by the call and, after an evaluation, if scored over a certain threshold, are funded. We define the condition, for a project proposal, to be selected for receiving a grant as "successful".

The goal of this study is to find evidences of the determinants of the success of a research proposal, looking in particular at the "research proposal" stage within the 7th Framework Programme (FP7). In this phase potential partner interact one each other, mixing competences, planning to work together and committing to achieve the key objective. According to Gibson & Wang (2004) the more planning a project has, the more successful it will be.

By the analysis of the literature we know that FP7 has been highly effective in boosting excellence in science, in strengthening European industrial competitiveness and therefore in contributing to growth and jobs. Official monitoring and ex-post evaluation reports (European Commission 2015) (European Commission 2015) show a lot of data on the participation of universities, research centers and other organisations to the research activities funded by the European Union. Additionally, we know that the model of distribution of resources is strongly unbalanced. Indeed, the top 500 most funded organisations (with grants from 800 million euros to 13 billion euros per organisation), representing the 1,7% of all the FP7 applicants, received about the 60% of total funding of FP7. The 62% of this group is represented by Universities which received the 57% of the total FP7 budget. The second group is composed by 4.000 organisations representing the 19% of all the FP7 applicants that received about the 29% of the total budget (2,4 million each). Finally, the 80% of organisations (about 23.000) received about the 10% of the total FP7 contribution. Looking at this picture it is clear where funds go but it is difficult to understand what drives the allocation. At the national level we know that the size of the states' research systems affect the participation rates and, consequently, the resources distribution (Peter 2016), but any other factor has been highlighted and demonstrated. To this end we need to define when a project proposal can be considered "successful" and then to explore its pathway towards that goal. Freeman and Beal (1992) claim that success means different things to different people: architects consider it in terms of

appearance whereas engineers in terms of technical features. Differently, for accountant success means respect of the budget and chief executive officers rate the success as a value in the stock market. Literature on project management is quite fragmented on the issue of success, in fact Prabhakar, with a wordplay, argues that everybody agree on the fact that there is no agreement on what success is for a project (Prabhakar 2008). To our aims we cannot adopt neither any of the definitions focused on the implementation and finalization phases of a project (Rockart 1979), (Verma 1995) (Baccardini 1999) nor those based on the role of leaders and managers (Shenhar, et al. 2001) (Shenhar, Levy e Dvir 1997), rather we feel closer to what Freeman and Bale (1992) claim: success can be considered in terms of budget. According to the very initial phase of a project we are considering (from the idea to the submission), the first and most important milestone for a project is the fund raising. Therefore, looking at research proposals regularly submitted under a European Framework Programme call, the first unavoidable step is being funded by the European Commission.

This research aims to demonstrate empirical evidence on what determines success in research project proposals. The analysis is at the country level and the unit of analysis is the single organisation that submitted at least a proposal in FP7. The FP7 sub-programme Cooperation, the greater and most representative part of all the Programme.

In order to provide such evidence we investigate on two main dimensions that literature considers as strategic for achieving good results in research: (1) the competitiveness as system for allocating resources and (2) the quality and the reputation of the research system at the national level. For the first we start from the hypotheses that funds are randomly allocated by the EU, according to a competitive allocation system based on peer-review mechanism which grants the quality and excellence of each single research

proposal. For the second we start from the hypotheses that the higher the quality of national research systems, the greater the amount of funds on research and development, countries are able to attract.

The participation to FP7 is the first step in order to look at the success. Chapter 5 shows that the Cooperation sub-programme funded 65,6% of the granted participants, allocating nearly 28 billion euros which represents the 63.29% of the global budget: this is why it is the most interesting sub-programme to be explored for the aims of this study.

The popular feeling "the more you participate, the more you gain" seems not to be confirmed by data: in terms of granted organisations, Universities have the higher rate of participation (38%) but the lowest rate of success in terms of number of granted. On the contrary public bodies (except for public universities and schools) with the 4% of participation rate have the 30,3% of granted. Even if we look at participation and success rate by Country both in terms of number of granted organisations and of allocated funds, not always high levels of success correspond to high levels of participation. It's not the same picture if we consider allocated funds. Universities and research centres attract most of the funds, confirming the general scope of the Framework Programme for Research and Development. This means also that the quotes of funds for Universities and Research Centres within the granted consortium are greater than those for other types of partners (in fact usually Universities and Research Centres first of all are coordinators of such projects, getting more funds in respect of the other partners of the same

consortium, secondly a consortium is composed for the majority by universities and research centres than from companies or other kind of partners).

However, we can conclude that participation per se does not always – and not only - mean success. Variations in success are expected to depend also from other variables.

We propose to set this study analysing the State level. Member states contribute to the EU budget proportionally to their own Gross National Income and keep receive back money according to EU Policies and relative multiannual financial framework. That's why governments pay growing attention to the national "operating budgetary balance"[33] trying to reduce their deficit or improve their income. For this reason, they adopt policies and invest resources to keep national research systems at high levels. That's why some authors argue that states, through public policies on education and research, have an impact on the competition for the allocation of European Budget in the research sector.

For the ims of this analysis we use a dataset composed of a sample of proposals officially submitted under FP7. The dataset includes about 37.000 proposals and 363.000 participant organisations and the analysis is at the state level. The dependent variable measures the success of an organisation in receiving funds by the European Union. It is a dichotomic variable with values 1 when a proposal is funded and 0 when not. Three dimensions of success are considered, defined as follows: "internal", "external gross" and "external net". "Internal" represents ratio between the number of granted organizations of a country and the number of all participant organizations of that state, "external gross" is the ratio between the

[33] The operating budgetary balance of each Member State is calculated as the difference between the operating expenditure (excluding administration) allocated to each Member State and the adjusted 'national contribution

number of granted organizations of a country and the number of all the European applicant organisations (both granted and not granted) and "external net" ratio between the number of granted organizations of a country and the number of all the European granted organisations. For each of the three dimensions we first keep together the role of partner and of coordinator (defining participants regardless the role) then we isolate the two roles. Therefore, in addition to the three dependent variables described above we have six further dependent variables: internal success as partner, external gross success as partner, external net success as partner, internal success as coordinator, external gross success as coordinator, external net success as coordinator. Analysis of distributions and descriptive statistics show lack of normality of the nine variables, in particular for the six "external". To solve the problem, we normalize them by the percentage of Research personnel on total employees of a country avoiding the bias of the size of a state.

According to the literature, the quality and the performances of the research system at the country level could be affected by several variables related to socio-economic issues, to European Union policies and to collaborative attitude of doing scientific research collaborating with other subjects and institutions. Accordingly, we propose three groups of Independent Variables. The first group relates to economic and social capital invested in research at the state level and it is composed by (1) the Gross Expenditure in Research and Development measured as share of the Gross Domestic Product of a country, (2) the number of graduated students of a country, (3) the number of patents registered at the European Patent Register and (4) the quality of the education system of a country measured through the OECD's Programme for International Student Assessment (PISA) of 2012. The second group includes variables related to the relationships with the European Union: (5) the distance in kilometres of each Capital city to Brussels as proxy of closeness to the heart of the EU, (6) for how long a country has being member of the European Union and (7) the administrative and technical experience a state has with the rules and procedures of EU Framework Programmes. The third group deals with the relevance of the higher

education system of a State in terms of quality of research and scientific collaboration capacity and it is measured by (8) the citations of books, articles and scientific products and (9) the publications as a proxy of scientific collaboration of an authors at the country level.

Although 6 out of 9 Independent Variables have 27 observations, one has them 26 and two (those related to the Higher Education System: publications and citations indexes) have only 18 observations. A "small-n" problem could be observed but there is not agreement in literature on the minimum size of the sample using the multiple regression analysis (Green 1991).

The model of analysis wants to predict the success for organisations applying to call for proposals within a European Framework Programme by using the OLS regression. Predictors, at the state level, are the economic investments of the state in the field of research and development, the quality of the education system and the engagement with the European Union. First we estimate the success for organisations applying both in the role of Coordinators and Partners, then we only as partners and finally only as coordinators. Each of the three shows results for the success with a national perspective and with a European perspective.

The regression analysis does not confirm the overall validity of the model proposed except for the relevance of the investments on Research and Development and the "experience" the organisations of a State have in EU Framework Programmes. Therefore, although policies and investments in research and development together with the "seniority" of an EU Member State have a certain impact on the competitiveness of Universities and Research Centres, in general the other variables at the national level, do not allow us to predict success. This means that we can not infer that European Countries that attract more funds for research than others build their success on specific issues related to the education sector (publications and citations) or on the contribution to the European Budget. Indeed the analysis proposed

in this study does not confirm the allocation system of European resources for research based on determinants at the state level.

We conclude this study by proposing to scale down the level of analysis exploring the network level and the organisation level. These two further lines of research cannot be part of the present study basically because data available are not sufficient to clearly understand the characteristics of each applicant, the research team and the resources spent to write the proposal. Moreover, the network level needs relevant information on the dynamics behind the composition of the networks, the pivotal role of the most funded universities, the stability of relationships among different Universities or research groups. All the data needed to analyse these issues have to be gathered through an expert survey, it is not possible to use the official dataset we used for this study.

APPENDIX

Methodological Note

This note provides tables figures and all the data analysed and discussed in Chapter 7 and in particular the regression analysis at 7.4 and related check of assumptions. The software used for the data analysis is STATA (version .12). The model we propose comprises three levels. In the first level we estimate the success for all the Universities, Research centres and organizations in general, applying to EU call for proposals (FP7, Cooopreation Sub-Programme) both in the role of coordinators and partners. In the second level we consider only those who have applied as partners and in the third level we consider only those who have applied as coordinators. In order to give a size to these three groups of universities, research centres and applicants in general, the numbers of organizations included in each group are the following:

- Applicants, coordinators + partners: n° 363.517
- partners n° 325.562
- coordinators n° 37.949

The dataset includes 28 rows: 27 of them represents European member countries (Croatia is not included) and a onw row ("Others") reports data related to all non-EU member countries. Columns represent variables, listed and described in chapter 7.3, with aggregated values per country.

We propose this analysis in order to understand the determinants of the success of research proposals, submitted within a framework Programme, using the OLS regression. The following part is dedicated to check if our data meet the main assumptions of the regression. In particular we will test the linearity of the relationships between the independent variables and dependent variables. We will use a visual representation through a matrix picture. Then we will observe the correlations between both independent and dependent variables (for each level of analysis) and among the independent variables. After that we check for multicollinearity among independent variables, in order to be sure that all the proposed

variables of the model explain the dependent variable and, if the case, to exclude redundant variables. As final check, after having run the regressions, we will check the normality of residuals.

The following part proposes the check of assumptions for regression of the three levels: applicants (both coordinators and partners), partners and coordinators.

For each level we check for linearity between the Dependent Variable and we will predict the success of research proposals at the country level by regressing "Internal Success" [DV1], "External Gross Success" [DV2] and "External Net Success" [DV3] - the three dependent variables measuring the national and international dimensions of success - with the independent variables.

Before entering in detail with the three levels we test the correlations among the Dependent Variables and the three Independent Variables for each of the three levels. Table 1 shows an overview of the Pearsons' R coefficients.

Table 10: Pearsons' R coefficients

	APPLICANT (PART + COORD)			PARTNER			COORDINATOR		
	INTERNAL SUCCESS (Participants)	EXT GROSS SUCCESS (Participants)	EXT NET SUCCESS (Participants)	INTERNAL SUCCESS (Partners)	EXT GROSS SUCCESS (Partners)	EXT NET SUCCESS (Partners)	INTERNAL SUCCESS (Coordinators)	EXT GROSS SUCCESS (Coordinators)	EST NET SUCCESS (Coordinators)
GERD (% GDP)	0.7535*	0.3641	0.3641	0.7640*	0.3654	0.3654	0.6554*	0.3511	0.3511
	0.0000	*0.0619*	*0.0619*	*0.0000*	*0.0609*	*0.0609*	*0.0002*	*0.0726*	*0.0726*
	27	27	27	27	27	27	27	27	27
GRADUATED	0.1793	-0.0154	-0.0154	0.1874	-0.0105	-0.0105	0.0084	-0.0555	-0.0555
	0.3709	*0.9393*	*0.9393*	*0.3492*	*0.9586*	*0.9586*	*0.9667*	*0.7833*	*0.7833*
	27	27	27	27	27	27	27	27	27
PATENT	0.7643*	0.4532*	0.4532*	0.7678*	0.4533*	0.4533*	0.7175*	0.4485*	0.4485*
	0.0000	*0.0176*	*0.0176*	*0.0000*	*0.0176*	*0.0176*	*0.0000*	*0.0190*	*0.0190*
	27	27	27	27	27	27	27	27	27
BXL DISTANCE	-0.7033*	-0.4460*	-0.4460*	-0.7026*	-0.4472*	-0.4472*	-0.6172*	-0.4331*	-0.4331*
	0.0000	*0.0197*	*0.0197*	*0.0000*	*0.0193*	*0.0193*	*0.0006*	*0.0240*	*0.0240*
	27	27	27	27	27	27	27	27	27
AGE OF MEMBERSHIP	0.6879*	0.6943*	0.6943*	0.6781*	0.6918*	0.6918*	0.7755*	0.7097*	0.7097*
	0.0001	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0000*	*0.0000*	*0.0000*
	27	27	27	27	27	27	27	27	27
STATE EXPERIENCE IN FP	0.8579*	0.7334*	0.7334*	0.8592*	0.7331*	0.7331*	0.8543*	0.7312*	0.7312*
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
	27	27	27	27	27	27	27	27	27
PISA2012	0.6551*	0.2992	0.2992	0.6618*	0.2995	0.2995	0.5660*	0.2947	0.2947
	0.0003	*0.1376*	*0.1376*	*0.0002*	*0.1372*	*0.1372*	*0.0026*	*0.1439*	*0.1439*
	26	26	26	26	26	26	26	26	26
UNIV_IMPACT: CITATION	0.8444*	0.3728	0.3728	0.8364*	0.3693	0.3693	0.8662*	0.3978	0.3978
	0.0000	*0.1276*	*0.1276*	*0.0000*	*0.1315*	*0.1315*	*0.0000*	*0.1021*	*0.1021*
	18	18	18	18	18	18	18	18	18
UNIV_COLLAB: PUBBLICA	0.4740*	-0.3369	-0.3369	0.4636	-0.3343	-0.3343	0.3673	-0.3554	-0.3554
	0.0469	*0.1716*	*0.1716*	*0.0526*	*0.1752*	*0.1752*	*0.1337*	*0.1478*	*0.1478*
	18	18	18	18	18	18	18	18	18

Applicants (both coordinators and partners)

DV1: Internal Success

We start analysing the assumptions for the dependent variable "Internal Success". In order to check the assumption of linearity between the dependent variable and the predictors, we focus on the first

column of Figure 46. Except for two variables ("age of membership" and "graduated"), the relationships between Internal Success and the predictors show a good linearity.

Figure 46: scatter plot Internal Success (DV) with all the Independent Variables

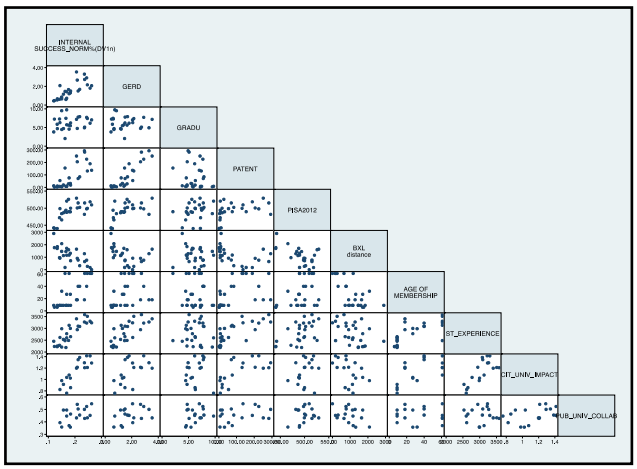

Table 11: Stata Output

Source	SS	df	MS	Number of obs =	18
				F(6, 11) =	15.82
Model	.022291693	6	.003715282	Prob > F =	0.0001
Residual	.002582872	11	.000234807	R-squared =	0.8962
				Adj R-squared =	0.8395
Total	.024874565	17	.00146321	Root MSE =	.01532

INTERNALSUCC~1n	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GERD	.0129276	.0060091	2.15	0.055	-.0002984	.0261536
PISA2012	.0001248	.0002797	0.45	0.664	-.0004908	.0007404
BXLdistance	-.0000177	9.82e-06	-1.81	0.098	-.0000394	3.88e-06
AGEOFMEMBERSHIP	.0005941	.0003198	1.86	0.090	-.0001099	.001298
CIT_UNIV_IMPACT	.0536956	.0337506	1.59	0.140	-.0205889	.1279801
PUB_UNIV_COLLAB	.0986387	.0868781	1.14	0.280	-.0925787	.2898562
_cons	.0074801	.1507816	0.05	0.961	-.3243879	.3393482

DV2: External Gross Success

Figure 47: Linearity

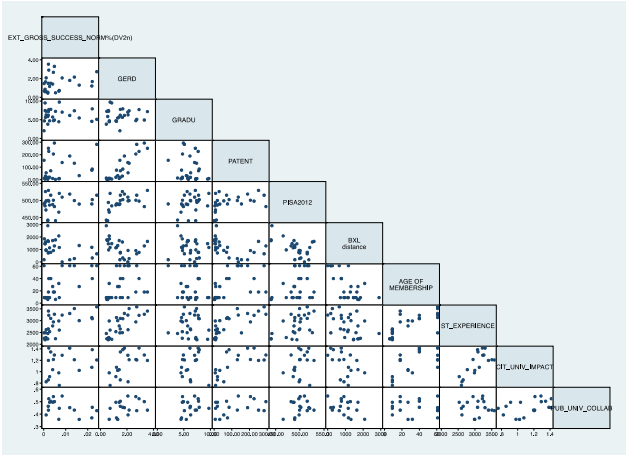

Table 12

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. regress EXT_GROSS_SUCCESS_NORMDV2n GERD PISA2012 BXLdistance AGEOFMEMBERSHIP CIT_UNIV_IMPACT PUB_UNIV_COLLAB

      Source |       SS       df       MS              Number of obs =      18
-------------+------------------------------           F(  6,    11) =    3.08
       Model |  .000622637     6  .000103773           Prob > F      =  0.0507
    Residual |  .000370555    11  .000033687           R-squared     =  0.6269
-------------+------------------------------           Adj R-squared =  0.4234
       Total |  .000993192    17  .000058423           Root MSE      =   .0058

------------------------------------------------------------------------------
EXT_GROSS_SU~2n |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------+----------------------------------------------------------------
           GERD |  -.0005167   .0022761    -0.23   0.825    -.0055263    .0044929
        PISA2012 |  -.0000131   .0001059    -0.12   0.904    -.0002462    .0002201
     BXLdistance |  -3.11e-06   3.72e-06    -0.84   0.421    -.0000113    5.08e-06
AGEOFMEMBERSHIP |    .000169   .0001211     1.40   0.190    -.0000976    .0004357
  CIT_UNIV_IMPACT |   .0040826   .0127837     0.32   0.755    -.0240541    .0322193
  PUB_UNIV_COLLAB |  -.0667064   .0329068    -2.03   0.068    -.1391337    .0057209
            _cons |   .0393842   .0571115     0.69   0.505    -.0863173    .1650856
------------------------------------------------------------------------------
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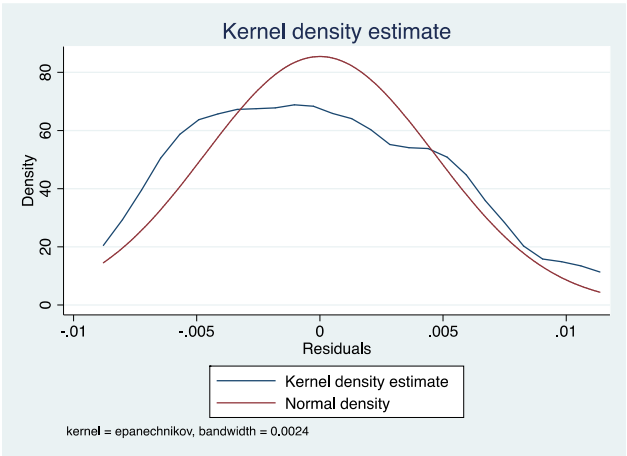
Figure 48: Residuals



DV3: External Net Success

Figure 49

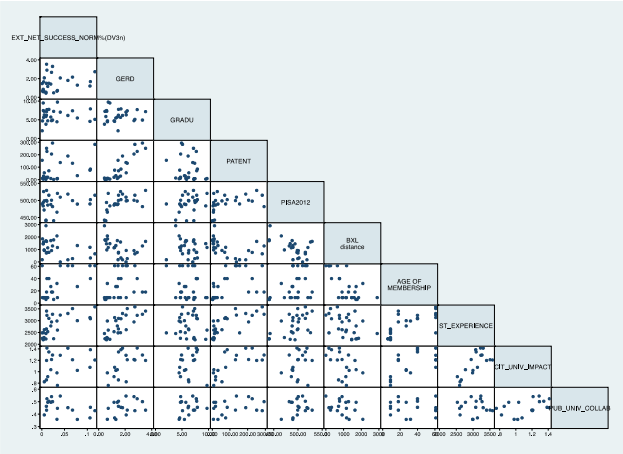
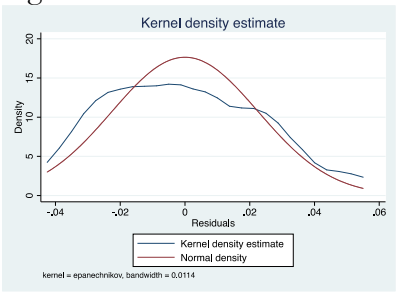


Table 13: Regression output

Source	SS	df	MS		
Model	.014597237	6	.002432873	Number of obs =	18
Residual	.00868737	11	.000789761	F(6, 11) =	3.08
				Prob > F =	0.0507
				R-squared =	0.6269
				Adj R-squared =	0.4234
Total	.023284607	17	.001369683	Root MSE =	.0281

EXT_NET_SUCC~3n	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GERD	-.002502	.0110206	-0.23	0.825	-.0267581	.0217541
PISA2012	-.0000632	.0005129	-0.12	0.904	-.0011922	.0010657
BXLdistance	-.0000151	.000018	-0.84	0.421	-.0000547	.0000246
AGEOFMEMBERSHIP	.0008185	.0005866	1.40	0.190	-.0004726	.0021096
CIT_UNIV_IMPACT	.0197674	.0618976	0.32	0.755	-.1164683	.1560032
PUB_UNIV_COLLAB	-.3229873	.159332	-2.03	0.068	-.6736748	.0277001
_cons	.190695	.2765292	0.69	0.505	-.4179417	.7993317

Figure 50: Residuals



PARTNERS

DV1: INTERNAL SUCCESS (partners)

Figure 51: scatter plot between DV and IVs

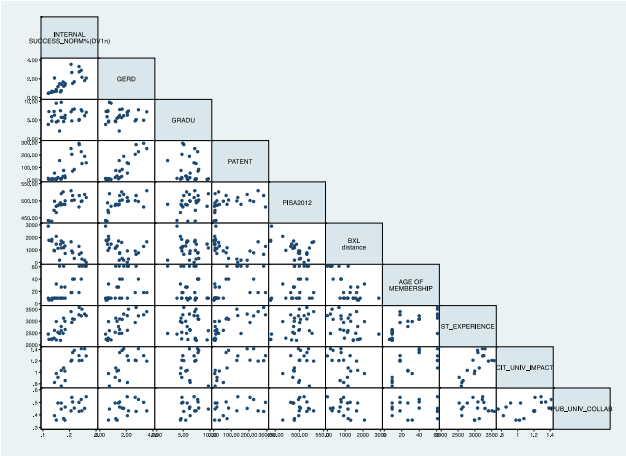
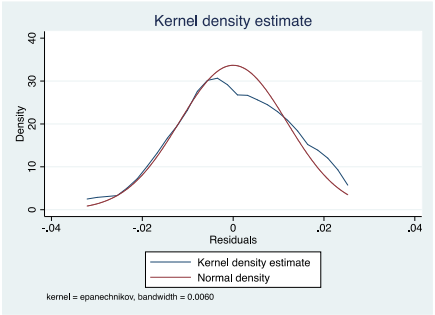


Table 14: Regression output

Source	SS	df	MS		
Model	.020447017	6	.003407836	Number of obs =	18
Residual	.0026211	11	.000238282	F(6, 11) =	14.30
				Prob > F =	0.0001
Total	.023068117	17	.001356948	R-squared =	0.8864
				Adj R-squared =	0.8244
				Root MSE =	.01544

INTERNAL_SUC~4n	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GERD	.013687	.0060534	2.26	0.045	.0003635	.0270106
PISA2012	.000102	.0002818	0.36	0.724	-.0005181	.0007222
BXLdistance	-.0000184	9.89e-06	-1.85	0.091	-.0000401	3.42e-06
AGEOFMEMBERSHIP	.0005279	.0003222	1.64	0.130	-.0001812	.0012371
CIT_UNIV_IMPACT	.0509724	.0339994	1.50	0.162	-.0238598	.1258047
PUB_UNIV_COLLAB	.0787903	.0875187	0.90	0.387	-.113837	.2714176
_cons	.0357875	.1518933	0.24	0.818	-.2985275	.3701025

Figure 52: Residuals



DV2: EXTERNAL GROSS SUCCESS (partners)

Linearity:

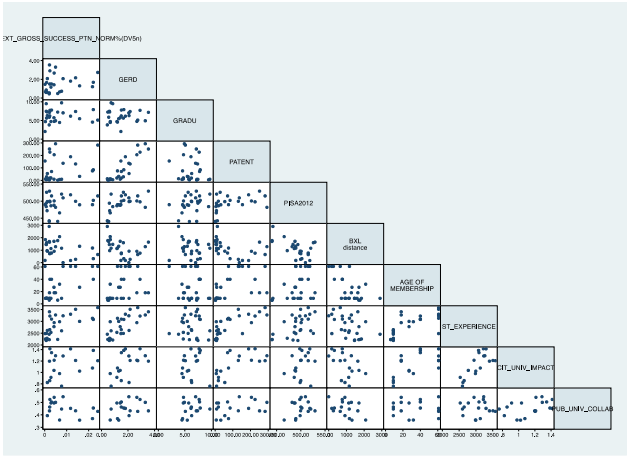


Table 15: Regression output

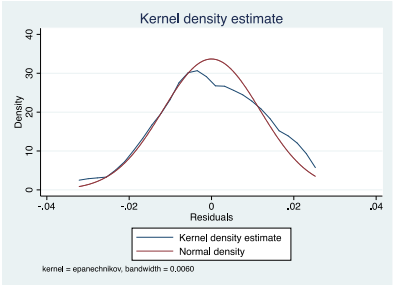
Source	SS	df	MS		
Model	.000605818	6	.00010097	Number of obs =	18
Residual	.000374062	11	.000034006	F(6, 11) =	2.97
				Prob > F =	0.0563
Total	.00097988	17	.00005764	R-squared =	0.6183
				Adj R-squared =	0.4100
				Root MSE =	.00583

EXT_GROSS_SU~5n	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GERD	-.000526	.0022868	-0.23	0.822	-.0055593	.0045072
PISA2012	-9.64e-06	.0001064	-0.09	0.929	-.0002439	.0002246
BXLdistance	-3.13e-06	3.74e-06	-0.84	0.420	-.0000114	5.10e-06
AGEOFMEMBERSHIP	.0001684	.0001217	1.38	0.194	-.0000995	.0004363
CIT_UNIV_IMPACT	.0034808	.012844	0.27	0.791	-.0247887	.0317503
PUB_UNIV_COLLAB	-.0654004	.0330621	-1.98	0.074	-.1381696	.0073689
_cons	.0378674	.0573811	0.66	0.523	-.0884274	.1641623

Table 16: Variance Inflation Factors

Variable	VIF	1/VIF
CIT_UNIV_I~T	3.64	0.274768
AGEOFMEMBE~P	3.10	0.322540
BXLdistance	2.19	0.457634
PUB_UNIV_C~B	1.91	0.523505
GERD	1.85	0.541544
PISA2012	1.42	0.704481
Mean VIF	2.35	

Figure 53: Residuals



DV3: EXTERNAL NET SUCCESS (partners)

Linearity:

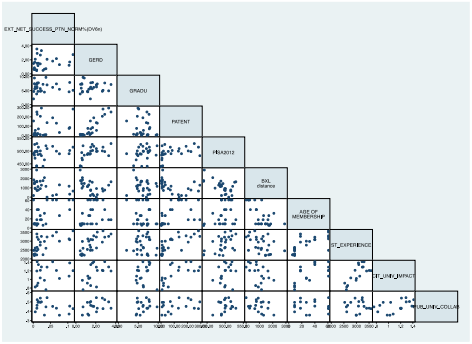
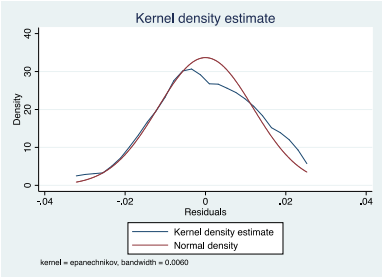


Table 17: Regression output

Source	SS	df	MS		
Model	.013787356	6	.002297893	Number of obs =	18
Residual	.008512983	11	.000773908	F(6, 11) =	2.97
				Prob > F =	0.0563
Total	.022300339	17	.001311785	R-squared =	0.6183
				Adj R-squared =	0.4100
				Root MSE =	.02782

EXT_NET_SUCC~6n	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GERD	-.0025094	.0109094	-0.23	0.822	-.0265208	.021502
PISA2012	-.000046	.0005078	-0.09	0.929	-.0011636	.0010716
BXLdistance	-.0000149	.0000178	-0.84	0.420	-.0000542	.0000243
AGEOFMEMBERSHIP	.0008035	.0005807	1.38	0.194	-.0004745	.0020816
CIT_UNIV_IMPACT	.0166053	.0612732	0.27	0.791	-.1182562	.1514668
PUB_UNIV_COLLAB	-.3119962	.1577247	-1.98	0.074	-.659146	.0351536
_cons	.1806488	.2737397	0.66	0.523	-.4218482	.7831458

Residuals



COORDINATORS

DV1: INTERNAL SUCCESS (coordinators)

Linearity:

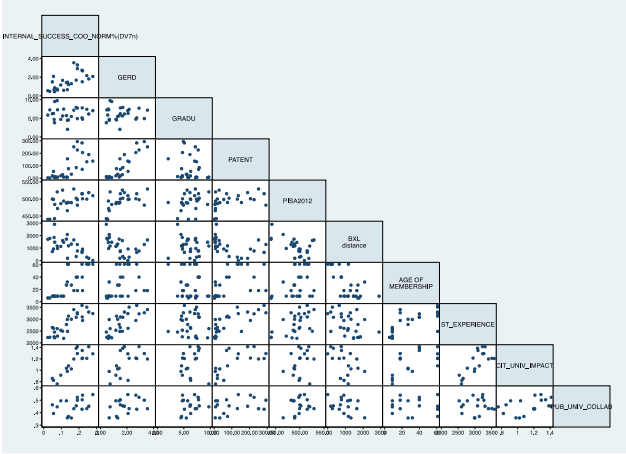


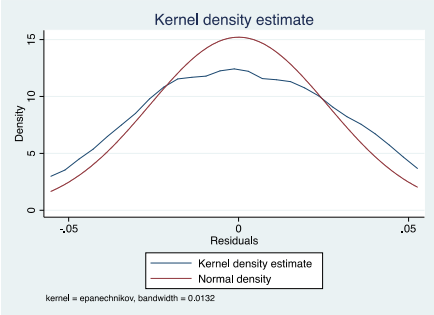
Figure 54: Regression output

Source	SS	df	MS
Model	.066070706	6	.011011784
Residual	.012081131	11	.001098285
Total	.078151837	17	.004597167

Number of obs = 18
F(6, 11) = 10.03
Prob > F = 0.0006
R-squared = 0.8454
Adj R-squared = 0.7611
Root MSE = .03314

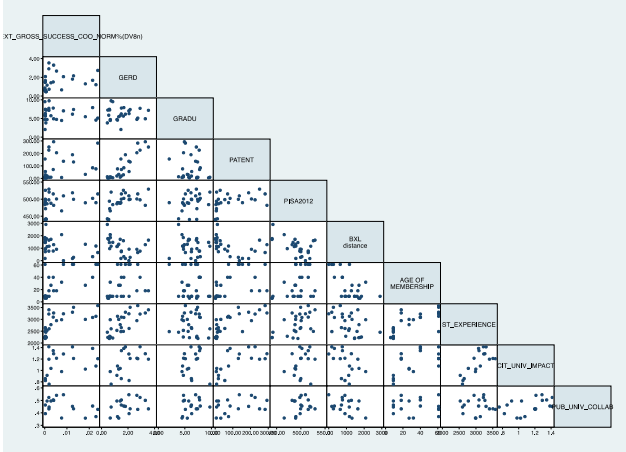
INTERNAL_SUC~7n	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GERD	.0069618	.0129961	0.54	0.603	-.0216424	.035566
PISA2012	.0002044	.0006049	0.34	0.742	-.0011269	.0015358
BXLdistance	7.24e-06	.0000212	0.34	0.740	-.0000395	.000054
AGEOFMEMBERSHIP	.001624	.0006917	2.35	0.039	.0001015	.0031465
CIT_UNIV_IMPACT	.1468276	.0729934	2.01	0.069	-.0138298	.307485
PUB_UNIV_COLLAB	.2100391	.1878939	1.12	0.287	-.2035127	.6235908
_cons	-.2720826	.3260999	-0.83	0.422	-.9898237	.4456585

Figure 55: Residuals



DV2: EXTERNAL GROSS SUCCESS (coordinators)

Linearity

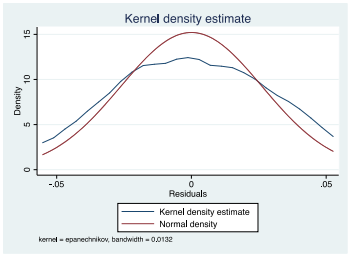


Regression without 2 DVs

Source	SS	df	MS		
Model	.000791472	6	.000131912	Number of obs	18
Residual	.000362477	11	.000032952	F(6, 11)	4.00
				Prob > F	0.0226
				R-squared	0.6859
				Adj R-squared	0.5145
Total	.001153949	17	.000067879	Root MSE	.00574

EXT_GROSS_SU~8n	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GERD	-.0004372	.0022511	-0.19	0.850	-.0053919	.0045175
PISA2012	-.0000424	.0001048	-0.41	0.693	-.0002731	.0001882
BXLdistance	-2.92e-06	3.68e-06	-0.79	0.445	-.000011	5.18e-06
AGEOFMEMBERSHIP	.0001743	.0001198	1.45	0.174	-.0000894	.000438
CIT_UNIV_IMPACT	.0092458	.0126436	0.73	0.480	-.0185825	.0370741
PUB_UNIV_COLLAB	-.0779217	.0325461	-2.39	0.036	-.1495552	-.0062881
_cons	.0524023	.0564855	0.93	0.373	-.0719216	.1767261

Residuals



DV3: EXTERNAL NET SUCCESS (coordinators)

Linearity

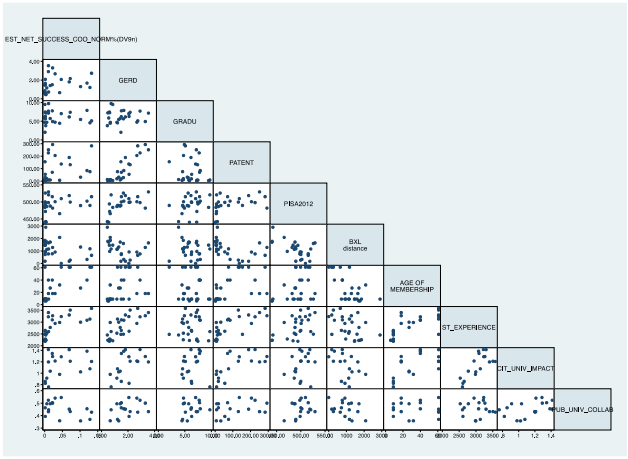
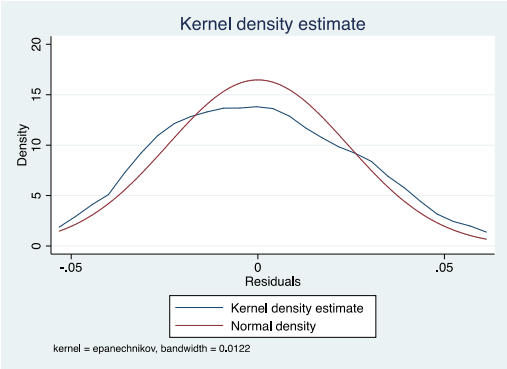


Table 18: Regression output

Source	SS	df	MS	Number of obs =	18
				F(6, 11) =	4.00
Model	.024412551	6	.004068758	Prob > F =	0.0226
Residual	.011180429	11	.001016403	R-squared =	0.6859
				Adj R-squared =	0.5145
Total	.035592979	17	.002093705	Root MSE =	.03188

EST_NET_SUCC~9n	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GERD	-.0024279	.0125023	-0.19	0.850	-.0299452	.0250894
PISA2012	-.0002357	.0005819	-0.41	0.693	-.0015165	.001045
BXLdistance	-.0000162	.0000204	-0.79	0.445	-.0000612	.0000288
AGEOFMEMBERSHIP	.000968	.0006654	1.45	0.174	-.0004966	.0024327
CIT_UNIV_IMPACT	.0513492	.0702197	0.73	0.480	-.1032034	.2059018
PUB_UNIV_COLLAB	-.4327601	.1807541	-2.39	0.036	-.8305972	-.034923
_cons	.2910308	.3137084	0.93	0.373	-.3994367	.9814983

Figure 56: Residuals



REGRESSION WITH NEW DV: External Net Success /EU Budget Contribution

Figure 57: Linearity

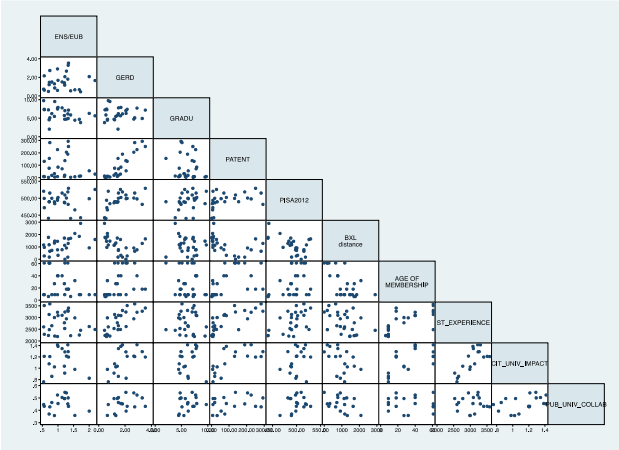
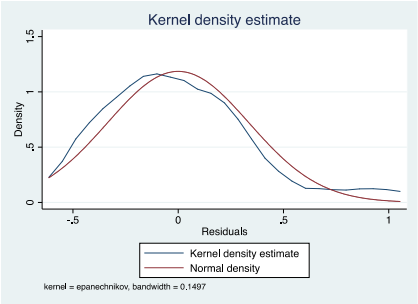


Table 19: Regression output

Source	SS	df	MS	Number of obs =	18
				F(6, 11) =	0.56
Model	.527169225	6	.087861538	Prob > F =	0.7569
Residual	1.73934556	11	.158122324	R-squared =	0.2326
				Adj R-squared =	-0.1860
Total	2.26651479	17	.133324399	Root MSE =	.39765

ENSEUB	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GERD	.070367	.1559382	0.45	0.661	-.2728506	.4135846
PISA2012	-.0053897	.0072581	-0.74	0.473	-.0213646	.0105852
BXLdistance	5.94e-06	.0002549	0.02	0.982	-.0005551	.000567
AGEOFMEMBERSHIP	-.0089068	.0083	-1.07	0.306	-.0271749	.0093614
CIT_UNIV_IMPACT	.5646468	.8758361	0.64	0.532	-1.363055	2.492349
PUB_UNIV_COLLAB	-.8232473	2.254509	-0.37	0.722	-5.785387	4.138893
_cons	3.688414	3.91282	0.94	0.366	-4.923644	12.30047

Figure 58: Residuals


Kernel density estimate
Density
0
.5
1
1.5
-.5
0
.5
1
Residuals
Kernel density estimate
Normal density
kernel = epanechnikov, bandwidth = 0.1497

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