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The economic and social value of fostering entrepreneurs in a regional system: the role of education

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Abstract

The aim of this paper is to investigate the role of education in spreading entrepreneurial culture at the regional level. Key items explored in the paper are: the focus and the scope of entrepreneurial education at the regional ecosystem level; what content and methodologies are consistent with the different phases of the education process; actors, relations and policies operating in the local ecosystem of innovation. On the basis of the existing literature and empirical evidence, the paper analyses: entrepreneurship as the main explanatory factor for the economic performance of a country; the potential of education in fostering entrepreneurship; the conceptualization of innovation and education as processes consistent with the perspective of ecosystems. Finally, the actors' relations and behaviours in the regional context are analysed in the light of enhancing the impact of education, from primary to post-graduate, aiming at the economic growth and social development of the community

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1 Introduction

It is widely recognized that entrepreneurship and innovation play a key role in economic development, at both the national and local levels (Andersson and Noseleit, 2011). This is due to the fact that new firm formation creates wealth and a significant number of jobs, impacting on social and economic development (Mitra *et al.*, 2011).

At policy level, recent documents by the European Commission (2010) and OECD (2010) have emphasized the importance of entrepreneurship and innovation to promote the development of member countries. The Green Paper launches a public debate on the key issues to be taken into account for future EU research and innovation funding programmes. Delivering on the widely supported Europe 2020 objectives of smart, sustainable and inclusive growth depends on research and innovation as key drivers of social and economic prosperity and of environmental sustainability. The aim of Cohesion policy is enhancing the capacity of regional economies to change and innovate through the creation of new knowledge based firms. This investment focuses on four key elements: R&D and Innovation, Entrepreneurship, ICT and Human Capital development (Europe 2020 Strategy).

There are good reasons to believe that entrepreneurship is an essential explanatory factor of the economic performance of a country and that the degree of productive entrepreneurial activity explains part of observed cross-country differences in economic performance (Davidsson and Honig, 2003). The authors point to the different domains of entrepreneurship research, delineating entrepreneurship as having both a scientific and a social dimension. In the past few decades, interest in the role of start-ups and small firms in employment growth and economic development has increased substantially. One reason is that several regions in advanced economies have experienced stagnation or decline in traditional manufacturing jobs. Stimulation of entrepreneurship in general and new business formation in particular are viewed as means to secure present and future job opportunities (Andersson and Koster, 2011).

As a result of these changes, during the last fewer decades, there has been an explosion of courses and degrees at several levels in the US. A recent European Commission (2008) document assesses the state of entrepreneurship education in higher education institutions[1] in Europe, comparing it to developments in the US. In Europe, entrepreneurship programmes only became popular in the curriculum in the early 2000s, although a handful of institutions had started earlier (Twaalfhoven and Wilson, 2004).

The main differences between entrepreneurship education in the US and Europe are: 1) the definition and focus of entrepreneurship: in the US, entrepreneurship generally refers to growth-oriented ventures or companies, while in Europe it is often equated with SMEs;[2] 2) the role of the university in the local innovation and entrepreneurial system: the university-industry relationship has become important due to the essential role played by technological progress in the economic development of countries. US universities foster networks with entrepreneurs, business-people, venture capitalists and business angels in the learning process. In Europe, most universities lack experience in technology transfer activity due to the fact that they maintain traditional structures that find it difficult to integrate new approaches; 3) the place of entrepreneurship education: while entrepreneurship is still not fully accepted as an academic

[1] Here, higher education institutions mean universities and business schools.

[2] Europe has a legacy of small and medium-sized enterprises (SME), many of them family-owned and many "entrepreneurship" programmes are actually SME training programmes that focus on functional management skills for small businesses (Zahra, 2005) rather than skills for building, financing and nurturing high-growth companies.

discipline in Europe, in the US many business and technology schools have created academic entrepreneurship departments and a large number of schools offer entrepreneurship courses. In Europe, entrepreneurship education is fragmented and often driven by external actors instead of by the education system. Fewer universities in Europe have academic entrepreneurship departments. Professors of entrepreneurship often teach within traditional disciplines such as economics or business administration; in this sense, most entrepreneurial courses and curricula are in economics and business universities. A recent study of entrepreneurship education in Italy confirms this: entrepreneurship education is rather underdeveloped and these results could be explained by the limited presence of entrepreneurship courses and curricula both in Italian universities and in higher schools. Only a few universities have courses or curricula dedicated specifically to entrepreneurship and these are concentrated within business faculties, very few exist in science and engineering faculties (Iacobucci and Micozzi, 2012). Moreover, the majority of the entrepreneurship professors are traditional academics, reflecting long-standing policies and practices in the university system.

The cornerstone of our work is that, in order to stimulate an entrepreneurial culture and pervade the social milieu in general, entrepreneurial education should be incorporated at several levels of education, starting from high school to university and business schools.

The aim of this paper is threefold:

1. to investigate different ways to spread an entrepreneurial culture at regional level with a specific focus on education, starting from the premise that a new entrepreneurial culture will be also achieved by incorporating entrepreneurship education in the existing university, business school and high school curricula, but also even earlier;
2. to launch the idea of identifying two main processes: education and learning on the one side, and innovation and technology transfer on the other, in order to enhance their interaction in the regional ecosystem to have the highest impact on social and economic growth;
3. to relocate entrepreneurial and management education in the innovation ecosystem by redesigning the roles of private and public actors.

2 Literature review

The analysis starts from the premise that, according to the GEM study (Global Entrepreneurship Monitor) (Bosma and Amorós, 2013), Italy reports the lowest index of entrepreneurial dynamics in the global ranking, and the lowest share of new high-tech firms compared with the main EU countries.[3] Even in the Marche Region the data concerning the new firm formations shows alarming results (Iacobucci and Micozzi, 2012).

This is in vivid contrast with the directions of Horizon 2020 which focus on knowledge-based innovation and promotion of a new entrepreneurial culture across Europe.

The hypothesis in this study is that education has a positive influence on entrepreneurship.

A review of the literature shows that several empirical studies find a positive effect of the level of education on the probability to become a nascent entrepreneur (Beugelsdijk and Noorderhaven, 2004; Davidsson and Honig, 2003; Landry *et al.*, 2002; Liñán *et al.*, 2011; Oosterbeek *et al.*, 2010; Raposo and Do Paço, 2011; Shane and Venkataraman, 2000; Venkataraman, 2004). Various forms of educational and social resources contribute differently

[3] The Global Entrepreneurship Monitor shows Italy with a total early stage entrepreneurial rate of 2.4% compared with the EU average of 4.8% (Bosma and Amorós, 2013).

to the dynamic processes of opportunity recognition and exploitation. Formal education is one component of human capital that might assist in the accumulation of explicit knowledge providing skills useful to entrepreneurs (Davidsson and Gordon, 2012). Formal education can affect the likelihood of entrepreneurial entry through the acquisition of skills and sorting people by ambition and assertiveness. The shape of the relationship differs somewhat across analyses. Davidsson and Honig (2003) for Sweden, indicate positive effects along the whole spectrum or towards the high end of education; on the contrary, US and international comparative analyses emphasize the under-representation as entrepreneurs of those with low levels of education, but with no further increase in the propensity to become nascent entrepreneurs above medium levels of education (Bygrave *et al.*, 2001).

The association between education and entrepreneurship depends also on the type of education. General business and technical skills can guide nascent entrepreneurs in setting up basic business functions and avoiding common mistakes. Formal education, as a credential, can also provide access to certain social networks (e.g., alumni networks) or serve as a positive signal for nascent entrepreneurs when evaluated by resource providers (e.g., venture capitalists). The social contacts generated through the education system favor the acquisition of resources to identify and exploit business opportunities (Eckhardt and Shane, 2003). Formal education is seen as providing the necessary cognitive skills to adapt to environmental changes (Hatch and Dyer, 2004). The analysis conducted by Micozzi (2013) using GEM data available from 2001 to 2007 for Italy, Netherlands, Belgium, France, Spain, UK, Denmark, Sweden, Norway, Germany, investigates the factors affecting the trend in entrepreneurial rate by countries. This study shows clearly that the differences among countries are based on their historical, cultural, social, economic and political heritage. In order to facilitate or enhance entrepreneurial activity in a specific geographical area, we need to know the mechanisms by which these peculiarities act in a local system. The empirical analysis is based on econometric estimates that compare the European average (as represented by the ten countries considered) with the values observed for Italy. The estimations are repeated splitting the sample of nascent entrepreneurs into high-tech and low-tech entrepreneurship. Taking the pooled sample, the first regression shows that level of education affects the probability to start a new business. The results show that there are some interesting differences between the Italian and European averages: level of education loses significance (this is not confirmed for high-tech new firms: having a degree improves the probability of starting a new firm in high-tech sectors by more than twice). The result is confirmed by the findings of the Eurobarometer survey of the low perception of Italian citizens of the role of their school education in promoting interest in entrepreneurship.[4]

The empirical analysis of the impact of entrepreneurial education shows that entrepreneurship education would help to influence culture and build enterprising economies (Matlay, 2005; Kirby, 2004), promoting an effective way to facilitate the transition of students from education

[4] The Eurobarometer report shows that an equal proportion of EU citizens agree and disagree that their school education helped them to develop a sense of initiative, or a sort of entrepreneurial attitude (49% of respondents "strongly agree" or "agree" while 49% of respondents "disagree" or "strongly disagree"). For Italy, Eurobarometer data show low perception among citizens of the role of their school education in promoting interest in entrepreneurship (e.g. by stimulating development of an entrepreneurial attitude) and preparing them to become entrepreneurs (e.g. by provision of courses that help develop the requisite skills for running a business). Roughly 4 in 10 agreed that their school education gave them the skills and know-how to enable them to become an entrepreneur (10% "strongly agree" or "agree"); just a quarter agreed that their education had made them interested in becoming an entrepreneur (6% "strongly agree" or "agree"). Finally, 11% of EU citizens strongly agreed and 33% agreed that their school education had helped them to better understand the role of entrepreneurs in society.

into work (Matlay and Westhead, 2005). In this sense, there is a need to understand how an entrepreneurial culture could be engendered through education, by identifying contextual factors, inputs into the system, educational processes and outputs (Pittaway and Cope, 2007), and by optimizing a culture of entrepreneurship in the locality, based on historical, cultural, social, economic and political heritage. If we start from the premise that entrepreneurship is the willingness and ability of individuals to identify and implement new business opportunities, we have to identify the factors that enhance that willingness and that ability. They depend on a number of personal, social and economic elements that are specific to different geographical area and local systems. In a study of entrepreneurial dynamics in Italy from 2001 to 2009, Cainelli *et al.* (2013) show that the level of entrepreneurial rates is different across provinces and shows strong persistence over time: provinces with high entry-rates in the past are most likely to have high levels of start-up activity in the future. This is true for most of the new firms in the manufacturing sector where the factors linked to the social and economic context are important and stable over the long time. The persistence observed in entrepreneurial rates could be explained as a sign of path dependence in entrepreneurial dynamics: the entrepreneurial rate decreases in Italy in the period considered, but in the province with a high level of manufacturing firms this fall is less relevant. In this sense, the structural factors that influence new firm formation at the local level are relevant. Therefore, there is a need to optimize a culture of entrepreneurship in the locality, based on its own historical, cultural, social, economic and political heritage. To facilitate or enhance entrepreneurial activity in a specific geographical area, we need to know the mechanisms enabling these factors, and also the specificity of these mechanisms in the local system.

Starting from this perspective, the paper assesses the educational policies required to foster entrepreneurship within a local perspective.

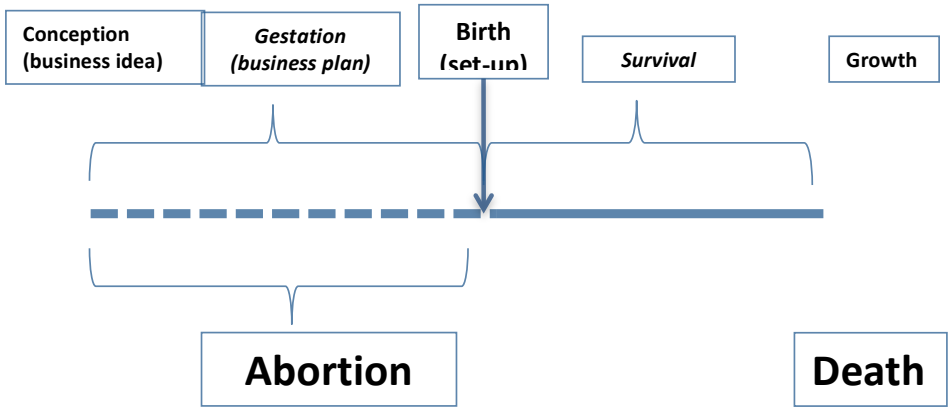
3 From the entrepreneurial process to the local ecosystem of innovation

People may decide to start businesses when and because they recognize specific entrepreneurial opportunities. Others may decide to start ventures and conduct a search for ideas. Entrepreneurs may recognize opportunities well in advance, or just before they set up their businesses. Consequently, the perception of opportunities relative to new business start-ups can take many different paths. The quantity and quality of the opportunities that individuals perceive, and their beliefs about their capabilities, may be affected by various conditions in their environment: for example, economic growth, culture and education.

Three major stages can be associated with the creation of new enterprises. The first is the decision of individuals, alone or in teams, to initiate the creation of a new firm – the conception of a new enterprise. The second is the organization and identification of the individuals and resources required to establish the new firm – the gestation or start-up process. The third is the culmination of the start-up phase with an operational new firm and the subsequent growth trajectory of the enterprise – the birth of the new firm.

There is a wide range of issues associated with the life-cycle of a business. It is important to know more about those individuals and teams that enter the process, what proportion actually complete the process by opening a new business, and what proportion of these new businesses have a high growth trajectory. For those concerned with maintaining a dynamic, competitive

Figure 1: *The process of business creation*



entrepreneurial sector, it would be useful to know what types of ambient conditions seem to promote greater levels of start-up efforts, and thus more nascent enterprises.

This conceptualization of firm creation (Figure 1) assumes that individuals pass through the first transition when they begin to take some action to create a new firm.

There are two potential second transitions: new firm creation or disengagement.

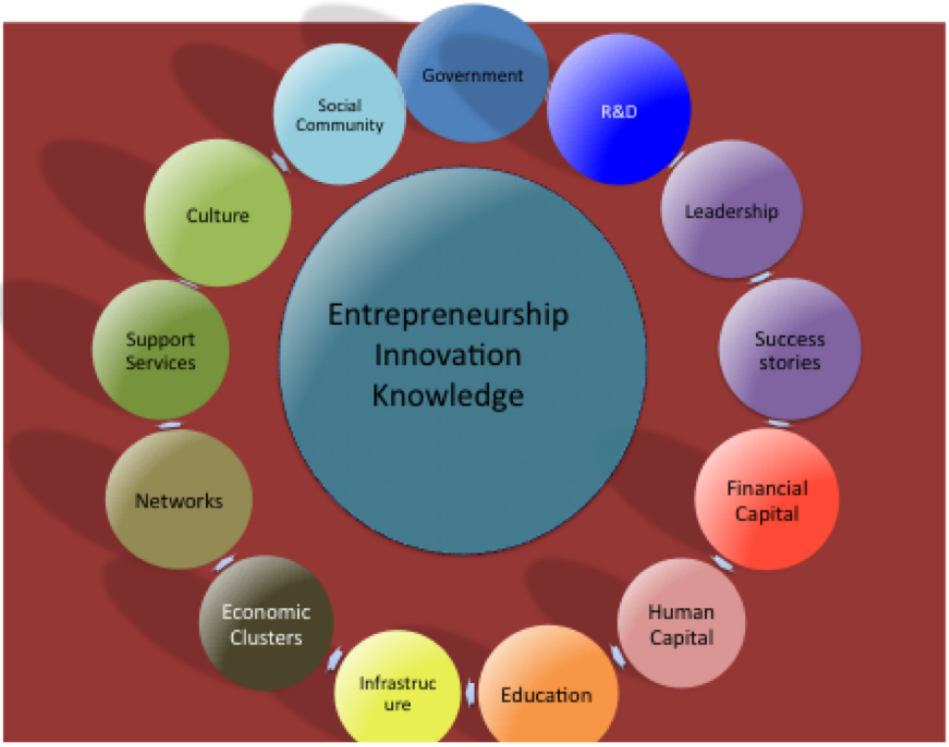
The entire firm creation process is considered to occur in a distinct social, political, economic and historical context. We refer to the economic and social context of the process of business creation as the entrepreneurial and innovation ecosystem. The first critical transition in the firm creation process is entry into the start-up phase. In this sense, the process of business creation happens within a economic and social context that we call entrepreneurial and innovation ecosystem.

A regional innovation system perspective allows us to capture the knowledge spillovers and their exploitation in the market. Harris (2011) shows that since the 1970s several models of regional growth have been proposed to explain the factors that ensure this. Harris first suggests demand-side approaches such as export-base and cumulative causation models, then a more recent version of the neoclassical model that considers the spatial dimension (such as New Economic Geography Models and Agglomeration Scale Economies), and finally, the innovation systems approach. According to this last, the inclusion of spatial factors emphasizes agglomeration economies and knowledge spillovers.

Identifying exact geographic boundaries is also important since spillover effects are limited by distance. A significant part of the knowledge that influences economic growth is tacit and is embedded in individuals and firms and the organizational systems in different locations (Gertler, 2003). Investments in knowledge and human capital endogenously generate economic growth through spillovers of knowledge. However, endogenous growth theory does not explain how or why spillovers occur. Braunerhjelm *et al.* (2010) present a model that shows how growth depends on knowledge accumulation and its diffusion through the activities of both incumbents and entrepreneurs, explaining that entrepreneurs are a missing link in the conversion of knowledge into economically relevant knowledge. Endogenous growth theory assumes that knowledge (normally defined as codified R&D) is automatically transformed into commercial activities. Braunerhjelm *et al.* (2010, p. 107) explain the missing link:

> "New knowledge indisputably leads to opportunities that can be exploited commer-

Figure 2: *The regional ecosystem of innovation and entrepreneurship*



Source: Elaboration from Babson model

> cially. Economic growth, however, requires that new knowledge has to be converted into economic knowledge that constitutes a commercial opportunity, a considerably more unpredictable and complex process. The nexus of opportunity and enterprising individuals is crucial in order to understand economic growth. This implies that knowledge by itself is only a necessary condition for the exercise of successful enterprise in a growth model. The ability to transform new knowledge into economic opportunities involves a set of skills, aptitudes, insights, and circumstances that is neither uniformly nor widely distributed in the population".

This implies that firm investment in R&D and human capital does not automatically result in the generation of knowledge that causes growth. These factors generate opportunities that economic agents have to recognize and commercially exploit in incumbent firms. In this sense, entrepreneurship is an important source of economic knowledge derived by transformation of knowledge that otherwise would have remained not commercialized. Thus, it is important to understand from where the endogenously created knowledge stems in the regional innovation system.

A regional innovation system is composed of economic agents (e.g. firms, private research institutes), institutional actors (e.g. education institutions, government departments, chambers of commerce), technological actors (e.g. technology transfer agencies) and social systems. The choice of regional dimension is because in Italy the innovation and entrepreneurship policy is mainly focused on the regional level (Figure 2).

4 Contextual background: the origin of the Marche Region ecosystem within a historical perspective

The regional production system in Marche (and in Italy generally) is undergoing profound changes brought about by both the external environment and by alterations to the internal economic and social milieu.

The Marche region is one of the most industrialized regions in Italy and is considered a region of excellence of both economic performance and cultural, natural, and social richness (Iacobucci and Micozzi, 2012). Marche belongs to what has come to be called the "Third Italy": a model of development based on SMEs located in industrial districts. Its economy is driven by the performance of myriad SMEs, characterized in the past by high levels of creativity and innovation. Since the 1950s, the Marche region has displayed strong entrepreneurial energy. The huge industrial developments in the region that occurred in the 1960s and 1970s, were the result of the high entrepreneurial vitality, characterized by the creation of small businesses specialized in different types of production and linked with other local enterprises within traditional industrial districts (Fuà, 1988). In the 1980s, Giorgio Fuà (1983) noted that the phenomenon of new entrepreneurship in the region was certainly remarkable for its quantity but not its quality. Entrepreneurs were often "share-croppers" (mètayer or *mezzadro*) who had transformed themselves into small businessmen. The farmer was the tenant of the land which was rented from the landowner. Many tenants abandoned their land and became entrepreneurs in industry or trade sectors, first undergoing an intermediate phase called "meta-share tenancy". In this phase, especially young people started working in factories, though they still lived with their peasant families. The new initiatives were characterized by their very small size, limited market orientation, and in many cases, were sub-supplier firms in the same geographical area as the original company. The nascent entrepreneur was competent in specific production areas, but lack of entrepreneurial 'quality' in organizational skills constrained the growth of these firms and their ability to create networks to obtain financial resources and human and material capital (Accornero, 1999; Favaretto, 1995).[5] In general, they were entrepreneurs with low levels of formal education. The results are SMEs with several characteristics which influence their development:

- founder's skills, competences, values, and culture required for the firm's evolution;
- founder often embodies the firm's technical know-how;
- founder's decisions strongly influenced by social and cultural factors;
- personal relationships and paternalistic attitudes play a key role in firm strategies and policies.

Although in some cases the region has shown unexpected resilience, it has been less entrepreneurially dynamic since the early 2000s: local production systems based on small firms have experienced increasing difficulty in ensuring the competitiveness of their production and the proper placement and remuneration of new recruits, in particular young people with higher level education (Onida, 2004).

The regional business model has gradually changed: the number of spin-offs from existing businesses has decreased in the last decade, especially in the manufacturing sector. At the same time, a new generation of entrepreneurs seems to be emerging with higher levels of formal education than in the past and even the 'process' of spin-out is more structured and

[5] Favaretto (1995) analyzes the productive relationship between small firms focusing on technology, market form, evolution in demand, supply changes.

includes people, both internal and external to the company, who are involved in launching new initiatives. Even in the case of academic spin-offs, we observe the presence of entrepreneurial teams made up of several people with complementary skills and resources. This is a significant change from the traditional model of entrepreneurial activity, which associated the new business either to a single person or to members of the same family.

According to an OECD report on SMEs, entrepreneurship, and local development in the Marche Region (OECD, 2010), critical challenges include:

- in the context of globalisation and the increasing competitiveness of emerging markets, the Marche model has shown the following weaknesses in the last decade: scale constraints (small businesses with an average of five employees), lack of cooperation and networking (extreme sectorial and regional identification), lack of innovation (few new start-ups), undercapitalisation (emphasis on credit as opposed to other forms of finance) lack of support environment (roads, space, business development services, finance, etc.);
- the significant presence of family owned businesses in the region puts forward threats as well as opportunities, depending on how (or if) firm transmission is planned and executed.

Iacobucci and Micozzi (2012) conducted an analysis of entrepreneurial dynamics to assess the nature and scope of business in the Marche region and to provide a better understanding of the process of setting up new initiatives considering the resources mobilized by the entrepreneurs and problems they encounter in implementing their business ideas. The main results are that the Marche region has experienced the same decline in new firm creation as the rest of Italy although it displays some positive elements: the gender gap in entrepreneurial activity is less relevant compared to the average for Italy, and level of education influences the probability of starting a new firm.

In this context, the rest of the paper analyzes the Marche region ecosystem and proposes a model linking the components of the innovation and entrepreneurial system to the education system.

5 Actors and behaviors in the regional ecosystem of innovation

Looking at the Marche ecosystem as a whole, two classes of actors can be identified:

1. those acting for innovation technology transfer, i.e. Government (Regione Marche, Chambers of Commerce); Industry Associations (Confindustria), ILO's (Industry Liaison Offices) and TTO's (Technology Transfer Offices); academic and private R&D departments (i.e. Centre for Innovation and Entrepreneurship - UNIVPM) and Labs (Contamination Labs and Home Lab);[6] Financial Capital/Services (banks, venture capitalist), Incubators (i.e. JesiCube); Academic Spin-offs;
2. those involved in education and training for entrepreneurship, including four universities (UNIVPM, Università di Urbino, Università di Camerino, Università di Macerata) and one regional business school: Istituto Adriano Olivetti - ISTAO.

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[6] Home Lab is a consortium of 8 made in Italy firms aimed at providing a future "home" environment based on advantage domotic systems. The Home Lab consortium is based on the idea of creating a network for the development of an "open innovation" model enabling enterprises, universities and research organizations to share experience, know-how and patents for the purpose of fostering a culture of innovation and defining standards for communication and interoperability between products and services in the home.

5.1 Technology transfer actors

The Marche ecosystem of entrepreneurship and innovation is characterized by:

- Low capacity of private firms to invest in R&D (level of expenditure on R&D, such as R&D employment, in the Marche region is lower than the national average;
- Presence of private and public technology transfer offices;
- The relevance of small and micro firms that leads to an underestimation of the level of innovation.

These stylized facts are due to the structural characteristics of sectors of activity which are mostly supplier dominated according to Pavitt's (1984) taxonomy. Innovation is developed in collaboration with suppliers of productive technologies. Innovation is aimed mostly at improving the level of efficiency through the acquisition of new machines, hardware, and software.

The growing intensity of university-industry ties is a profound organizational change that has shaped the work experience of academic scientists since the early 1990s (D'Este *et al.*, 2010; Denis and Lomas, 2003). Academic science is undergoing a transformation in response to the growth of an entrepreneurial academic paradigm that stresses knowledge capitalization (Etzkowitz *et al.*, 2000). The EU government's science and technology policy since the early 1990s has included various initiatives to promote knowledge transfer to industry requiring universities to play a more central role in supporting economic growth.

At the same time, universities have become willing actors in the exploitation of research results to boost their income and adapt to a more competitive environment. As a consequence, there has been a growth in the variety and volume of university-industry collaborations, and an increased institutional emphasis on using commercialization of intellectual property as a means of generating revenue (Lockett *et al.*, 2005).

The entrepreneurial university is defined as a university that generates technological progress and facilitates the technology diffusion process through the work of academic scientists and intermediaries such as TTOs and the creation of incubators or science parks that foster the formation of new firms. Increasing engagement in interactions with industry, means the core of the university system has expanded to include activities outside the "ivory tower" of academia, with the goal of transforming inventions into innovations for the benefit of society. So the entrepreneurial university is the focus of an increasing number of commercialization activities.

Technology commercialization occurs in various forms through various mechanisms:

- formal mechanisms (patenting, university licensing, strategic alliance through formal and informal research partnerships or joint ventures, and the creation of university spin-outs or spin-offs);
- informal mechanisms (knowledge transfer, consulting and joint publications with industry scientists).

One of the most efficient ways to transfer research results to the market place is the creation of academic spin-offs. In Italy, the phenomenon of university spin-offs has become relevant in the last 10 years, partly as a result of regulatory changes that introduced the possibility for universities and research institutions to authorize their staff, on a temporary basis, to participate in business ventures for the exploitation of research results. Academic spin-offs are a phenomenon with significant potential for the Marche region, especially in view of the need for the Italian economy to move from so-called 'traditional' or 'low-tech' sectors to 'high-tech' sectors (OECD, 2005), or 'science-based' sectors (Pavitt, 1984). In 2000 to 2012, 49 spin-offs were born, 35 from Università Politecnica delle Marche (UNIVPM), 9 from Università di

Camerino, 5 from Università di Urbino.

Following the pattern observed for Italy as a whole, the birthrate of spin-offs reached a first peak in 2008, suggesting a boom effect generated by the introduction of this model in the Italian system. In 2009 we observe a slow down in the number of spin-offs induced not only by achievement of the maturity stage but also by the financial crisis that hit the European economies starting in autumn 2008. The prevalent sectors of activity are ICT, energy and green economies, and innovation services. The sector composition of spin-offs from UNIVPM does not necessarily reflect the research fields in which the university is strongest in terms of research and teaching, but rather those that are more involved in technology transfer activity and relations with industry. Most spin-offs originate from the engineering faculty.

A recent survey of Italian academic spin-offs shows that UNIVPM is ranked third among universities and research centres in Italy (Iacobucci and Micozzi, 2014). A recent study of the impact of academic spin-offs at the local level shows they could be a mechanism to increase the diffusion of knowledge spill-overs within the local context through provision of advanced services to established firms. In this sense, spin-offs contribute to upgrading the regional industrial system rather than creating new technology clusters. In the case of the Marche region this is an important aspect because the region is characterized by a strong industry structure in low and medium tech sectors; thus, there is the need to upgrade products and processes. Spin-offs play an important role as intermediaries between university and industry, given the difficulties for small firms to establish direct collaborations with the university. While addressing the local market, spin-offs maintain close relationships with the parent university through participation in joint research projects and providing funds for young researchers and PhD students. The major long lasting effect of spin-offs based on involvement of academics in start-up experience is that people with entrepreneurial experience have a much higher propensity to start up new companies.

The other actors that contribute to spreading the entrepreneurial spirit in the Marche ecosystem of innovation and entrepreneurship are ILO's and TTO's. These offices have been created in the four universities to stimulate and encourage the dissemination of research outcomes, translate them into practice, and facilitate their interrelations with the other two agents in the innovation systems: industry and government. The specific technology transfer policies established by TTOs mainly address the creation of spin-offs, patenting, and cooperation activities with industry.

Services and financial aid to start-ups and research for innovation are provided by "company incubators" such as the local JesiCube, the first incubator in the Marche region established in 2012 by Fondazione Aristide Merloni which supports the set-up of new start-ups in the Marche region, and Fondazione Marche, the first sponsor of E-capital competition which consists of the presentation of new business ideas for the creation of new firms. E-capital is also supported by UNIVPM, ISTAO Business School, banks, the Chamber of Commerce, the University of Camerino and the Marche region. The actors are involved in the selection of the best business ideas by evaluating the quality of their business plans. The best ones are eligible for the final premium and free enrolment in entrepreneurial courses at ISTAO.[7]

[7] The competition consists of presentation of new business ideas for new firm creation. The organizing team provides training and support in business, legal, tax, and commercial aspects. The main purpose of the competition is to start a virtuous circle of Young - University - Venture Capital - Institutions - Companies, which is the fundamental engine of development in new enterprises. The competition is designed to encourage participants to take an active stance, a prerequisite for coping with entrepreneurial risk. ECAPITAL is a unique opportunity to evaluate projects in close contact with the business and financial community. The 2

5.2 Actors involved in the Entrepreneurship Education and Training

At the university level in the Marche region, UNIVPM is active in entrepreneurship research through the Centre for Innovation and Entrepreneurship which brings together academics, spin-offs, and student-entrepreneurs, for the study and practice of entrepreneurship. Its programmes and events combine research and practical teaching of entrepreneurship to support entrepreneurs and high-growth companies.

UNIVPM is promoting a new initiative called Contamination Lab which is a forum for "contamination" among students from different backgrounds.[8]

A specific role for entrepreneurial education is assigned to Istao Business School, which operates in the field of high-level training for young graduates and managers; its teaching methodology is innovative and falls outside traditional schemes, and over time has become a reference point for the dissemination of an enterprise culture. ISTAO[9] applies training methods and techniques that optimize the maximum of "learning by doing" (i.e. learning by interacting, on-the-job training) without in fact excluding the process of learning in classes or the lecture hall, adopting an American-style training course (building theory upon practice). Teamwork and action learning encourage students to forge strong relationships with enterprises. The

best projects receive 50,000 euro each and 7 business idea receive 20,000 euros each; 3 new entrepreneurs are enrolled in a Masters in Business Administration at ISTAO Business School.

[8] Contamination Lab (CLab) promotes entrepreneurial attitudes and innovation, to foster cross curricular activities, new learning models and development of entrepreneurial innovation projects. It provides a forum for students, researchers, young professionals from different backgrounds and faculty interested in shaping (creating) business ideas. The initiative is aimed at creating a human capital network to enhance innovative high-potential projects. The objective is to sow the seeds of entrepreneurship or awaken students' natural entrepreneurial attitudes through mutual contamination. The process is aimed at creating and speeding up the Italian innovation ecosystem. The ecosystem includes brilliant and creative brains from different backgrounds working together in a shared space, to help, compete with, confront, and "contaminate" one another, creating a entrepreneurial milieu where new ideas can find a breeding ground (entrepreneurial humus) for the development of successful firms. Services provided are divided into training and informal activities. Training is structured lessons (TT, intellectual property management, marketing and business management) e-learning courses (business planning), and seminars (academic entrepreneurship, innovation regional system, support for new venture creation, self-marketing, etc.). Informal activities include informal interaction among students and people connected to the CLab network: entrepreneurs, managers, policy makers, VC, banks, business angels, etc. There are organized meetings with university spin-offs. Spin-off promoters can access the CLab and the social areas which fosters positive externalities. Contextually CLab students are involved in visits and internships in spin-offs. In addition selected news items are screened (news, videos, newspaper articles ,etc.) to stimulate interactions and debates among students about themes linked to innovation and entrepreneurship. Students from the Faculties of Agriculture, Economics, Engineering, Medicine and Surgery and Sciences can participate in the CLab project.

[9] ISTAO was conceived and founded in 1967 by Giorgio Fuà supported by the Olivetti Foundation, the Social Science Research Council, the National Research Council, and the Bank of Italy. During its 40 years as a training centre, ISTAO has held numerous 1-year training courses for qualified managers, who have become part of the production fabric of Italy. All Master's and post-graduate training courses are designed with maximum scientific rigor and methodological quality, with a view to supporting the development, innovation, and internationalization of the Italian economy. ISTAO owes its name to the entrepreneur Adriano Olivetti, in his personal as well as professional capacity, and has benefited from his far-reaching insights into the social responsibility underlying economic activity. Adriano Olivetti was an internationally acclaimed industrialist, still well-known and respected, and an intellectual, politician, reformer, urban planner and publisher, and more. He believed in a new kind of society beyond capitalism and socialism. Fuà was one of the leading Italian economists who devised the "Adriatic Model" of Italian economic development, based on highly innovative and international-leaning SMEs. He devoted significant work to applied studies on the structural themes of growth, population, labor and technology.

continuous and mutual exchange of know-how from firms to students and *vice versa* have fostered ISTAO as a "learning community" and as a relevant hub and integrator of innovation and entrepreneurial culture at the regional level.

5.3 Innovation and Education Processes: some stylized facts

In considering the growth performance of the Marche economic system as not exclusively linked to the district specialization or even to the capacity of the system to develop networks of cross-fertilization across sectors, "actor variety" is a strategic factor for innovativeness and start up processes. The capability for cross fertilization among sectors in terms of related variety is analyzed in recent literature on the innovative performance of regional systems. The presence of firm agglomerations in related sectors fosters the creation of knowledge spill-overs that improve the incremental innovation (Boschma and Iammarino, 2009). Bosma *et al.* (2011) find that the productivity effect of business dynamics in the service sector is relatively high in regions exhibiting diverse but related economic activities, which may be an environment conducive to the emergence of knowledge spill-overs. The notion of related variety (Frenken *et al.*, 2007) is captured by Jacobs externalities that involve external economies from a variety of sectors available to all local firms. It reflects both sector diversity and the degree to which sectors are related. Related variety is assumed to have a positive effect on the probability of new combinations given the opportunities to combine ideas from different, but related sectors.

High levels of related variety in a region are likely to have a catalyzing effect on variety creation; this has been regarded as a source of competitiveness.[10]

In fact the 'related variety' approach exceeds the vision of district and gives value to the relationship between regional actors with different knowledge: from this diversity (variety) emerge the main benefits in terms of learning and innovative capacity (Nooteboom, 2000).

In the Marche region various actors contribute to increasing the variety of the innovative system. In particular, the potential network among organizations becomes relevant in the relationship between universities, business schools, development agencies, and firms. The increasing attention paid by industry to university research promotes a move away from a "vertical" model of R&D to a "network strategy" of innovation, based upon the exploitation of external knowledge resources.

In the Open Innovation perspective[11] collaborative networks are formed through several kinds of relationships between different actors in the system of sources of innovation resulting

[10] Agglomeration and urbanization effects were introduced by Marshall (1920) and developed by Krugman (1991). They are mostly associated with the presence of a pooled labor market for workers with industry-specific skills and ensure a lower probability of unemployment and labor scarcity. Those factors are usually more favorable in agglomerations and urban areas than in rural areas. In addition, urban areas usually attract younger, better-educated adults, thereby providing a source of entrepreneurial talents. These effects of agglomerations and urban areas are usually proxied by population density, the proportion of managers in the workforce, and the proportion of highly educated in the workforce. In the present analysis agglomeration is measured by active firms (in thousands) relative to the size of the area in square kilometers. To sum up, agglomeration effects contribute to new firm formation because of demand effects, such an increases in population or population density or personal income growth, or from regional spillovers, such as labor market characteristics.

[11] The Open Innovation model offers a framework to discuss the links between agents, due to the fact that it consists of 'the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology" (Chesbrough, 2003, p. 1).

from collaborations between firms rather than from single organizations (Chesbrough, 2003). Most of the Open Innovation literature takes the perspective of the firm in the relations with universities and a large number of approaches have been developed to conceptualize these interactions. The most important is the triple helix model and the idea of the entrepreneurial university[12] (Etzkowitz and Leydesdorff, 2000). The triple helix model has been used as a way of understanding the interconnection between three major components of national innovation systems: university, industry, and government. In the triple helix model, interaction among universities, industry, and government is identified as being the key to innovation and resultant economic growth. The changes in the academic and industrial systems defined as the "knowledge economy", require that traditional forms of technological transfer must be associated with a range of new activities.

The effectiveness of the relations between university and industry depends on several factors such as the sector of activity and its stage of evolution, firms' absorptive capacities, institutional autonomy, the reputation of research centers and its response to political pressures exerted at international, national, and sub-national levels. In the Marche region the multiplicity and variety of actors in the educational and technology transfer processes enhance the potentiality of the ecosystem by increasing efficient collaboration, mutual trust, and networking activities.

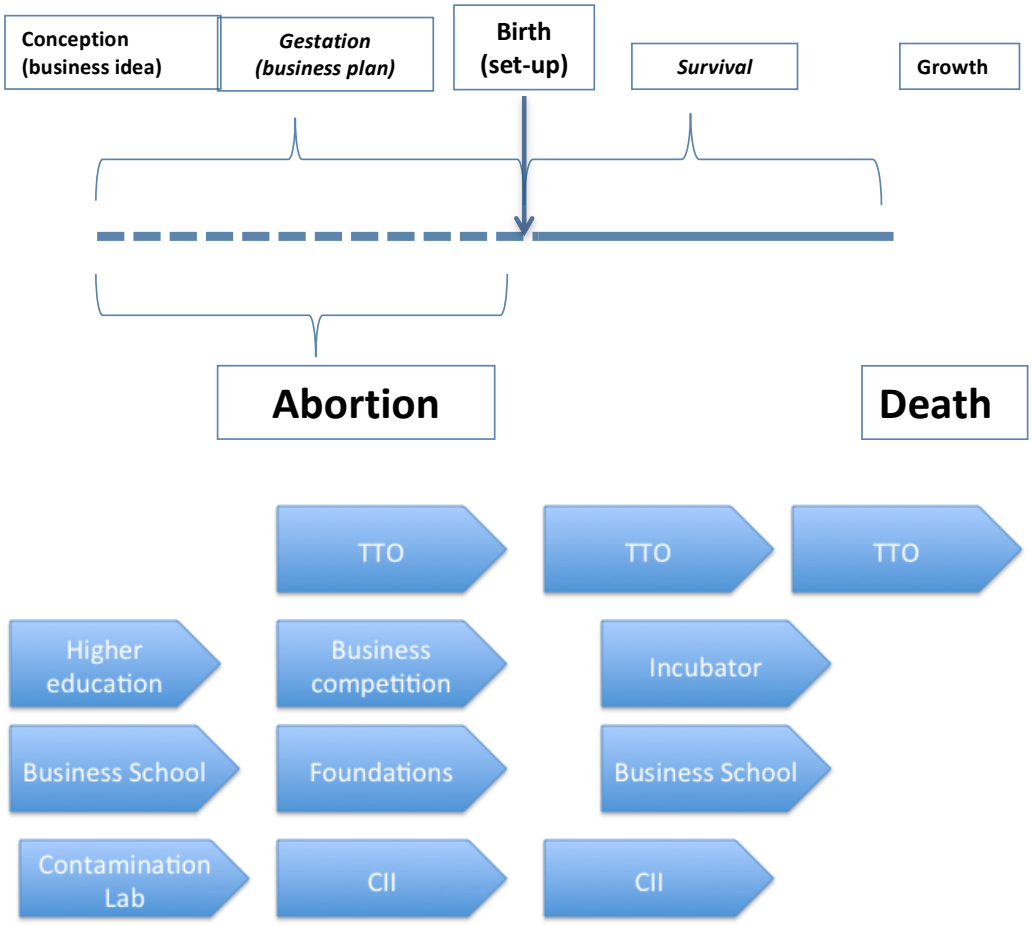
By matching the process of business creation with the regional system of entrepreneurial education we may assume that each step of the line, from the conception to the growth of start up, faces different and specialized education suppliers (Figure 3).

The importance of entrepreneurship education is to spread the entrepreneurial culture at each education level. In Italy and in the Marche region there is a need to offer teaching and training programmes for entrepreneurship at all education levels but in particular higher education. Some modules related to entrepreneurship should be compulsory and the entrepreneurial interest systematically developed in students.

Embedding this type of course in the higher education curriculum is problematic because the entrepreneurial approach to teaching entrepreneurship is the antithesis of traditional approaches to teaching. Academic assessment processes evaluate and test knowledge and skills rather than behavior. In addition, existing curricula have limited opportunity for expansion to include new courses and in order to offer entrepreneurship modules, due to the strict definition of the content of scientific fields and the codification of scientific sectors within which courses and curricula are designed.

[12] Since the mid-1990s, universities and research organizations have been increasingly involved in commercializing research results. This trend was formalized in a range of legislation promoting the 'third mission' of technology transfer as being of equal importance to universities' traditional remit of teaching and research. There is a wide range of arguments concerning universities' economic benefits for knowledge societies (Schutte and van der Sijde, 2000). The literature considers universities as key actors in an innovation system where universities work together with industry to evolve new competitive industrial forms. If we accept that knowledge-based economies are innovation driven, knowledge, technological innovation, and industrial competitiveness are linked. Universities should be crucial stakeholders in the innovation process to drive economic development, especially in a country such as Italy characterized by a lack of research-based innovations. Universities are a key resource for high-tech firms, especially in the early stages of product development. Universities in this way contribute directly to innovation, by providing firms with technical solutions or devices, or by getting involved in applied research activities. This role is in accordance with a view of the university as a permeable institution, which pays attention to problem-solving activities that have immediate relevance for business firms, at national and local level. As a result, governments and public opinion have placed more emphasis on demanding that universities fulfill this mission, and also by commercializing their own academic inventions. This change was fostered by the wave of legislation aimed at encouraging universities to register patents and license them under profitable conditions.

Figure 3: *The connection between start-up process and entrepreneurial education*



As a result, in Italy there seems to be a cultural bias among students: they tend to hesitate to see themselves as entrepreneurs. Instead, they look for employment in large organizations after graduating from management school or engineering school, while most graduate students studying the humanities attend university with the aim of starting a career in the public sector or as a professional. Generally, students ignore the important contribution of SMEs and entrepreneurship for the development of economic system. In this sense, it is crucial to create the right entrepreneurial environment at the education institution: the entrepreneurial activities should be integrated into the institution's curriculum from an early stage and should be supported by the education system. Moreover, the innovative entrepreneurial education should be consistent with related demand for skills and competencies from the local economic system, in order to assure effective educational policy for entrepreneurship.

As for the relation between the regional historical path of economic development (i.e. the "soft" transition from agriculture to industry) and the regional entrepreneurship features, (i.e. culture, leadership, family ownership, etc.), it may be observed that, at the origin of the economic system in Marche region, the family and paternalistic model of management replaced the first generation entrepreneurs' formal managerial education. This is not appropriate for the second generation facing a more complex and turbulent world which requires high quality and specialized management skills to manage it. Consequently it follows that the content

and methodology of entrepreneurial education should reflect and take account the regional economic system's contingent needs and changed features. For example, the second generation of companies in the region is still strongly embedded in the regional and local eco-system although internationally developed, SMEs maintain local specific features (family culture, geographic and geopolitical territory references, imitation models, etc.) although looking for high-tech innovation and new markets.

The economic internationalization of local systems and the rapid growth of the third world in global competition require transformation to traditional educational systems for example the implementation of didactic activities and teaching aimed at fostering entrepreneurial motivation and attitudes since the first steps in the educational process (primary and secondary schools).

5.4 Educational Value Chain and Entrepreneurial/Management Training: Contents and Methodologies

Starting from the idea that entrepreneurial attitude can be taught or enforced from the first stages of education, we can suppose that, at each level, entrepreneurial education is defined and properly shaped as in Figure 4.

Figure 4: *Entrepreneurial education*

In general, the methodology of entrepreneurship courses should be consistent with the following main issues:

- Joint theory and practical work to develop entrepreneurship know-how, entrepreneurial behavior, and entrepreneurial commitment;
- multidisciplinarity;
- meritocracy;
- virtuous integration between knowledge and behaviors of different and specialized actors;
- circulation and exchange of ideas creating a meeting point which favors listening, comparison, creativity, planning feasibility, and action (lab, working-project, team-work).

As for the contents of entrepreneurship education the main issues can be considered to be:

- entrepreneurship as an attitude to developing the growth process at the individual and collective levels;
- motivation and competitiveness as incentives and professional satisfaction;
- celebration and success stories to provide examples for the next generations.

In detail, the contents for each level of education include the following:

- Primary/Secondary School: the entrepreneurial attitude in very young people is demonstrated by team working, and a collaborative and sharing attitude, while solidarity and a sense of responsibility towards a restricted community (class) may be fostered through didactic activities (business simulations, role playing, competitions).

- High School: entrepreneurship courses to introduce the basics for entrepreneurial/managerial skills (economics, accountability, planning, problem solving, marketing, etc.) through practical activities such as business games, project work, and elementary development of business ideas.
- Universities: at university level and depending on faculty specialization the entrepreneurial courses should integrate or develop the existing curricula in order to model or shape a mental attitude to innovation and managing resources.
- Business Schools: masters' courses and post graduate education in general should compete for advanced development of skills, competencies, attitudes, and motivations to start or manage a new business.
- Long Life Training: entrepreneurial attitude and motivation could be included in executive courses for re-training.

6 Conclusion

The growing value of entrepreneurship as a subject of study is based on the growing importance of SMEs in job creation and innovation. There is a need for higher education institutions to be challenged to meet the demands of economic and social change.

Endogenous growth theory has shifted the lens to the importance of knowledge in the production process and its potential to create spillovers. The gap between knowledge and exploitable knowledge or economic knowledge, should be filled by nascent entrepreneurs that recognize the opportunity enclosed inside knowledge spillovers. In the framework of this theory, in which knowledge is the most potent factor generating growth, technological innovation and managerial skills are seen as the most important factors for achieving long-term economic growth. In advanced countries, growth is powered by the capacity of nascent entrepreneurs to innovate and to compete in new global markets with their technologically advanced products (technological innovation) and with a high level of organizational competences. In this sense, it is important to foster students with high levels of knowledge to start up new firms in high-tech sectors. Several analyses of the process of growth of academic high-tech firms show an imbalance in team sponsors towards technical functions, because few of the founding partners have management training or experience. Moreover, analysis confirms initial lack of clarity about the people who are entrepreneurs (Iacobucci *et al.*, 2011; Colombo *et al.*, 2010). Entrepreneurship education at university and post university levels could play an important role in this context.

The diffusion of entrepreneurship courses in Italy, at any level of education, is important to enhance knowledge about the phenomenon of entrepreneurship and its role in the economic system and in society as a whole, to foster a more general change in the entrepreneurial attitudes and culture of small Italian firms, generally not oriented towards innovation and growth, and to cover the knowledge gap in managerial and entrepreneurial skills of high-tech entrepreneurs.

In the Marche region, and throughout Italy in general, a change in the composition of production activities is needed, especially in the manufacturing sector, with a move towards production with a higher knowledge content (high-tech sectors).

Regional policy in this area, prompted mainly by the availability of European funds, takes two parallel directions: on the one hand, to promote innovation within existing firms, and on the other to promote entrepreneurship in new areas of activity, especially in high technology

sectors. Both cases require a reassessment of the role of universities and other actors that operate at different levels within the ecosystem of entrepreneurship and innovation. In this context, there is a need to establish a common policy to guarantee that each actor involved in the entrepreneurial process follows the same directions.

Entrepreneurship education can help promote an entrepreneurial and innovative culture in Europe by changing mind-sets and providing the necessary skills.

The value proposition of spreading the entrepreneurial culture in the socio-economic ecosystem at local level can be analyzed from different points of view. From an industry perspective, entrepreneurial education can help students to succeed in a dynamic business world: employers who received an entrepreneurial education are able to think like entrepreneurs, facilitating corporate entrepreneurship to address global competition and technological changes (Singh and Magee, 2001). From a the university (business school) perspective, the focus is on acceptance that entrepreneurship can be learned and taught (Gibb, 2002; Kuratko, 2005) and that education plays an important role in the process of building entrepreneurial capacity (Hannon, 2006).

From a policy perspective, policy makers have responsibilities related to economic development and a belief that an enterprise culture is the key to more employment and innovation through the creation of new ventures.

In the light of the ecosystem approach the most valuable results, in terms of enhancing the impact of education, are strongly determined by the pool of local actors, their efficiency and willingness to cooperate, the feasibility of the structure and infrastructure, supporting actions by local institutions, and finally, mutual trust and a shared culture in the territory.

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Il valore economico e sociale del sostegno all'imprenditorialità in un sistema regionale: il ruolo della formazione

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Sommario

Lo scopo del paper è quello di analizzare il ruolo della formazione nella diffusione della cultura imprenditoriale a livello regionale. I temi discussi sono il ruolo della formazione imprenditoriale, i contenuti e le metodologie adottati nelle diverse fasi del processo formativo, gli attori coinvolti, le relazioni e le politiche che caratterizzano un ecosistema imprenditoriale e dell'innovazione a livello regionale. Sulla base delle evidenze empiriche, il paper analizza il ruolo dell'imprenditorialità nello sviluppo economico e sociale di un Paese, le potenzialità della formazione nel favorire l'imprenditorialità, la concettualizzazione dell'innovazione e della formazione come processi che si sviluppano all'interno di un ecosistema regionale. Gli attori coinvolti e il ruolo del policy maker sono analizzati nell'ottica di valutare l'impatto della formazione, dalla scuola primaria alla formazione post-universitaria, sulla crescita economica e lo sviluppo sociale di un territorio.

Classificazione JEL: *L52; O38*

Parole Chiave: *Imprenditorialità; Processi educativi; Ecosistema; Innovazione.*