

Collaborative Networks and Strategic Axes, Fundamental Pillars of the Development of Technology Entrepreneurial Ecosystems

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Abstract

The objective of our research is to highlight the role that collaborative networks have in the emergence and development of entrepreneurial ecosystems, especially in information technology. We have identified a series of strategic axes that through collaborative networks ensure the emergence and the development of tech entrepreneurial ecosystems. The role of collaborative networks is essential due to the part the collaboration plays in the context of nowadays business environment. The strategic axes represent strategies to exploit the potential of organizational, regional and national level in accordance with the influences of economic factors, social and technological, as well as with the main trends in the field of information technology.

Keywords: *collaborative networks, entrepreneurship, information technology, strategic management*

JEL classification: M10, M19, P13, L26

1. Introduction

The strategic axes are part of an analyses model whose main objective was the decodification of the strategic patterns that various states from European Union had conducted for the development of entrepreneurial ecosystems in Information Technology. The diversity of contingency factors has led to the identification of some original strategic axes. These axes are not included explicitly in the scientific literature and their identification was made through a complex and wide-ranging research on the factors specific to each context under consideration – on one hand - and on the existing potential of the three tiers of the organizational, regional and national level in the States involved - on the other hand.

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Identifying the domains of excellence and the business areas with a high potential on becoming visible in a large context, even global, is important for analyzing the way in which the technological entrepreneurial ecosystem has developed over time. The approach of organizations to integrate themselves into complex systems of innovation in order to achieve their strategic goals converges with the strategic axes that the Governments run at regional and national level. This convergence strengthens our argument that, once with the beginning of the regional strategies of systematic innovation and contribution of the strategic axes for increasing the competitiveness, have led to the emergence and development of the main technological entrepreneurial ecosystems in Europe. Therefore there is a very important bound between the organizations' approaches for becoming more competitive through innovation and research and development and strategic axes in development tendencies at regional and national level.

2. The pillars of strategic axes underlying the emergence of technology entrepreneurial ecosystems

The analysis of collaborative forms as pillars emergences of technological entrepreneurial ecosystem consists in terms of methodologically group of characteristics studied in four main categories, namely: contextual factors; strategies, policies and programs for the emergence and development of collaborative networks; strategies and strategic orientations of collaborative networks; strategies for harnessing entrepreneurial potential in collaborative networks. The four pillars on which it is designed methodology of studying local contexts, regional and national entrepreneurial ecosystem that generated the emergence of technology, incorporate several features and distinctive elements which we will detail below. The analysis of the distinctive characteristics of collaborative forms will highlight the particularities of technological entrepreneurship ecosystems.

The objectives of collaborative networks, regardless of forms and names can be varied. The strategic objectives of the collaborative networks in the regional and national context are established for medium and long time horizons and can target economic growth, competitiveness, and the potential organizational discovering, developing innovative potential, developing new business sectors, attracting foreign direct investment and support to SMEs and social development.

Collaborative networks consisting of various units such as Public or Private Organizations, Government Agencies and other institutions are designed to generate the necessary support the capitalization of the entrepreneurial spirit in a collaborative manner. In the current paradigm, economic and social progress can be achieved through innovation, investment and maximizing the potential distinctive organizations in a collaborative manner

Through the innovation, the organizations can gain sustainable competitive advantages, and the collaboration in collaborative networks ensure information flows, the transfer of know-how and skills that organizations need to remain

competitive in a highly dynamic and complex context. In the current economic climate, increasing the competitiveness of the collaborative organizations through collaboration represents a condition to become visible in a European or even global environment. Also, increasing the competitiveness of business sectors is the foundation of long-term development and prosperity in a global context. The collaboration inside of networks represents one way through which the organizations can gain competitive advantages and can become more competitive through innovation because the access to the information's and know-how. Through the actions which they promote and maintain, the collaborative networks have an important role on regional area, contributing to the development of the regional entrepreneurship spirit.

Collaborative networks represent one way through which integrated development strategies, founded on the potential and the needs of organizations, can be implemented by the state agencies. Also, the relations arising in collaborative networks is a key element in the development of entrepreneurial ecosystems.

On regional and national level the collaborative networks can represent an original variety of guaranteeing the investment flows and foreign direct investment, which is extremely important for entrepreneurs in information technology. By correlation of "top-down" strategies state agencies and institutions that are directly involved in generating the emergence of collaborative networks with national strategies to attract foreign investors can encourage not only foreign direct investment, but also the transfer of technology and know-how in entrepreneurial ecosystem.

Maintaining regional attractiveness for investors requires that the pace of development of the entrepreneurial ecosystem to be correlated with permanent renewal of labor skills and competencies in information technology. Lifelong learning is a prerequisite for progress and organizational continuity condition entrepreneurial ecosystems. To maintain the increased interest of investors, entrepreneurial ecosystem organizations must continuously develop their skills to easily adopt flexibility and technology. Also, the development of distinctive competencies provide for a long-term competitive advantages of organizations and the synergy generated by working with other business partners can maintain these effects.

Another strategy that is the base of collaborative emergence forms is the focus on innovation, technology and science. These strategies are based on the emergence of collaborative relationships through interaction within triptych academic institutions, business environment and local institutions. Transforming business sectors and the development of new business sectors in regions with potential, especially in information technology, can be achieved through collaboration between entities that originate in the three environments listed. Regional development through regional innovation systems can be achieved creating collaborative relationships between academic institutions, research - development and business to marketing of intellectual property through spin-offs or establishment of new companies.

The majority of new business sectors and peak areas are composed of small and medium sized businesses, and startups as a result of the establishment of new companies, growth strategies and capital investment in regional entrepreneurial ecosystems. In case of restructured business sectors the large companies were reconfigured and strategically shifted to new business areas, more visible globally. Starting from these research we have identified two types of strategies that lead to the forms collaborative emergences which are specific to the technological entrepreneurial ecosystems (Fransman, 2010).

Collaboration between organizations can emerge as a consequence of local, regional or contractors or other agents' generators of collaborative relationships. This type of collaboration is called bottom-to-top because they are based on business initiatives such as simple relations of cooperation, affiliation, joint venture, alliance or any other type the relationships that are formed in business at local or regional level, without the direct intervention of an originator institution or coordinating such a step. Working under these initiatives has its origins in strategic behavior and competitive behavior of organizations and entrepreneurs. These initiatives arise because entrepreneurs' strategic focus is on increasing competitiveness, outsourcing, risk sharing, access to skills, know-how, information and resources and the desire to increase the visibility of start-ups in a broader context (Carayanis and Kores, 2013).

The second type of initiatives that can generate emergence of collaborative networks are the top-down. These initiatives are in fact policies, strategies and actions implemented by agencies, institutions and organizations within the state apparatus or regional administrations and have as main objective the economic development on several levels, namely at the organizational, local, regional and national levels. Initiatives known as top-down were the principal objective of features and capabilities that we have in organizations and regional contexts. Once identified, the next step is the development and implementation of appropriate strategies to exploit organizational capabilities and increased competitiveness levels mentioned above. From the research we have identified also contingency factors and their influences on entrepreneurial ecosystems. There are a number of contingency factors that were stimulated or created through initiatives such as "top-to-bottom".

Development strategies through initiatives such as the top-down are designed to create an environment conducive to the emergence and development of collaborative and supportive forms of activities in a collaborative manner. The emergence of technological entrepreneurship ecosystems is largely determined by the pre-existence of a favorable context formed by all the factors that define it. The top-down strategies of the state institutions are intended to form this context. Moreover, strategic reorientation of the organizations and the transition from individual innovation organizations to systemic one, which occurs regionally generated the emergence of new technological collaborative entrepreneurial ecosystem. This favorable environment appeared on the one hand as a consequence of the strategic axes and on the other factors that influence the effects of technological, economic and social.

Creating an entrepreneurial context in which to generate value, collaborative spirit manifestation involves several steps. To generate the emergence of a regional ecosystem technological strategies top-down and bottom-up, those must be convergent and have the following objectives:

- ✓ Identify the distinctive features of organizations that can generate competitive advantages in technological entrepreneurship ecosystem.
- ✓ Structural trends and directions of development of business sectors.
- ✓ Diagnosis specific information technology business sector and identify future directions for development.
- ✓ Convergence of organizational capabilities and potential strategies to exploit the potential of regional entrepreneurship in information technology.
- ✓ Development and deployment of collaborative business strategies in order to exploit the complementary capabilities of organizations.
- ✓ Correlation strategies to increase competitiveness with other strategies and initiatives at all levels of interaction.

The countries with a developed economy and with a unitary vision regarding the development of national potential, have used in a consistent manner both initiatives bottom-up and type to- own. It is a distinctive feature of countries with a developed economy to the emerging economies that have used local and regional entrepreneurship completing them through a unified vision with complementary strategic axes through initiatives such as top-down. More specifically, these countries have left to chance entrepreneurial potential, but have developed and deployed strategies that have supported and valued.

The emergence of technological entrepreneurship ecosystem is based on both complementarity and convergence strategies bottom-up with the top-down. For collaborative relationships to benefit and added value to organizations, local and regional initiatives should be supported by policies and strategies of policy makers at national and regional levels.

The sustainability is a major objective of collaborative strategies in technological entrepreneurship ecosystems. The time collaborating organizations depends largely on individual goals, the common and contextual factors.

The convergence vision and goals is important for the sustainability of ecosystems technological entrepreneurship. For example, in advanced technological ecosystems, large companies, and multinationals can become main nodes in the collaborative networks.

As applied research highlights, the technological entrepreneurial ecosystem is a coordinated policy mix of a macro-strategy whose main objectives are focused on economic and social development and growth at regional and national analyzed countries.

If they want to prove their efficiency, initiatives should be supported by entrepreneurial development strategies startups, small and medium enterprises, especially foreign direct investment in emerging economies, policies in education and research - development policy and regional development strategies, strategies

to increase competitiveness, so a complex convergence of policies and strategies at regional and national level. The major role that the technological entrepreneurship ecosystems have, envisages the need for a strategic vision that education should be formed, the mindset, skills and abilities in entrepreneurship capital and for collaboration.

In the process of technology entrepreneurial ecosystem emergence, an important aspect, besides the mix of programs, policies and initiatives is to analyze the factors and contingency strategies and adaptation to the specific business environment. In these efforts, the administrative institutions of local, regional and national design and implement top-down development strategies and have a particularly important role in ensuring sustainable collaboration between organizations. One of the roles of these institutions is to create synergies in collaborative networks that make up the technological entrepreneurial ecosystems. Other responsibilities of these institutions are to diagnose and know in depth the context of local, regional and national levels to identify and then developing those distinctive potential that can lead to increased competitiveness and thus to economic and social development (Volkman, Nijkamp and Stough 2010).

Regional institutions have an important role in identifying compatibility between organizations and creating the appropriate context by coordinating and providing support to collaboration. To bring together organizations develop their potential through collaboration, regional institutions and agencies have created clusters, technology parks, business incubators and other spatial economic agglomeration that exploit the region's entrepreneurial potential.

3. Characteristics of the strategic axes specific to technology entrepreneurial ecosystems

To better understand the dynamics of technological entrepreneurship ecosystems, we must analyze and understand the contextual factors and their influence on organizations and technological entrepreneurship ecosystem.

In practice, we identified a number of strategies, programs, policies and initiatives designed and implemented in the definition and development of technological entrepreneurial ecosystems.

Some of the European countries have adopted top-down initiatives through policies that took into account regional and national economic development. Also, to support entrepreneurship and start-ups, governments have initiated programs, strategies implemented at regional or national level.

The first strategic axe is „regional strategies that took into account regional potential“. Policies initiated at national or regional level, focused on bridging the gap between the developed and the existing economic less developed in terms of economic and social restructuring of industrial or mono-industrial sectors. Through these programs, support was provided as grants from European Union structural funds. Complementing these funds, governments have developed and implemented strategies and programs in science and technology, but also to support small and

medium enterprises to switch to areas where innovation generates higher added value.

The second type of strategy is „strategies for innovation in science and technology”. Innovation and research & development are key objectives of the European Union for economic and social development. New strategies and programs such as Horizon 2020 support entrepreneurial initiatives capable to generate value through innovation.

The third strategy is „strategies for increasing the competitiveness of organizations”. These strategies had as main objective to support groups of organizations that have a significant contribution to regional economic growth and development. These efforts have not focused on providing individual support to organizations but on increasing cohesion within groups of organizations belonging to the business sectors with high potential for development, such as that of information technology. In this regard, there have been various economic clusters in regions with high growth potential.

The fourth strategy named „strategies for regional synergies”. The purpose of these strategies was to ensure the transition to economic development models based on entrepreneurship and SMEs. These strategies were the principal objective of all stakeholders in the business that can increase the synergic effect of collaboration in the entrepreneurial ecosystem. Over time, these strategies have made the transition from development models based on large companies to entrepreneurial ecosystem-based models and collaborative networks.

Table 1 includes specific strategies for ecosystems stages of evolution in technological entrepreneurship.

Table 1. Specific strategies for technological entrepreneurial ecosystems

Strategies	First stage	Second stage	Objectives of the second stage
Regional Development Strategies	Redistribution of income from developed regions	Creating competitive regions by connecting between the main regional players has an important role for traditional sectors. It's role is to generate emergence and develop sectors with high growth potential such as in information technology	<ul style="list-style-type: none"> • Inclusion in regional development programs with economic gap • Focusing on entrepreneurship and small business development, companies and organizations with a high potential for innovation and creativity • Focusing on existing latent potential in information technology • Focusing on innovation and R & D • Generating synergistic effects in the entrepreneurial ecosystem • Harnessing the unique potential of organizations and their integration in collaborative networks • Complementarity information technology sector with other sectors of business

Strategies	First stage	Second stage	Objectives of the second stage
Strategy development and exploitation of scientific and technological potential	The financial support for organizations and consortia or sectorial level basic research	Stages of development funding for innovative businesses	<ul style="list-style-type: none"> • Development and funding of leading business sectors such as information technology, nanotechnology, life sciences and biotechnology
		Financing projects with a high capacity junction between academia and research and business Transformer and acts synergistically Encouraging collaboration at technological entrepreneurship ecosystem level	<ul style="list-style-type: none"> • Strategies of marketing products research, development and innovation • Positive effects generated by spatial agglomerations such as clusters and regional innovation networks • Creating premises and tools for collaborative research • Support and development of spin-offs and start-ups to market innovative products capable research • Integrating new start-ups in collaborative networks as viable partners of small and medium-sized or large growth stages under
Strategies for increasing the competitiveness of start-ups and SMEs	Support given to start-ups and SMEs Support for companies that are the nodes of regional networks	Supporting individual needs, but especially common organizations	<ul style="list-style-type: none"> • Technology transfer, know-how and expertise to small and medium-sized enterprises • Increasing the grade use of technology • Increasing innovative and creative potential through the use of technology • Supporting entrepreneurs and innovative start-ups • Financing start-ups through seed funds and venture capital type
		Support to entrepreneurs, groups of firms or SMEs	<ul style="list-style-type: none"> • Providing support through innovative services to start-ups • Support for SMEs to overcome barriers to uptake of modern technologies • Creating conditions for attracting foreign direct investment, particularly in the market for venture capital
		It has transformer and synergistic role	<ul style="list-style-type: none"> • Increasing the visibility of those start-ups that can become globally visible

4. Strategic axes and collaborative networks, pillars entrepreneurial ecosystems in France

France is one of the EU countries that began to exploit the positive effects of the emergence of collaborative networks. The fact that in France there are business sectors built on the principle of collaborative networks and their constituent organizations internationally visible, highlights the success of the strategic axes that this country has developed. At the end of 2008 there were seven in France oriented collaborative networks and international visibility is essential pillars for regional entrepreneurial ecosystems.

Approaches and programs based on which France has implemented strategic axes to increase the competitiveness of organizations took into account regional development through competitive clusters and local development through local production systems. Strategies that France has adopted regionally aimed at creating value through business interaction with R & D institutions. To a lesser extent, France has implemented strategies to develop local production networks through a systemic approach.

In a first step, since 1998, France has initiated a program aimed at developing local systems of production - a first draft of what would later become regional innovation systems, through which it was intended development of industrial zones with tradition subordinated to big cities. This strategy led to the creation of collaboration in a systemic manner between primary sector organizations. Strategies aimed at increasing competitiveness not but strengthen collaboration between organizations. Subsequently, from 2005, through the creation of regional competitiveness poles and based on collaborative relationships strengthened by previous programs in France appeared collaborative regional networks which aim mainly at increasing competitiveness and international visibility of organizations (OECD, 2010).

A distinctive feature was the transformation of the productive sectors of economy based on innovation, research & development and adoption of an accelerated pace of technical and technological progress. France currently focuses on supporting initiatives entrepreneurial business information technology.

Economic development strategies and increasing competitiveness in France were implemented in a consistent manner on several levels, these being found at regional, national and supra national in a European context through cross-border cooperation.

Strategic axes implemented regionally focused in recent decades on reducing inequalities and regional disparities in the allocation of funds supporting higher regions with low competitiveness. Successful implementation of these strategies was also due to the decentralization process initiated in France in 1982.

The dynamics of business environment, the increased competition at European level and the transition to the knowledge economy factors led

government of France to rethink strategic approach to increase competitiveness from over 1999-2002. The main objective of the strategic axes became primarily focus on knowledge and a 50% share of knowledge-based sectors of the national economy. This target has generated significant changes in the organizational context, the state supporting the organization by building an information infrastructure for dissemination and use of knowledge (OECD, 2014a). Today, having created this context, France invests in programs to stimulate entrepreneurship in information technology in the regional entrepreneurial ecosystems.

To implement strategies to increase competitiveness, France has developed an innovative organizations funding model inspired by the National Science Foundation of USA. Also, all initiatives were supported by special laws to exempt payment of taxes by organizations located in areas considered to be growth poles (Petti, 2009). These measures led to a greater cohesion between organizations and the creation of sustainable collaborative relationships due to the location in the same space, common infrastructure and convergent objectives.

Initiatives emergence of collaborative networks came from government agencies and research institutions by implementing strategic axes, thus creating multiple connections and collaboration between academia and business organizations from various sectors and industries. Since 2006, France has adopted a package of support for spatial concentrations that have the potential to become competitive through research - development (Petti, 2009).

This type of spatial concentration is different from other strategies found in other states. If other states have implemented strategies to attract and generate the agglomeration of enterprises, companies and multinationals in spaces for collaboration, France has implemented strategies for spatial agglomeration of research, which in time became attractive and nodes in complex networks for companies and businesses. Moreover, these regions have become attractive to investors. The potential of these regions to generate spin-offs and innovative start-ups is extremely high.

These collaborative networks are springboards for innovation in areas such as genetic engineering, biotechnology, nanotechnology and cutting edge technology. Their role is to facilitate technology transfer and knowledge from research to organizations, particularly for small and medium businesses with a high potential to become competitive in leading sectors and emerging businesses.

New forms of collaboration led to increasing complexity of research activities and products made through collaboration. With the benefits to organizations of technical and technological progress, the collaboration between organizations have become more complex and beyond the limits of geographic space of regions.

Table 2. France entrepreneurial ecosystems strategic axes

STRATEGIC AXES		OBJECTIVES
<ul style="list-style-type: none"> • Increasing the competitiveness of organizations through collaboration with research centers and educational institutions • International visibility of French business sectors • Poles of competitiveness and local production systems • The transition to the knowledge economy • Creating entrepreneurial ecosystems formed around markets or technologies which are internationally competitive 		<ul style="list-style-type: none"> • Increased regional competitiveness • Increased competitiveness of local productive networks together in a systemic approach • Synergies between businesses, research centers and academic institutions • Develop a regional first stage of primary sectors - local production systems and strengthen collaborative relationships • Development of the second phase of key sectors - competitiveness poles • The transition from planned economy to one based exclusively on knowledge and innovation • Developing the potential of regional and inter-sectoral collaboration • Develop strategies consistent with the dynamics of global markets and technologies
CONTEXTUAL FACTORS		
ECONOMICAL	<ul style="list-style-type: none"> • Emphasis on product innovation in organizations and processes • Economic development at several levels of complexity: local, regional, national and global • France's economy was based mainly on large companies and is currently considering development strategies and crucial role of SMEs and start-ups • Significant investments in knowledge networks • Create a special financial system for financing innovation • Financial facilities for organizations located in areas considered competitiveness poles • Strategies for supporting and incubating initiatives such spin-offs and start-ups 	
SOCIAL	<ul style="list-style-type: none"> • Increase the level of education • Multiple programs for lifelong learning • Attract the poles of competitiveness of highly skilled human resources • Develop a social culture based on collaboration • Linking strategies to increase competitiveness policies with social and educational strategies • Convergence of training programs with the development trends of technological entrepreneurship ecosystems 	
TEHNOLOGYCAL	<ul style="list-style-type: none"> • Transforming business sectors based on outdated technology • Research in the top as biotechnology, nanotechnology and information technology • Facilities for access to technology, knowledge and innovation 	

OTHER FACTORS	<ul style="list-style-type: none"> • Fragmented educational system • Educational institutions in France had a small role in collaborative partnerships between academia, business and administrative • Public investment in research and development programs, but not a market orientation • Laws that created the core fundamental research and development in the central nodes collaborative networks • Regional agencies have a particularly important role in increasing cohesion between organizations, restructuring and financing organizations in the flexible joint projects • Transforming business sectors based on outdated technology • Research in emergent field of biotechnology, nanotechnology and information technology • Facilities for access to technology, knowledge and innovation
FEATURES	
<ul style="list-style-type: none"> • Orientation and international visibility • Innovation through joint projects • Local production networks as productive systems have emerged in the primary sectors in which technological progress has not played a decisive role • Regional networks that have emerged from development programs focused on competitiveness poles leading sectors in which technical and technological progress plays a decisive role • Spatial concentration of institutions and organizations that have generated the emergence of entrepreneurial ecosystems • Focus on emerging markets or with a high potential for international development • Focus on internationally competitive technologies 	

Such collaborative networks were expanded and regional development programs „poles of competitiveness” were considered developing collaborative relationships at a larger scale and in a wider context. It was a step that caused the transition from local production systems to complex systems of innovation, and the vertical structure of horizontal network structures. The consequence of these changes was to generate a new ecosystem in which connections and relations of cooperation between the entities became more stable.

The emergence of entrepreneurial ecosystems based on collaborative networks and clusters in France led to the development of business sectors and industries, trade, health and nutrition products, automotive industry, logistics, trading and electronic commerce, railway construction, electronics and telecommunications, engineering, complex systems engineering, medicine, agriculture, food, renewable energy, nuclear energy, mechanics, materials engineering, nanotechnology, biotechnology, communications networks, telecommunications, chemicals, information technology, optics, aerospace, urban transport, environmental protection and safety (OECD, 2014b).

5. Strategic priorities and collaborative networks, pillars of entrepreneurial ecosystems in Germany

Germany is the most complex example of strategic axes and strategies identified in practice in order to increase competitiveness through collaborative networks. The complexity of strategic approaches derive from a common vision for the development of key sectors in Germany.

Germany has initiated several programs and has implemented several strategies for the development of key sectors. The emergence of collaborative networks in Germany had a profound technical connotation as the focus of strategic approaches was collaborative diffusion of technological progress and its embedding in products, such as automotive applications, services, microsystems engineering, optics, materials sciences, processes and production technologies and in new areas such as biotechnology and nanotechnology.

Another strategic axis aimed at increasing competitiveness through innovation. The main objective of this axis was improving and developing skills and innovative capacity of organizations through new forms of collaboration between different entities. The axis orientation is to correlate entrepreneurial ecosystems emerging markets and segments with high growth potential in existing markets. These networks have generated the emergence of regional innovation systems, a proper environment for startups.

The oldest strategic axis of development that has led to collaborative forms administratively. This strategic axis has been implemented since 1969 in the context of regionalization of Germany.

The main purpose of the competition was to avoid excessive competition between lads, provide the financial and administrative independence and the implementation of economic and social development policies in a consistent manner. The effect was that of establishing an environment conducive to social and economic development potential of regions.

The three strategic axes were supplemented by complementary strategies that have helped to increase cohesion within ecosystems, entrepreneurship training and collaborative business culture, increasing training and skills training, lifelong learning, networking and education active involvement of collaborative research networks.

Each axis complementary to the main axes had a clear purpose to support the strategic axes of regional and national importance. In order to increase the strategic axes and collaboration through collaborative networks at regional and national level in Germany were initiated three programs based on different strategies but the same logic of collaborative networks.

The complementary strategic axis for the development of innovative poles to support initiatives aimed at innovation in less developed lands in Germany, involving research and educational institutions in these programs, and incubating

ideas and startups who later had the potential to become key pillars to increase regional competitiveness, all in a collaborative spirit.

The second strategic axis focuses on the transfer of knowledge and know-how had as main objective the development of skills and competences through programs of lifelong learning. This axis supports other complementary strategic axes through strategies focused on basic skills training human resources in order to adopt a faster and more easily to technical and technological progress by the organization, resulting in increased competitiveness based on distinctive and long term competences.

Within entrepreneurial ecosystem, this axis is extremely important, especially in information technology because the generated progress and change are highly dynamic. Another benefit of educational networks is promoting innovative projects and an attitude focused on innovation in education, promoting collaborative spirit and entrepreneurship, all of which are for the benefit of technological entrepreneurship ecosystems.

The contribution of the complementary strategic axis of establishing regional networks of competences was particularly important because of the role it has in technology entrepreneurship and organizational innovation. The role of this network is to increase the cohesion of the scientific, academic and economic to technology transfer and adaptation of technological progress in the context of international business sectors in Germany.

The integration in networks of the top producers of information technology and communications, facilitated both the transfer of technology and know-how and provide the expertise from experienced large companies to start-ups.

One of the most important factors of success generated from collaboration through collaborative networks in Germany is complementary strategic axes of development of technological entrepreneurship ecosystems. Because Germany has designed its strategic axes based on precise strategies that were based on technological progress, one of the factors that led to the emergence of entrepreneurial success was the high capacity of organizations in Germany to incorporate technology into their business processes. The pace of technological progress adopted in organizations can create differences, and taking into account the economic context of any complexity landing micro, meso or macro, the technology is currently an indispensable resource of any organization. Adoption of technology and, by default, of the technological products by German companies in their business processes made the entrepreneurial ecosystems and innovation more dynamic.

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Table 3. Germany entrepreneurial ecosystems strategic axes

STRATEGICS AXES		OBJECTIVES
<ul style="list-style-type: none"> • Development of biotechnology and life sciences, technologies and services providing complementary sectors • Development of innovative potential of organizations and innovative startups • Network development for improving regional economic structures • Regional development through innovation and technology (complementary strategic axis) • Regional development focused on learning through educational network (complementary strategic axis) 		<ul style="list-style-type: none"> • Collaborative research project financing (through networks) • Develop collateral networks of financial institutions to finance startups and innovative projects • Convergence public research projects with private companies strategies • Generation of spin-off • Improving the skills of innovation and new forms of collaboration with academia and research • Linking innovation with technology emerging markets • Avoid excessive competition between regions and complementarity • Ensuring equitable financing and uniform implementation of regional policies • Support initiatives for regional innovation • Creating collaborative networks including: research institutions, organizations, universities as pillars of entrepreneurial ecosystems • Conducting educational research projects - development that can grow in future regional growth poles • Conducting training programs and lifelong learning • educational networks for the exchange and transfer of knowledge between regions • Promote innovative projects in education • Developing collaborative business culture and business culture • Improving educational infrastructure
CONTEXTUAL FACTORS		
ECONOMICAL	<ul style="list-style-type: none"> • High number of competitive companies • The service sector is well developed • Marketing strategies for research and innovative products • Availability of financial resources for research and innovative start-ups • Financial resources for technology renewal in organizations • Proactive management 	
SOCIAL	<ul style="list-style-type: none"> • Highly qualified labor force • The culture of cooperation at regional level • Increased potential for research & development and innovation 	

	<ul style="list-style-type: none"> • High level of training to increase the efficiency of emerging technologies
TECHNOLOGICAL	<ul style="list-style-type: none"> • Focus on investments in technology and its transfer in organizations • Very high capacity to incorporate technology into organizational processes • Partnerships with leading companies and network technology and communications companies in the world • Linking the needs of sectors and industries highly developed in Germany and worldwide
OTHER FACTORS	<ul style="list-style-type: none"> • Existing networks between research laboratories • The existence of two prestigious universities with global visibility • High density of research institutions in biotechnology
FEATUERS	
<ul style="list-style-type: none"> • Organization's regional focus based on knowledge • Easy integration in entrepreneurial ecosystems • Marketing orientation • Thematic competitions • Initiatives like „ top - down” and ”bottom-up” • Connecting at national and regional level for all the stakeholders in tech entrepreneurial ecosystems • Knowledge's transfer at entrepreneurial ecosystems level • Large capacity and availability of the business sectors to use the latest technologies and innovations, developed within the technological entrepreneurial ecosystems • Development of high technologies • Focus on clearly defined Market Technology segment • Entrepreneurial ecosystem's emergence and development in areas in which the potential of development is high and where the industry has a high capacity to absorb new technologies 	

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