

1) Theme no.7 Place based innovations (building and accelerating regional clusters)

2) THE DEVELOPMENT OF THE CLUJ IT INNOVATION CLUSTER – AN IMPLEMENTATION OF THE TRIPLE HELIX MODEL IN ROMANIA

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4) Keywords: Innovation clusters; Triple Helix model of innovation; Innovation city; ICT; European Union structural and cohesion funds

5) JEL Classifications

R58 - Regional Development Planning and Policy, R11 - Regional Economic Activity: Growth, Development, Environmental Issues, and Changes, R12 - Size and Spatial Distributions of Regional Economic Activity, O32 - Management of Technological Innovation and R&D

6) Introduction, state-of-the-art, methodology, findings and interpretation, conclusions, policy implications and directions for further research

1. INTRODUCTION

The concept of clusters has established itself as an important concept for competitiveness and economic development. The paper will present the conceptual framework for the development of innovation clusters and will consider the development of the triple helix model of innovation through the knowledge space, consensus space and innovation space.

The predominant research methodology that will be used is the case study. It will reflect the development of the Cluj IT Innovation Cluster initiative, its economic importance (summarizing, the enterprises from the cluster have had in 2011 a turnover of approximately 70 million euros, of which 78% comes from exports and together with the relevant institutions about 3000 employees), a summary of the objectives and actions of the cluster organization and its internal organization. The organizational structure of the cluster is based on two organs: a) the General Assembly, which is the governing body of the cluster organization and consists of representatives of the totality of cluster members

and b) the Board of Directors, which is the executive body of the cluster organization, in charge with the effective running of the cluster and enforcement of the decisions of the General Assembly. It will be presented the role of the Strategic Council, which supports the strategic direction of the cluster and promotes its interests and the role of the Scientific Council, which supports the development of the cluster through harnessing the results of scientific activity.

It will be considered the reporting of the Cluj IT Innovation Cluster to key success factors that have an important role in the development process of successful clusters.

2. STATE-OF-THE-ART

The reference definition for clusters has given by Michael E. Porter in 1998, according to which clusters are geographic concentrations of interconnected companies and institutions, in a particular economic sector. Clusters comprise a group of interrelated industries and other entities, which are relevant to competition. They regularly include suppliers of specialized inputs and providers of specialized infrastructure. Clusters can extend downstream to the distribution channels and customers and laterally to producers of complementary products and to companies in industries related by skills, technologies or common inputs. Many clusters have between their component entities governmental institutions and other institutions such as universities, standards-setting agencies, think tanks, vocational training providers and trade associations, which provide specialized training, education, information, research and technical support (Porter, 1998, p.78).

Innovation clusters consist of: i) groupings of independent undertakings — innovative start-ups, small, medium and large undertakings, ii) research organizations and institutions, operating in a particular sector and in a particular region, that are designed to stimulate innovative activity by promoting intensive interactions, sharing facilities, sharing of knowledge, expertise and experience and by contributing effectively to technology transfer, building networks and making information dissemination among the enterprises of the cluster. States through government institutions and authorities can help to launch cluster initiatives can come up with legislative or infrastructure facilities for development, it is possible to provide financial support from public funds on a project basis for launching and operation of clusters (European Commission, 2006/C 323/01, p.9).

According to the Organisation for Economic Co-operation and Development (OECD), the basics of clusters are (OECD, 2011, pp.206-207): i) geographic concentration; ii) specialization; iii) the presence of companies with institutions such as the academic/ research and development institutions, the institutions of the public administration, regional innovation agencies and intermediaries between different institutional spheres; iv) connectivity, which highlights the importance of regional innovation systems; v) the structural character; vi) critical mass, it is desired that the enterprises of the cluster have an important role in the economic sector to which they belong in the geographical area in which they are located; vii) the importance of innovation. Innovation is addressed in a broader sense, which includes in addition to product innovation and process innovation, organizational innovation and marketing innovation.

Innovation can be defined in a broad approach as "a change which achieves and / or adds value and provides a competitive advantage here and now" (European Commission, 2010, pp.5-6). Thus, entrepreneurship is important in encouraging innovation. We can talk about product innovation, process innovation, marketing innovation and organizational innovation (OECD, 2011, p 35). Product innovation signifies the realization of a new or significantly improved good or service. These improvements may refer to technical specifications, components and materials, incorporated software, functional characteristics. Another type of innovation is the process innovation, which means the establishment of new or significantly improved production methods. This includes the significant changes in the techniques, equipment and/ or software elements incorporated. The third type of innovation is marketing innovation and means the significant changes in product design or packaging, product placement, promotional activity and pricing, all of which can lead to gaining new markets. Fourthly, we speak of organizational innovation, which signifies new organizational methods in the business practices of the firm, workplace organization or the external relations of the firm.

An innovation system represents the determinants of innovation processes, all economic, social, political, organizational and institutional factors that influence the development and dissemination of innovation. Innovation systems consist of organizations and institutions and the specific relationships between these entities, the main function of the innovation systems is the achievement of innovative processes that involve the development and dissemination of innovations (Edquist and Hommen, 2008, pp.8-9).

Cluster initiatives are organized efforts to stimulate the development and competitiveness of clusters within a region, involving cluster companies, public administration, regional innovation agencies, universities, research and development and technology transfer institutions (Sölvell, Lindqvist, Ketels, 2003, p.31). Cluster initiatives are organized regional sectoral networks between partners, having as main objective the improvement in innovation performance and international competitiveness of the participating entities.

The environment of dynamic clusters involves more features (Sölvell, Lindqvist, Ketels, 2003, pp.18-19), including: i) the existence of an intense local rivalries that involve competitions of prestige (Porter, 1998, p 83), which stimulates continuous development and technical progress and form the basis for a more diversified network of suppliers; ii) the propagation of dynamic competition, among other things emanating from the entry of new firms in the cluster, including the phenomenon of spin-offs from larger companies; iii) intensive cooperation organized through various institutions for collaboration, such as cluster organizations, professional organizations and chambers of commerce, with a strong informal interaction based on interpersonal networks; iv) the access to specialized and developed production factors (human capital, financial capital, infrastructure) and in the case of innovative clusters, strong links with universities and research and development institutions; v) links to related industries, sharing the pool of human resources and the benefits arising from technical progress and vi) the proximity to customers, which form a strong and sophisticated demand.

In their evolutionary process, clusters undergo change and have to adapt their strategy and activities. The cluster organization needs to implement structures for

decision-making processes with clear roles for the entities of the cluster in order to facilitate and balance in the same time continuity and change (Hagenauer, Kergel and Stürzebecher, 2011, p.2).

Studying the life cycle of clusters (Sölvell, 2009, pp.21-22, 39-62, 67-68, 109-123) has a special importance for the establishment and development of innovative clusters. For entities involved in this process is important to know the stage of development of the cluster and to implement measures involved in each stage of development. Completing the various stages of cluster development is influenced by the actions of the involved entities together with objective factors such as the life cycle of products and markets. Sölvell has studied the life cycle of clusters and identified the following stages of development:

- i) the stage of development of the emerging cluster "heroic phase of entrepreneurship", which involves setting up the cluster – at this stage the number of entities involved in the development process of the cluster is growing, the market sectors involved generally have a dynamic expansion, on the other hand the development of networks, partnerships between the entities of the cluster is in an incipient stage;
- ii) there is a growth stage for the cluster, the number of entities involved can reach a critical mass in the area activity of the cluster in the geographical area concerned, involving strong enterprises in the relevant economic sectors. At this stage the market maintains its growth potential, there are developed partnerships and the building of networks enters in an upper phase;
- iii) then follows a maturity stage for the cluster, characterized by the achievement of efficiency primarily through economies of scale, which are supported through

maintaining a critical mass of the entities involved in the cluster and the development of partnerships and networks between these entities. Generally, at this stage can be observed reduced growth rates for the relevant market, which can reach a stage of maturity and in accordance with this process reduces the profit margin the involved enterprises can get, so it is possible for some enterprises from the cluster to reposition and therefore decreases the number of entities involved in the cluster;

iv) the cluster can reach the decline stage, if the decrease of the number of the entities involved is accompanied by the decline of the market and of the development of networks and partnerships within the cluster;

v) if the process is irreversible the cluster after a sharper or slowly decline reaches the stage of development called "museum" and loses its impact in the regional economy. The reasons underlying the decline include: a) excessive concentration, b) strong involvement of the government in the form of grants, c) the emergence of fundamentally new technologies in other locations that respond more efficiently to the demand, d) a radical change in the structure of the demand, which has negative implications for the area of activity of the enterprises involved; e) extreme circumstances;

vi) the maturity stage of the cluster and even a reversible decline stage may be followed by a "revival stage" that occurs through regaining momentum in addressing business problems, this dynamism has been fostered by the encouragement of innovation, the diversification to activity areas with growth potential and by the encouragement of innovative processes and through attracting new businesses in the cluster.

For example, authors (Kenney and Patton, 2006, pp.39-40, 58-59) who analyzed the evolution of Silicon Valley, one of the most important high-technology clusters in the

world, have concluded that the organizational culture which emphasizes the importance of entrepreneurship has had a key role in the complementary development of enterprises and institutions. It is important to specify that this organizational culture is constructed by the society through an evolutionary process which involves individuals, companies and institutions. In Silicon Valley technology domains like the semiconductors, computers, peripherals –magnetic storage, computer networking, the World Wide Web or software development evolved in a way that allowed the appearance of opportunities for new enterprise development. The technologies that promise future success can attract financial and managerial resources, as venture capitalists explore their business potential. The Silicon Valley region (Santa Clara County, San Mateo County and part of Alameda County and Santa Cruz County) is a successful example for the capitalization and continuous development of its intellectual assets. The top universities of the region and corporate research laboratories attract bright students and researchers from around the world. Important companies of the region are attributable to universities and corporate research laboratories (e.g. Google, Yahoo!, 3Com, Cadence, Sun Microsystems, Seagate or Cisco). The world-class high technology companies of the region (e.g. Oracle, Gilead, facebook, vmware, Apple, Linked in, intel, Polycom, zynga, twitter, Microsoft or salesforce) are regularly attracting some of the best professionals in the relevant technology areas. The authors point out that some of these engineers and managers will be the entrepreneurs of the future and will launch or join start-ups.

The triple helix model of innovation is closely linked to the specifics of innovative clusters. The triple helix model signifies the converging institutional spheres involving academia/ research and development institutions, industry and business and

government, each taking the role of the other institutional spheres in the stages of integrated development. In this connection, universities and research and development institutions can contribute to the development of enterprises, the industry and business sector can foster vocational training, and the government institutions can perform a role as venture capitalist. In a developed triple helix model (Etzkowitz, 2002, pp.4-7, Etzkowitz and Leydesdorff, 2000, pp.111-117) the three institutional spheres overlap, collaborate and cooperate with each other.

The model involves the dynamics of innovation spaces (Etzkowitz, 2002, pp.4-7), which is the underlying conceptual framework of knowledge-based regional economic development. This development process involves three stages. The first step is the establishment of "knowledge spaces", i.e. concentration of related education and research and development activities in a certain geographical area, thus improving local conditions for innovation.

Highlighting the potential of knowledge spaces is achieved through the second stage called "consensus space", which represents the environment in which individuals with different perspectives meet and interact representing businesses, organizations and institutions from the three institutional spheres and through mutual interaction are generating new ideas and innovative development strategies.

The third stage is the realization of the "innovation space", which is a new organizational mechanism that aims to achieve the objectives set out in the "consensus space", through attracting public or private venture capital. For the success of this stage is essential the effective combination of venture capital, business knowledge and technical knowledge. This mechanism may result in the formation of hybrid organizations arising

from the interaction of the three institutional spheres and thus synthesizing their theoretical and practical elements – we can talk about the establishment of innovation clusters, business incubators, science and technological parks, research and development organizations (Etzkowitz, 2002, pp.4-7).

3. THE DEVELOPMENT OF THE CLUJ IT INNOVATION CLUSTER

On the 16th of October 2012 was launched the Cluj IT Innovation Cluster initiative by establishing the Cluj IT Association, with the participation of 36 partner entities. The Cluj IT Innovation Cluster includes:

- 25 enterprises from the ICT sector located in the metropolitan area of Cluj-Napoca (Annex),
- academic/ research and development institutions, including the Technical University Cluj-Napoca and the Babeş-Bolyai University Cluj-Napoca,
- public administration authorities, including the Cluj County Council and the Mayor of Cluj-Napoca and
- catalyst organizations, including the North-West Regional Development Agency, the Cluj Territorial Office for Small and Medium Sized Enterprises and Cooperation, the Transylvania branch of the Romanian Association for Electronic and Software Industry (ARIES Transylvania), Transylvania Advanced Equipments and Technologies produced in Romania (TETAROM SA), whose main business is the management of industrial parks in Cluj County, which have supported the establishment of

the cluster. These catalyst organizations may help to generate future projects and to facilitate interaction between the partner entities of the cluster.

The Cluj IT Association shall operate on the entire Romanian territory and abroad. In order to achieve the expansion and representation objectives of the member entities it is possible to establish branches in the country or abroad with a minimum of 3 members, with an own management for the branch, the establishment taking place through a decision of the General Assembly of the Cluj IT Association. The Headquarters of the Cluj IT Innovation Cluster is currently located in the TETAROM I Industrial Park.

The establishment of the ICT cluster in the metropolitan area of Cluj-Napoca has been initiated in the framework of the regioNet sub-project called Clusters and networks, development engines through increasing the economic competitiveness and innovation capacity of regions. The role of the Cluj County Council in launching this cluster initiative was determined by the fact that the regioNet sub-project is part of the SMART+ project funded by the INTERREG IVC Interregional Cooperation Programme of the European Territorial Cooperation objective of the EU Cohesion policy. The total project budget was 299,700 euro, with an implementation period of 2 years (1 May 2011 – 30 April 2013). The Cluj County Council is the partner institution from Romania for the SMART + project. The Agency for the promotion of innovation and technology transfer AGIL GmbH Leipzig from Germany is the project coordinator and the Malopolska Regional Development Agency from Krakow, Poland; the North-west Regional Development Agency and the Cluj Territorial Office of Small and Medium sized Enterprises and Cooperation were partners in the project. The objectives of this project

have included: the transfer of expertise in the management of networks and clusters; the promotion of cooperation between business, research and development institutions and public authorities from Saxony, Germany, Malopolska, Poland and Cluj County, applying the best practices and establishing at the end of the project implementation period an ICT cluster in Cluj-Napoca.

As a founding member, the Cluj County Council has the opportunity to participate in the establishment and development of the Cluj IT Innovation Cluster in order to foster cluster development through facilitating the obtainment of financing for projects that lead to the support of the establishment or development of enterprises and innovative activities that have a high potential for innovation. These actions support the overall economic development of the metropolitan area of Cluj-Napoca and of the North-West Development Region. Some enterprises from the cluster have branches outside of Cluj County and the location of the customers of these enterprises is not limited to this region.

Among the founding members of the Cluj IT Innovation Cluster are universities, which have recognized research structures. These are the Babes-Bolyai University of Cluj-Napoca (BBU) and the Technical University Cluj-Napoca. In several faculties of the BBU are research units that are specific to ICT or have a strong IT component. We can mention the: a) Economic Informatics Research Centre of the Faculty of Economics and Business Management, b) Research Laboratory in Informatics of the Faculty of Mathematics and Informatics, c) Department of Information Technology of the Institute of Technology of the BBU, d) Centre for Research in computer assisted Chemical Engineering of the Faculty of Chemistry and Chemical Engineering, e) Regional Centre for Topography, Cartography, Seismology and Geographic Information Systems of the

Faculty of Geography, f) Multimedia Laboratory for sports testing applied on computer of the Faculty of Physical Education and Sport.

Two faculties within the Technical University Cluj-Napoca benefit from research units that are specific to ICT. In the Faculty of Automation and Computers is a laboratory of PC Networks, an Image Processing Laboratory, and a laboratory for databases, a laboratory dedicated to distribution systems, a laboratory for logics and programming and the Reconfigurable Information Systems Laboratory. In the Faculty of Electronics, Telecommunications and Information Technology is a research centre dedicated to information technology in electronics, a centre for data processing and safety and a centre for Multimedia Technologies and Distance Learning.

The main purpose of the Cluj IT Association is the planning and implementation of services and activities in order to promote and develop mechanisms for the support of companies and institutions that are from the ICT sector in order to increase their competitiveness nationally and internationally. The Cluj IT Association is the management entity, the cluster organization that coordinates the activities and projects undertaken within the Cluj IT Innovation Cluster.

According to Article 5 of its Statute, the Cluj IT Association will work towards achieving development goals aimed at the overall development of the ICT sector. There are pursued the following objectives:

- (1) achieving a favourable environment for the sustainable development of the cluster members (including the elaboration of a human resources ethical code);
- (2) facilitate the formation of the cluster and support its long-term development;

(3) increasing the capacity of research and development (R&D), through stimulating the cooperation between universities, research and development and innovation (R&D& I) institutions and enterprises, increasing the access of enterprises to R&D&I;

(4) exploit the potential of information and communication technology through its application in the public (administration, education, health) and private (business, companies) sectors;

(5) realizing of the premises to increase the competitiveness of the ICT sector through an economic growth based primarily on the intensive use of knowledge;

(6) increase of the regional competitiveness of the ICT education through activities related to the organization of vocational training sessions and events to facilitate the exchange of experience;

(7) support of the economic exchanges and commercial activities between the member entities of the Cluj IT Innovation Cluster and other organizations outside of this cluster;

(8) identifying and promoting initiatives that generate innovative products and services (the projects of Cluj IT Innovation Cluster in this field include: the defining of the research directions according to market demand, skills transfers and research spin-offs, promotion through Enterprise Europe Network, innovation and technology audits for the entities of the cluster, assessment of innovation culture and capacity of cluster entities, elaboration of business plans for new product or service development);

(9) generating research, development and innovation projects, with the support of the member entities;

(10) assist the public institutions in order to increase their efficiency and productivity (e.g. through the promotion of standards, regulations and good practices in ICT services for the public sector);

(11) realization and promotion of the brand of the local ICT sector (promote the „Cluj IT” brand in Romania and internationally through events like the Cluj ICT Days);

(12) promote the commercial interests of the enterprises of the cluster through carrying out activities related to the participation of the Cluj IT Association and its members in fairs, exhibitions and trade missions, e.g. activities for the organization of stands, realization and dissemination of promotional materials and realization of business contacts when attending these events;

(13) implementation and support of a cooperation and resource sharing platform of the member entities in order to increase the delivery capacity of individual companies, thus the surplus in resources of the member entities is used effectively and the benefiting companies can honour larger-scale business contracts;

(14) implementation of cooperative mechanisms in order to address large-scale international projects;

(15) representing the interests of the ICT sector in front of governmental institutions, including the promotion of legislation in the interest of the member entities (e.g. in the field of taxes and work regulations);

(16) supporting entrepreneurship and Small and Medium sized Enterprises in the ICT sector in the region; and

(17) attracting financial resources, including foreign direct investment and venture capital to develop the local ICT sector.

The internal organization of the Cluj IT Association is based on two organs:

a) The General Assembly, which is the governing body of the cluster organization and consists of representatives of the totality of cluster members and

b) the Board of Directors, which is the executive body of the cluster organization, in charge with the effective running of the cluster and enforcement of the decisions of the General Assembly and consists of seven members and one representative for each university, elected by the General Assembly for a term of two years.

According to Article 19 of the Statute of the Cluj IT Association, the General Assembly has the following responsibilities: (1) establishes the strategy and objectives of the cluster, (2) approves and amends the Statute, the Regulation of organization and operation, (3) approves the annual income and expenditure and financial statements, (4) discusses the report of the Board of Directors and the Auditor's verification report, (5) selects the chairman of the Board of Directors, (6) determines the number of members, elects and dismisses the members of the Board of Directors, (7) determines the number of auditors, elects and dismisses the auditors, (8) approves the establishment of subsidiaries, (9) approves the changing of the name of the Cluj IT Association, (10) approves the dissolution and liquidation of the association, (11) debates the current issues of general interest for the cluster and adopts resolutions containing conclusions and proposals for action, (12) establishes the fees used in the functioning of the cluster, including the membership fee and their level. All members of the of the Cluj IT Association have an equal vote in the General Assembly.

Regarding the responsibilities of the Board of Directors, they are governed by Article 25 of the Statute and cover the: (1) providing of the operational management and

implementation of the decisions of the General Assembly, (2) composition and submission to the General Assembly of the Regulation of organization and operation, of the action plan and of the budget of income and expenses, (3) review and approval of the agenda and materials presented in the General Assembly, (4) completion of legal documents on behalf of the Cluj IT Association, (5) approval of the personnel policy of the association, (6) developing of strategies and tactics for the implementation of programs and projects approved by the General Assembly, (7) establishing of contacts with business partners, public authorities, NGOs, organizations and institutions abroad to develop the cluster (8) providing the management and coordination of the committees set up in order to implement the projects of the cluster.

The Board of Directors proposes to the General Assembly the following bodies and individuals who have a significant role in shaping the vision, direction and control of the activity of the Cluj IT Association. These are the Strategic Council, Scientific Council, the President of Cluj IT Association, the Executive Director and the auditor of the association.

The Strategic Council is composed of members who are important professional personalities from the political and economic domains, whose experience and relationships can support setting up the strategic direction of the cluster and promote its interests. The Strategic Council is composed from a president and an even number of members. The Strategic Council's recommendations are advisory to the Board of Directors. The Strategic Council shall: (1) assist the cluster in its development process, particularly in the implementation of the large-scale projects, (2) perform the evaluation of programs and provide recommendations for improvement, (3) promote the strategic programs of the cluster in order to increase their impact, (4) stimulate and promote public policies that can support the strategy of the cluster, (5) assist the cluster in identifying funding for future development.

On 14 November 2012, in Bucharest, have been held the first meeting of the Strategic Council of the Cluj IT Innovation Cluster. This event served to launch at national level this ICT cluster, as an important step in the development of the metropolitan area of Cluj-Napoca as the IT pole of Romania. The event was attended by many actors from the economic and political domains. A major current concern is to identify a field to provide space for long-term development of the cluster.

The Scientific Council is composed of members who are important professionals in the academic and scientific domain, whose expertise can support the cluster development by harnessing the results of scientific activity. The Scientific Council is composed of a president and an even number of members. The recommendations of the Scientific Council are advisory to the Board of Directors. The Scientific Council shall: (1) assist the Board in defining the strategies and methodologies used in the scientific work, (2) perform quality and relevance assessment for programs proposed for implementation, (3) assist the Board in identifying opportunities to exploit the results of scientific activity; (4) provide incentives for partnerships with institutions engaged in scientific activities, (5) provide support for multi-disciplinary research, (6) review the way of use of financial, human and material resources distributed to or resulting from the R & D and innovation activities.

The cluster organization has a president with a representative role appointed by the General Assembly. An Executive Director, who is appointed by the Board of Directors, carries out the management of the cluster organization and of the implementation process of the decisions of the General Assembly and of the Board of Directors and of the approved programs and plans.

4. CONCLUSIONS

If we are reporting the Cluj IT Innovation Cluster to key success factors that have an important role in the development of successful clusters (DTI, 2005, pp.5-7, 22-38), e

can make the following remarks. Among the key success factors analyzed are: a) partnerships to develop networks, b) innovative technology, c) human capital, d) physical infrastructure, e) presence of large enterprises, market and technology leaders, f) entrepreneurship; g) access to finance and h) specialist services.

When evaluating the existence of the partnerships to develop networks, we see that the launch of the cluster initiative benefited from trans-national partnerships built in the regioNet project. This project has taken into consideration best practices on ICT cluster development, being considered examples from Silicon Valley, the Luxembourg ICT cluster or the Barcelona Digital ICT cluster. The associative organizational form of the Cluj IT Innovation Cluster has been inspired by the cluster organization of Barcelona Digital. The 22@Barcelona innovation district and the Skolkovo Innovation Centre are references for the development of Cluj Innovation City. It is also noted the role of ARIES Transylvania in the development process of joint projects between the enterprises of the cluster. There are companies that have important shareholders from abroad (e.g. Arobs), there are companies that have opened representative office in Silicon Valley (e.g. in 2012 IQuest opened an office in Palo Alto, in order to support its extension strategy to international markets) and we notice companies that are subsidiaries of foreign companies (e.g. Endava, Recognos, ISDC), all these aspects favouring the building of international business partnerships.

Although the enterprises of the cluster are SMEs, the Cluj IT Innovation Cluster still enjoys the presence of the majority of the most important software development companies from this region. The majority of these companies have developed from the level of micro enterprises. There is a consolidated experience in providing IT outsourcing

services and products to national as well as international customers. The enterprises of the cluster have capabilities to cover the value chain in their field of activity from business analysis, product or service realization, implementation, maintenance, project management and communication, research and development capacity. The enterprises of the cluster have expertise in various economic domains and have developed products and services for areas, such as financial services, automotive, retail, telecommunications, logistics, pharmaceuticals, manufacturing, mobile applications, the public sector, and social media.

There are developing partnership projects between the universities and the enterprises of the cluster. The universities have had an important role in the formation of this cluster initiative as they have expressed the demand that the business community should articulate a single voice so that universities can adapt more easily to the requirements of the labour market. One of the joint projects of the companies from the Cluj IT Innovation Cluster and universities is aimed at the development of internships (so called joint trainings), which period was extended from two weeks to three months of practice. Another course of action is related to the preparation of the diversification of the curriculum of universities in order to adapt to the needs of the labour market. The universities from the cluster are already working on the development of alternative solutions, such as retraining programs for graduates in order to improve their skills. Other projects concern the improvement of the IT skills of High School graduates, so preparing them to ICT labour market opportunities. There is an objective to realize joint a human resources capacity plan with the universities.

Regarding the projects of the Cluj IT Innovation Cluster on infrastructure development we can remark the realization of a data centre in the TETAROM III Industrial Park, the realization of the Cluster Portal, the covering of international flights needs (the city of Cluj-Napoca has an international airport) and the launching of the integrated urban development project Cluj Innovation City. This is planned to become a modern extension of the city of Cluj-Napoca, which would host company headquarters, competency centres, conference areas and hotels. There are long-term projects to support the development of Cluj Innovation City, estimated to occupy an area of approximately 300 hectares with a total investment of 300 million euros and will ensure the workplace in the next 15 years, for more than 20,000 ICT professionals. For the first 5 years there are planned 80,000 square metres of offices for approximately 5,000 employees, along with research laboratories, hotels and other public places.

Cluj Innovation City is realized in a public-private partnership. It is a Community Project, the first of this kind in Romania. The management of the project will be owned by the private sector, while the infrastructure will be carried out with the support of the Government and the Cluj County Council. Cluj Innovation City will be built based on a green concept with the use of energy from renewable sources and of ecologic materials and structures. The city will host primarily the ICT companies of the region, but also other innovative companies. Emphasis will be placed on creating competence centres that provide support and advice for start-ups.

Analyzing the development process of the Cluj IT Innovation Cluster, we can remark the following conclusions and implications for the business management or policy:

- The role of universities in the launch of the cluster initiative. The universities have expressed the need for structuring the demand from businesses.
- The importance of public funds (structural funds and government funds) to launch and support the cluster initiative.
- The importance of catalyst organizations for the launch of the cluster and for facilitating the interaction between the three institutional spheres.
- The importance of good practices in the development of cluster initiatives in the ICT sector (Silicon Valley, Skolkovo Innovation Centre, Information Technology Cluster of Skolkovo, the Luxembourg ICT Cluster, the Barcelona Digital ICT Cluster) for the development of the Cluj IT Innovation Cluster.
- A combination in the development objectives of the Cluj IT Innovation Cluster of the objectives aimed for the development of cluster specific infrastructure (Cluj Innovation City – a long term project which aims to provide 80,000 square metres of offices for approximately 5,000 employees, along with research laboratories, hotels and other public places) and the objectives aimed for the development of cooperation projects.

ACKNOWLEDGEMENTS

This work was possible with the financial support of the Sectoral Operational Programme for Human Resources Development 2007-2013, co-financed by the European Social Fund, under the project number POSDRU/107/1.5/S/77946 with the title „Doctorate: an Attractive Research Career”.

ANNEX

Table no.2 List of the founding enterprises of the Cluj IT Innovation Cluster (financial data and labour related data are available for the end of 2011)

	Enterprise (field of activity)	Location	Turnover (RON million)	Number of employees
1	IQUEST TECHNOLOGIES S.R.L (Activities to realize software on order - customer oriented software)	Cluj-Napoca, Cluj County	50.9	265
2	IQ TECH LABS S.R.L (Research and Development)	Cluj-Napoca, Cluj County	0.11	20
3	ISDC ROMANIA S.R.L (Activities to realize software on order - customer oriented software)	Florești, Cluj County	20.3	157
4	NET BRINEL S.A (Other service activities on Information Technology)	Cluj-Napoca, Cluj County	55.8	69
5	CENTRUL DE INFORMATICĂ MINIERĂ S.A (Activities to realize software on order - customer oriented software)	Cluj-Napoca, Cluj County	7.7	21
6	ALPIS PRODUCT S.R.L (Manufacture of computers and peripheral equipment)	Cluj-Napoca, Cluj County	0.26	5
7	ARXIA S.R.L (Activities to realize software on order - customer oriented software)	Cluj-Napoca, Cluj County	0.94	21
8	ALTOM CONSULTING S.R.L (Other service activities on Information Technology)	Cluj-Napoca, Cluj County	1.2	10
9	CODESPRING S.R.L. (Activities to realize software on order - customer oriented software)	Cluj-Napoca, Cluj County	4.2	48
10	RECOGNOS ROMANIA S.R.L (Activities to realize software on order - customer oriented software)	Cluj-Napoca, Cluj County	4.3	52
11	VBM SOFT S.R.L. (Activities to realize software on order - customer oriented software)	Cluj-Napoca, Cluj County	0.13	2
12	LIGHT SOFT S.R.L. (Editing	Cluj-Napoca, Cluj County	1.5	10

	activities of other software products)			
13	ENDAVA ROMANIA S.R.L. (Editing activities of other software products)	Cluj-Napoca, Cluj County	38.6	314
14	XOOMWORKS DEVELOPMENT ROMANIA S.R.L. (Editing activities of other software products)	Cluj-Napoca, Cluj County	2.7	20
15	FORTECH S.R.L. (Activities to realize software on order - customer oriented software)	Cluj-Napoca, Cluj County	18.3	160
16	SMALL FOOTPRINT S.R.L. (Activities to realize software on order - customer oriented software)	Cluj-Napoca, Cluj County	4.5	5
17	AROBS TRANSILVANIA SOFTWARE S.R.L. (Activities to realize software on order - customer oriented software)	Cluj-Napoca, Cluj County	31.0 (in 2010)	49 (in 2010)
18	EVOLINE S.R.L. (Activities to realize software on order - customer oriented software)	Cluj-Napoca, Cluj County	35.6	253
19	SOFTWARE ITC CLUJ S.A. (Research and Development)	Cluj-Napoca, Cluj County	0.03	1
20	ARTSOFT CONSULT S.R.L. (Other service activities on Information Technology)	Cluj-Napoca, Cluj County	7.7	87
21	PITECHAPPS S.R.L. (Activities to realize software on order - customer oriented software) – established in 2011	Cluj-Napoca, Cluj County	n.a.	n.a.
22	EFFECTRO S.R.L. (Repair of computers and peripheral equipment)	Cluj-Napoca, Cluj County	0.74	6
23	SMART TECH 2000 S.R.L. (Activities to realize software on order - customer oriented software) – established in 2011	Cluj-Napoca, Cluj County	n.a.	n.a.
24	OPTIMA GROUP S.R.L. (Activities to realize software on order - customer oriented software) – established in 2011	Cluj-Napoca, Cluj County	n.a.	n.a.
25	IMPREZZIO GLOBAL S.R.L. (Activities to realize software on order - customer oriented software)	Florești, Cluj County	2.4	19
Total		Cluj County	288.9 (approximately 68.3 million EUR)	1594

Source: National Office of Trade Register

Note: the annual average exchange rate was 4.23 Romanian lei (RON) for one Euro

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