



REPORT

Clusters and Potential Clusters in Romania

- A Mapping Exercise -

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PREFACE AND ACKNOWLEDGEMENTS

The current report was elaborated in the frame of a bi-lateral cooperation agreement between the German Government (represented by the GTZ) and the Romanian Ministry of Economy (ME).

The GTZ was asked in 2009 to support the Romanian Government in drafting a comprehensive cluster policy strategy including a mapping of existing clusters in the country. The current report presents the mapping exercise, its results and subsequent policy recommendations.

It shall be noted here also that the results presented in this study reflect a snapshot taken within a period of some eight months. The results are actual, and we will outline that they are also reliable. Economic development and cluster emergence represent dynamic processes. Short to mid term changes of the situation thus need to be expected.

The actual consultancy work was carried out by two consultancy firms: ZENIT GmbH, Germany, and Inno Consult, Romania between June 2009 and January 2010. In total eight regional peer workshops were organised in order to identify clusters and potential clusters in the development regions in Romania. It needs to be stated, that the work had not been possible to be undertaken without the strong commitment and support of the relevant departments within ME. In addition to that, the analysis in the regions could only be performed thanks to the support of strong regional institutions which were able to organise the workshops and nominate the peers.

It is clear, that only through this support the current study could be drafted. However, all mistakes, errors and any other failure fall under the sole responsibility of the two consulting firms.

We hope that the current analysis will contribute to an efficient discussion of clusters and cluster policy issues in Romania.

(MG / DC)

Mülheim and Ruhr/Bucharest, February 2010

1. GENERAL CONSIDERATIONS ON CLUSTERS

Today Michael PORTER is often being regarded as the Spiritus Rector of a cluster orientated economic development policy. According to his works, clusters can be defined as geographic concentrations of interconnected businesses, suppliers, and associated institutions (like universities, associations) in a particular field.¹ This definition is still widely accepted. However, first proposals for a cluster based view in economic development date back to the 1960s.

In this chapter we are going to briefly describe those concepts and their development towards the modern Porter interpretation. Against this background we will display selected cases of international good practice in cluster policy and finally we will try to propose a "Romanian model" of clusters.

1.1 THE CONCEPT OF CLUSTERS: BACKGROUND AND DIFFERENT APPROACHES

The cluster concept has a long history. Over the years it has received many names, including "pole of competitiveness", "industrial district", "concentration" etc. Today, a popular name is "cluster" or "pole of competitiveness" (in France and Belgium), but the most frequently used term is "cluster".

Professor Michael PORTER² is considered to be the inventor of the "cluster" term; he defined it as "a geographical concentration of interlinked companies and institutions from a certain economical field". From Porter's (1998)³ point of view, clusters have the following components:

- Interlinked industries and other entities, such as specialized suppliers and the according infrastructure;
- Distribution channels and customers, complementary product and service providers and companies affiliated as competencies, technologies etc are concerned;
- linked institutions, such as research institutions, universities, benchmarking organisations, training entities and others.

The most important dimension of a cluster is the distance between the companies and as a result the entire cluster theory is based on the geographical proximity. Nevertheless, there are also other dimensions like technological gap (how similar are the technologies used by the two enterprises), differences between the firms in

¹ PORTER, M. E. (1998), Clusters and the new economics of competition, in: Harvard Business Review, Nov./Dec., Vol. 76 Issue 6, p. 77.

² See PORTER, M.E. (1990), The Competitive Advantage of Nations, Free Press

³ See PORTER, M.E., (1998)

regard to the labour force qualification, market position and social relationships, which determine clusters.

1.1.1 Industrial Links: Supplier – Client Relations and the Value Chain

The most simple picture of clusters results from the description of supplier-client relations. Most of the firms buy "inputs" (raw materials, services, components) from other companies. In turn, other enterprises sell their products to other firms. Having a dense network of suppliers and clients near by turns this factor into a competitive advantage for the related companies. Porter's Model of cluster interaction regards the "value chain" element as the competitive advantage of a firm which derives from the way the company manages its activities, starting with the product design and raw material purchase and ending with marketing and service. Because many of these activities demand interactions with other supply-firms, professional service providers, distributors, clients and others, the geographical positioning of the company becomes essential for its strategy definition (Porter 1990). The importance of the client-supplier relations has increased once the companies have gone astray from the vertical integration model.

The concept of the "value chain" derives from the theory of Alfred MARSHALL (1842-1924) who showed that a geographical concentration of a certain industrial sector shapes the specialisation of the suppliers. For example, within the clusters from Northern Italy – small firm clusters – the enterprises are specialised in the different stages of the production process; between them we can identify strong cooperative relations.⁴

Marshall based his theory on the observations he made on the situation of the industrial districts in England. He identified three reasons for which the companies in closer proximity are more efficient than others which act at distance from one another. This theory is called "Marshall's trinity" and the reasons are:

- labour force basin;
- Supplier specialisation;
- Know-how transfer.

Marshall noticed that a concentration of similar companies attracted, developed and made use of a "labour force basin" with a common qualification set. On the other hand the specialised workers have a reduced economical risk because of such a huge number of employers. Marshall also detected that industrial concentrations developed a good market for suppliers and created conditions for them to improve and specialise their offer. This, eventually, translates into productive advantages for

⁴ BIANCHI, A. and GUALTERI G (1987), *The External Growth of Through Merger and Acquisition: The Italian Experience, 1983-1986*, Bologna: Nomisima.

the clients. Concurrently, Marshall discovered that ideas "travelled" a lot faster from a firm to another in an industrial concentration, this is what the economists call today "externalities".

1.1.2 Regional Sciences

Regional sciences build upon Marshall's theory that enterprises benefit from their proximity. One of the most prominent regional scientist, the urbanist Jane Jacobs argued, that cities play a major role in economic development. Although not an economist, but a good observer of urban realities, she came to the conclusion that "city knowledge" was the trigger of economical progress⁵. The size and diversity of the cities lead to new ideas. In Jacobs' opinion, creation of new products and technologies is a source of economic development.

1.1.3 Porter and the Competitive Advantage Theory

Traditionally, the economic success of a region/country depended directly on the availability and abundance of the production factors: labour, land (natural resources) and capital. This classical theory of economic development explained very well the economic phenomenon of the 19th century. Later, along with the amazing success of countries such as Japan or of regions such as the Silicon Valley, which were completely bare of any natural resources, this theory proved to be outdated. The solution was found by Michael Porter who, in his masterpiece "Comparative advantage of nations" (1990) showed that the economic success depends on the interaction of some factors, which later were grouped in Porter's so-called "diamond".

The factors which define the economical success of a region/country are:

- availability of resources;
- access to information, upon which companies decide to take specific actions using the according resources;
- objectives of each company;
- Pressure upon firms towards innovation and investments.

1.1.4 The New Diamond of Innovation

In today's economic context, one does not only speak about clusters. Often the discussion goes about innovative clusters. Innovation can be seen as a result of interactions between different actors from the innovative systems. The systemic view of innovation was first promoted by LUNDVALL⁶ (1992) and NELSON⁷ (1993), and

⁵ JACOBS, J. (1969.), *The Economics of Cities*. London: Penguin Books

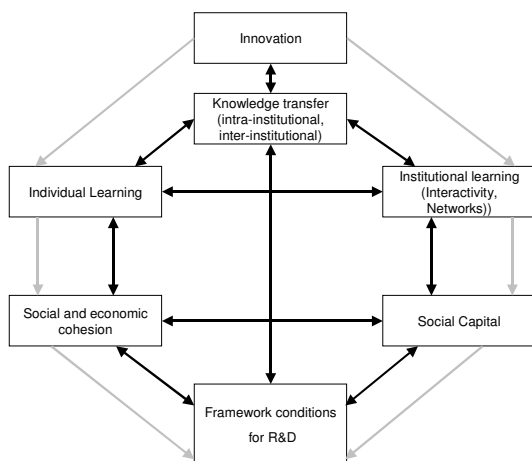
⁶ See LUNDVALL, B.A., Ed. (1992), *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*, London.

⁷ See NELSON, R.R., Ed. (1993), *National Systems of Innovation: A Comparative Analysis*, Oxford.

more recently by GUTH⁸ (2004). Considering these new ideas, the traditional linear model of innovation becomes less relevant. Learning, trust and social capital turn into foundation piles of this model.

The "New Diamond of Innovation" Model was developed by GUTH, M. (2004), taking into consideration the competitive advantage theory of PORTER and the individual and institutional learning concepts⁹.

Figure 1: New Diamond of Innovation



Source: GUTH, M. (2004)

1.1.5 The Triple Helix Model

All theoretical and historical considerations revealed so far, concluded into today's paradigm of the "triple helix" as a model for successful cluster initiatives. According to this model a cluster must consist of following categories of actors:¹⁰

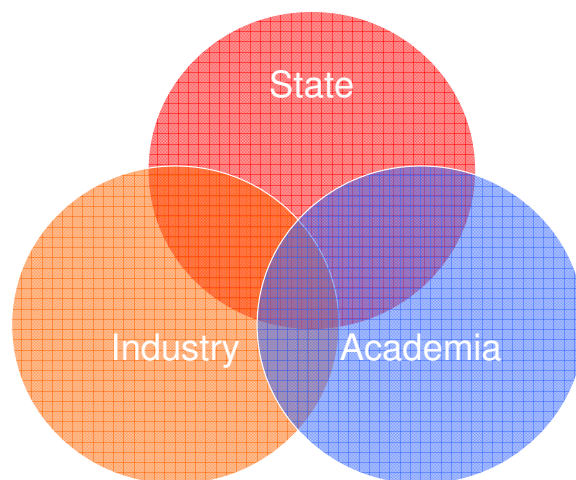
- Universities, research institutes – as suppliers of innovative products, technologies, processes and services;
- Industry, especially SMEs – which represent the innovation demand and in an ideal case they should determine and absorb the offer mentioned above;
- Authorities responsible for the process facilitation (ministries, regional authorities, etc).

⁸ See GUTH, M. (2004), Innovation, Social Inclusion and Coherent Regional Development: A new diamond for a socially inclusive innovation policy in regions, Discussion paper on the Conference on Territorial Cohesion, Galway

⁹ Research activity was financed by Hans Böckler Foundation, Germany (www.boeckler.de)

¹⁰ See ETYKOWITZ, H.(2002), The Triple Helix of University-Industry-Government Implications for Policy and Evaluation, Institutet för studier av ut b i ldnings och forskning, Stockholm.

Figure 2: The Triple Helix



1.2 INTERNATIONAL BEST PRACTICE

International "best practice" is often used as a benchmark for policy making. It is clear though, that the selection of the cases determines the results. For the work presented herewith we used results from two major international comparative studies on the drivers for success of cluster approaches. Secondly, we applied the results of a recent (unpublished) benchmarking study implemented on behalf of the Romanian Ministry of Economy, which is focussing on structural features of different cluster policies.

1.2.1 Drivers for Success

During the last 20 years, the concept of clusters has gained huge interest and acceptance amongst policy makers in Europe and the US. Hundreds of cluster initiatives emerged – some with astonishing success, whilst others ended in collapse.

One of the first comprehensive international analyses about the structure, the mechanisms and the outcome of clusters was provided in The Cluster Initiative Greenbook (2003).¹¹ With this publication both scientists and practitioners received a first insight into the characteristics of successful clusters.

¹¹ SÖLVELL, Ö, LINDQVIST, G and KETELS, C. (2003), The Cluster Initiative Greenbook

It cannot be surprising that this early work which analysed more than 250 cluster initiatives¹² did not identify a single mono causality. On the other hand, the research team was able to group various factors for success around three main drivers:

- the objectives,
- the setting (comprising of the business environment, the policy and the strength of the cluster), and
- the process.

Without oversimplifying we can summarise main characteristics for success as follows:

- Clusters are unique. They follow different objectives and approaches and they are built on the national socio-economic and cultural framework conditions.
- High level of trust between companies and between the private and the public sector as well as influential local government decision makers are clearly related to good performance.
- Cluster initiatives supporting strong clusters (high concentrations, strong value chains, high visibility) are more successful. Those initiatives which focus on sectors which are already advanced usually do achieve better results.

In a more recent study GUTH, M. et al (2007)¹³ analysed 15 cases of good practice in clusters against the background of a "new diamond of innovation" (see Figure 1). Without going too much into details it shall be noted here, that this work took on board the question of social cohesion and particularly the issue of learning, when analysing drivers for successful cluster policies. For the current exercise, namely the mapping and analysis of Romanian clusters, both aspects seem to be of specific relevance:

Cohesion and related aspects of employment and social security represent a key factor for any policy initiative in transition environments. With the current crisis this argument even wins in dominance. The capacity to learn, generally, can be regarded as important determinant for economic success in the knowledge society.¹⁴

Against the background of these theoretical considerations the work from GUTH et al. (2007) revealed some important findings:

¹² Cluster initiatives were defined as: "... organised efforts to increase the growth and competitiveness of clusters within a region...." SÖLVELL, Ö, LINDQVIST, G and KETELS, C. (2003), p. 15. For the purpose of our own analysis, cluster initiatives (CIs) are very similar to cluster policies.

¹³ GUTH, M. et al. (2007), Erfolgsdeterminanten für eine sozialintegrative regionale Innovationspolitik, Edition der Hans Böckler Stiftung, 180, Düsseldorf, p. 22.

¹⁴ The standard reference for this is FLORIDA, R. (1995), Towards the Learning Region, in: Futures, 27, p. 527-536.

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- Successful cluster strategies focus their activities on the facilitation of individual but also of institutional learning. Managers of those clusters are able to initiate, to accompany and to control learning processes. Important in this context was the support for inter-institutional learning (between firms or between firms and institutions).
 - The most successful innovation and cluster strategies are able to integrate all relevant actors. This starts with the formulation of the strategy and the objectives. The analysis revealed clearly that cluster strategies which build on external expertise only, are much more likely to fail than integrative approaches where the partners contribute with their knowledge (and commitment) to the formulation of the cluster strategy.
 - The issue of social cohesion is more complex. Not all successful cluster approaches take on board questions of labour market and social inclusion. However, GUTH et al found empirical evidence for the thesis that in regions which are already suffering from economic decline, the integration of aspects of the labour market into the cluster strategy led to better results. This finding is of particular relevance for Romania as it is currently undergoing both the transition process and the deepest economic crisis after the revolution.

1.2.2 Some Structural Observations

As already said above, the structural observations are based on a recent unpublished benchmarking study which was conducted on behalf of the Ministry of Economy. In this survey cluster policies in three countries (France, Germany and Sweden) have been analysed.¹⁵

Looking at the structure of clusters, the benchmarking revealed that all countries are following more or less their own approach:

- In Sweden we can see – after a period of reluctance – an explicit application of the triple helix model, almost as described in the text books. It is clear however, that Sweden could build this approach on a long tradition for industry-science cooperation as driver for economic development. A systemic view of innovation represents the basis for innovation policy in the country. The cluster support programmes finance the costs for the management of cluster processes and for training measures. To some extent also smaller regional R&D projects receive support. More significant (more costly) actions need to seek financing from elsewhere.

¹⁵ MINISTRY OF ECONOMY and GTZ (2009), Some strategic considerations for a comprehensive cluster policy approach in Romania

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- In France we see a slightly modified triple helix approach. A public partner is not a must, but can be invited. What is clear is that the cluster concept in France is a tool striving for excellence. As compared to Sweden, the French concept resembles more to a network one. The funding provides finances both for the cluster management as well as for joint projects (primarily R&D projects).
 - In Germany, mainly due to the Federal organisation of innovation policy, we find many different approaches. The triple helix is being applied but mostly implicitly. The country knows both classical support schemes for clusters as well as programmes financing the emergence of networks. International visibility as well as excellence are main selection criteria for funding. Funding is being provided for the management of the clusters and sometimes for cluster projects as well. Often the projects (e.g. a common R&D activity) need to find resources from elsewhere. In these cases the cluster works as project facilitator rather than a financier.

Against the background of the international good practice we will now reflect the Romanian situation and propose a cluster concept, tailor made to the socio-economic framework conditions in Romania.

1.3 ROMANIAN EXPERIENCES

In Romania, the planned and autarchic economy before 1989 was leading towards a certain type of clusters, namely the former "industrial centres". The period after the Revolution was marked by a huge decrease of the industrial activity, by a relocation of resources and a repositioning of the economy. It is only after 2001, when the economical growth has finally started, that a discussion about industrial concentrations makes sense.

A number of studies identified industrial concentrations similar to clusters in Romania. The first one was coordinated by the International Centre for Entrepreneurial Studies (CISA) in Bucharest in 1998. This research¹⁶ was commissioned by the World Bank's Institute for Economical Development and it focused on the competitiveness of the Romanian entrepreneurs. The analysis identified the existence of three "incipient" cluster forms for software manufacturing, naval engineering and wood industry.

Another major reference of the cluster research field in Romania is the analysis¹⁷ by Marco Riccardo FERRARI, research assistant of Economical Department of the University of Milano. The study was based on the Italian methodology of industrial

¹⁶ CISA (1998), *Avantajul Competitiv al Regiunilor: Evaluare a Competitivității de Țară*.

¹⁷ FERRARI, M.R., (1999), *Small Enterprise Clusters for Local Development in Transition Context: the Case of Romania*, Bocconi University, Milan

districts identification¹⁸. The survey identified also three "proto-districts"¹⁹, for the wood, textile and ceramics industry.

A third relevant research study was developed by Valentin IONESCU²⁰, whose analysis was based on the previous studies. In his study, Valentin Ionescu observes the difference between applied methodological criteria by other studies and underlines the uncertainty of a cluster definition. The researcher agrees that there are no functional clusters in Romania, regardless of the definition used. Nevertheless, Valentin Ionescu gives evidence of the presence of the "proto-clusters" or "emergent clusters". The analysis questionnaire was applied only to two possible clusters, one in the ceramics industry (Alba) and the other one in the software industry (Bucharest).

The fourth relevant source for the situation of the Romanian clusters is the VICLI²¹ project, developed within the European Program INTERREG II C - CADSES²². The project began in 1999 and lasted until 2001 and tried to identify and to support the cluster development by means of regional know-how transfer. Romania was a partner country in the project and the Transnational Expert Group designated Harghita County as an eligible pilot area for the implementation of the project methodology. The VICLI final report for Romania identified four potential clusters that emerged in the Harghita County (Region Centre): wood processing, pottery, printing and equipment.

A fifth important project of cluster studying in Romania was the INCLUD²³ project, financed by Interreg III B CADSES Programme. The project run during 2003 - 2004 and its objective was the study of potential clusters in the partner states from Central and Eastern Europe as well as their support based on the Austrian and Italian experience. Thus, some potential clusters were identified in the textile sector (North-East Region, Bacau County and Region West, Timis County), software (Timis, Cluj and Bucharest), wood processing, steel components and metal products (Region Centre). Moreover, the Brasov County had concentrations of companies in the area of chemical industry, machinery and engines.

¹⁸ BECATTINI, G. and PIKE, F. (1979) in "Dal settore industriale al distretto industriale" and BECATTINI, G. and PIKE, F. (1990) in "Industrial Districts and Inter-Firm Cooperation in Italy"

¹⁹ Term invented by Marco Riccardo Ferrari

²⁰ IONESCU, V., (1999), Supply-Side Strategy for Productivity, Competitiveness and Convergence between the CEECs and (in) the EU - Romania Case Study.

²¹ Virtual Clustering Identification and Dissemination of Strategic Territorial Planning Best Practices for Certain Countries of Danubian and Southern Europe

²² CADSES – Spațiul Central Adriatic Danubian Sud-Est European (Central Adriatic Danubian South Eastern European Space);

²³ Industrial Cluster Development

Another reference for research in Romania was the WEID²⁴ project, which investigated, through case studies, the relations between clusters, at European level. The project ran for three years, during September 2001 and end of 2004. The project gathered seven partners from Western Europe (Germany, Italy and Great Britain) and Central and Eastern Europe (Czech Republic, Poland, Slovenia and Romania). From a total of 15 case studies, two referred to Romania and the existence of potential clusters in two areas – Banat and Crisana - in the footwear industry and sportswear.

The last, but not least, reference for the analysis of the potential cluster development in Romania is the CURAS²⁵ Programme, which was financed within the Cooperation Agreement between the Romanian and the Flemish Governments. The project aimed at improving the quality level and the efficient use of SME resources in the automotive components sector. The result of the program would have been the implementation of an NGO as a first step towards the institutionalization of a functional cluster within the automotive sector, located near the Dacia-Renault plant, nearby Pitesti, Arges.

Unfortunately, the results of these studies, as good as they might have been both from a scientific as well as from the point of view of the application methodology were not followed by a coherent supportive action on the side of the Romanian authorities and their conclusions barely withstand the 2010 actuality test. However, methodological approaches are still of relevance and the most important of them have been also included in the approach of the current mapping exercise.

Some of the more recent initiatives aiming at developing innovative clusters in Romania, turned out to be more relevant and should thus be mentioned here as well:

The FP6 Project "Romanian Days of Innovation", run between 2004 – 2005 having as an objective to develop innovative networks at national level in the fields of ICT and biotechnologies²⁶. The ICT network was later enhanced also by means of a national CEEX project "PROM IST PC7" (2006-2007).

Another initiative, this time in support of the automotive suppliers, was the FP6 project "SPRINT" (2005-2007) which had as an objective the development of an innovative network of automotive suppliers in Romania²⁷. The novelty of this project consists in the interest conferred to the research-development activities by creating joint industrial research nuclei in regard to specific topics of research. Twelve such research nuclei have been identified, still working today.

²⁴ West-East Industrial Districts

²⁵ Clustering and Upgrading Romanian Automotive Suppliers

²⁶ See also <http://www.rodin.ro/>

²⁷ see www.sprintnetwork.ro

Concerning the wood and furniture industry we can mention the FP7 Project "Pro Wood" (2008-2010) and it aims at establishing an innovative cluster in the Region of Brasov – Covasna (see box 1).

Finally, in 2008 the Ministry of Economy launched a new campaign of identifying existing emerging clusters in Romania. One of the actions undertaken was a national project aiming at elaborating a handbook for cluster development (Innov Cluster).

1.4 CONCEPTUAL CONSEQUENCES FOR ROMANIA

Compared to many other European Countries, Romania's tradition for general cooperative structures, for deliberate public-private cooperation and for industry-university collaboration suffers from the distortions of the socialist system. Cooperative activities – particularly in a public-private context – often lack trust. Consequently, the three natural partners of the "Triple helix" model hardly cooperate. It seems, there is gap between the world of those three actors, which is difficult to overcome. Voluntary cooperation thus is the exception.

To this end, for the Romanian reality the triple helix way of thinking needs to be modified to a "Four clover" model, where the fourth actor is being represented by catalyst institutions: service providers in the field of innovation and technological transfer, centres for technological transfers, chambers of commerce etc. Amongst these we can further differentiate between specialised service providers (experts in the industrial field of the clusters) and generalist consultants dealing with management, communication, project generation etc. It is obvious that the actors within this model have different contributions and interests, which have to be harmonised.

Figure 3: Interests of different actors in the "Four clover" model

Partner		Contribution	Effect/Benefits
Education and Research <i>Universities, R&D institutes</i>		<ul style="list-style-type: none"> • applied up to date research • Information, know-how transfer 	<ul style="list-style-type: none"> • curriculum adjustment • new laboratories sponsored by industry • continuous learning • research cores
Industry		<ul style="list-style-type: none"> • cooperation • availability of production capacities 	<ul style="list-style-type: none"> • added value growth • another competitive advantages
Public authorities		<ul style="list-style-type: none"> • mediator • dissemination at central, regional and local level • direct support 	<ul style="list-style-type: none"> • central, regional and local economical development
Catalyst Institutions	Specialised service providers	<ul style="list-style-type: none"> • know-how transfer 	<ul style="list-style-type: none"> • added value
	Generalist consultants	<ul style="list-style-type: none"> • Coordination • dissemination at national and international level • know-how transfer 	<ul style="list-style-type: none"> • participation to an innovative network

Furthermore, in our opinion, when talking about the development of clusters in Romania, one has to consider the following approaches:

- **supply chain relations**, based on the neo-classical economical theory;
- cities' influence, as **urban growth poles** which create externalities, as described in the theory of the new geographical economy;
- **clusters/competitiveness poles** based on the complex relations between different actors (enterprises, research-development specialized institutions, public authorities, catalyst organisations) and based on the competitive advantage theory of Porter, on Triple helix – Four clover paradigm and on the „New Diamond of Innovation”.

The above mentioned considerations both from the institutional point of view (industry – R&D – public bodies- catalyst organisations) as well as from the point of view of the complex relations between actors (supply chain, role of cities, non-linear model of innovation) can be translated to the following five operational vectors allowing to drive clusters:

Concentration

It has been already argued (Marshall, Porter etc) that one of the most important dimensions and criteria of defining a cluster is the spatial proximity between enterprises. This vectors analysis the cluster form two points of view: *Where is the cluster located?* (town, county, region) and *Who are members of the cluster?* (are there big enterprises which act as a driver of the clusters? – e.g. Dacia in the Automotive cluster in Pitesti; are there big foreign investors within the cluster? – e.g. Siemens in the ICT cluster in the West Region).

R&D Units

This vector is based on the role of innovation as an important prerequisite of economic development. Furthermore, clusters are an immediate application of the non-linear innovation model. The questions to be asked are: *where* these units are located and of what kind they are (universities, research institutes, private research departments at the level of the enterprise).

Labour Force

One of the most important economic effects of clusters as an instrument of economic development concerns the labour force from the point of view of employment (availability of labour force), quality and specialisation. This vector answers to the questions: is there enough available labour force?; what is the quality of the labour force? (here a further differentiation might be of importance, i.e. between higher education graduates and secondary and inferior education graduates); are there qualification services available within the cluster?

Cooperation

Here we come to a very important criterion which differentiates a cluster from an industrial sector strongly represented in one region. Cooperation can occur between all the actors of the model as it was shown in Figure : enterprise – enterprise what production concerns, along the supply chain (vertical) or horizontal, enterprise – R&D Units (as it is the case of the Research nuclei established within the automotive cluster in Pitesti gathering university and enterprises on specific research topics, see www.sprintnetwork.ro) etc.

Third party service suppliers

This vector refers to the fourth leaf of the Four clover model, i.e. catalyst organisations like chambers of commerce, consultants in project and process management as well as to specialised service providers like technology transfer centres and other innovation actors.

2. THE CLUSTER MAPPING EXERCISE

Basically we can differentiate between two possible options for identifying and mapping clusters:

- (1) Statistical approach
- (2) Peer Review approach

Both methods are being applied at times and both have specific advantages and shortcomings.

2.1 METHODOLOGY

In our Porterian definition, clusters represent a geographic concentration of interconnected businesses, suppliers, and associated institutions (like research institutions, training organisations) in a particular field of the economy. An important feature of clusters is thus a certain density of firms in a specific industry (e.g. ICT or wood). With a statistical approach (based e.g. on NACE codes) regional zones of higher density of firms in specific sectors can be measured. The indicators need to be decided upon (e.g. portion of employment in a given NACE sector in a NUTS 2 region) and also the thresholds need to be defined (e.g. > 10 % of average in the region/country).

The statistical method is one approach which is being applied in order to identify clusters. As far as Romania is concerned, there were doubts about the data availability as well as about their actuality. Also, the definition of both the indicators and the thresholds may have prejudiced the results gained.

Box 1: The Pro Wood Case

The Four clover model is currently being applied in the field of wood processing and furniture in the case of the „Pro Wood Cluster”, in the region Brasov-Covasna (www.prowood.ro). The four categories of actors are represented as follows:

Box Figure 1: The Four clover model in Pro Wood



The analysis of Pro Wood according to the vectors defined above is presented as follows:

Box Figure 2: Summary of the Wood Cluster in Covasna

Concentration	R&D Units	Labour Force	Cooperation	Third party suppliers
Covasna	Faculty of Wood Industry within the University "Transylvania" in Brasov (sole in Romania)	Quantity: 3 Quality: <ul style="list-style-type: none"> superior:4 medium and less: 2 Qualification: 3 (industrial high schools in Sf. Gheorghe, Tg. Secuiesc etc)	<ul style="list-style-type: none"> "Technology audits" in enterprises performed by university professors Qualification projects industrial high schools - enterprises 	<ul style="list-style-type: none"> EEN points in Brasov (University Transylvania) and Sf. Gheorghe (ICPE CA) COVIMM (consultancy)

The establishment of the Pro Wood cluster, financed in the framework of an FP7 project (2008-2010) followed a specific procedure which may be considered as exemplary for other cluster generation process as well:

(1) Identification of partners

The cluster is built upon the initiative of the Association of SMEs in the county of Covasna (ASIMCOV) – representing the industry. R&D is represented by the University "Transylvania" in Brasov, the public authorities by the County Council of Covasna. The project is being supported by a series of specialised service providers as the Fraunhofer Institute for Wood Industry in Braunschweig, the TTS Institute for Optimisation of Work Processes in Helsinki and the French Pole of Competitiveness Cribois in Metz. The management is being supported by ZENIT – the Centre for Technology Transfer and Innovation in North Rhine – Westphalia, Inno Consult (Romanian consultancy enterprise) and the gtz.

(2) Analysis of current situation

This was performed via a thorough desk research and questionnaires. The problems identified were discussed in peer review workshops and out of it resulted the main topic of the cluster activities: use of IT solution, marketing and enhancement of the cooperation between school and enterprises.

(3) International best practice exchange

The Romanian partners visited similar clusters in Finland, France and Germany in order to adapt appropriate solution for the Pro Wood cluster

(4) Elaboration of an action plan

Based on the identified problems, appropriate activities were proposed and pursued such as: establishment of a marketing department at the level of the association, participation to fairs with common stands, joint training projects between schools and enterprises, technology audits performed by university professors in enterprises etc.

The peer review approach is based on the opinion of local/regional experts (=peers). This approach is more subjective, but on the other hand, the snapshot taken from the peer process is more actual and does not rely on out-dated empirical material.

Unfortunately, for the current exercise we could not implement both methodologies. Because of this we tried to find a combination of the two approaches. On the one hand we screened published regional development documents concerning clusters and on the other hand we organised a series of regional peer workshops in order to reflect the views, the knowledge and the perspectives of the stakeholders and experts in the eight development regions in Romania.

The eight workshops were implemented between October 2009 and January 2010. Each event was organised in one major location in the respective NUTS 2 region together with a renowned regional host (RDAs, Chambers, County Councils). The workshops started with a presentation of the cluster policy in Romania. A theoretic presentation of the notion of clusters in regional economics as well a summary of some international cases of good practice followed. The first part of the workshop always ended with some remarks about the cluster situation in the given region (presented by a regional stakeholder). In the second part of the event the actual peer process was moderated by the consultants. The objective of this part was the identification of existing and potential clusters in the region. After a general discussion, a list of clusters was drafted and prioritised. In a second round, the identified clusters were assessed following the main vectors of the herewith proposed Romanian cluster model:

- **Concentration** (which firm, where in the region);
- **R&D units** (which research centre, which university, where);
- **Labour Force**; in this vector the issues of quantity, quality and quantification (3Qs) were evaluated. For each issue the peers could dedicate between 1 (low) and 5 (high) points;
- **Cooperation** (existing or planned projects, other types of cooperation e.g. joint curricula); and finally
- **Third party service suppliers** (who provides additional services relevant for the cluster).

The results of the discussions were summarised in a matrix (see annex 1).

2.2 FIRST RESULTS OF THE WORKSHOPS

As mentioned above, in total eight workshops were conducted in the NUTS 2 regions in Romania. Generally the setting as described above was feasible. However, in two workshops the consultants were confronted with problems:

- In Timisoara, due to a huge number of interested participants and subsequent vibrant discussions, a rather long list of potential clusters was identified. In the frame of the time foreseen for the event, not all clusters could be discussed. As a result only for the two most important clusters the information was gathered. In the aftermath of the meeting the RDA conducted an additional survey which brought up further information²⁸. However this information does not yet fit into the matrix developed for the current exercise. As a methodological consequence, the consultants introduced for the following workshops (Timisoara was number 2) sub-working groups focussing on only one or two clusters identified.
- In Sibiu only three peers participated at the event. The results gained from this exercise thus need to be further justified.

In the current chapter we are presenting the results of the mapping exercise in two stages. First we provide an overview of the results and in a second step we take a closer look at the regions.

2.2.1 Overview

Table 1 below displays some important results of the mapping:

- In total we found 55 clusters or potential clusters in the eight regions. Although the results of the different workshops should not be used too much for comparing the single regions, we see that we have identified on average seven clusters per region. This speaks for a rather coherent regional distribution.
- What we see from the single results (see tables in annex 1) is, that the experts assessed the labour force situation as rather favourable. Table 1 shows the aggregated average figures. The top assessment would be 15 points. On average we see 11.28 points, representing 75 per cent of the maximum value. This finding goes along with several studies and surveys (e.g. innovation scoreboard) which also identified skilled labour as an asset for the country. To this end it is interesting to see which clusters were regarded to have a less favourable labour endowment (below 10 points). We can make out in total nine clusters from five regions performing with regard to this indicator below 10 points:
 - in Bucharest/Ifov the food cluster
 - in the North West the clusters clothes, tourism, wine and wood
 - in the South West agriculture and tourism
 - in the South glass; and
 - in the South East also tourism

²⁸ This survey was put at the disposal to ME as a separate document.

In three regions labour force in the field of tourism seems to have some potential for further improvement. Also the wider agriculture and food sector (incl. wood and wine) could profit from a more sophisticated labour force.

Table 1: Overview of Mapping Results

Workshop Location	Region	Number of Clusters identified	Average labour force assessment	Average number of cooperation projects	Average number of Third party service providers
Bucharest	Bucharest Ilfov	8,0	11,10	1,0	2,25
Timisoara	West	8,0	12,75	1,0	2,50
Sibiu	Centre	5,0	12,50	1,0	1,20
Cluj	North West	7,0	11,30	5,5	2,50
Piatra Neamt	North East	8,0	10,30	1,4	1,25
Craiova	South West	6,0	10,60	2,1	3,80
Calarasi	South	8,0	10,90	1,5	2,75
Braila	South East	5,0	10,80	1,2	1,80
Total		55,0	90,25	14,7	18,05
Average		6,9	11,28	1,84	2,26

Source: Consolidated results of eight peer workshops, own calculations.

- Another important criterion in our cluster definition is the cooperation issue. We consider the cooperation aspect of high importance in recognising a cluster identified in the peer review process. Table 1 therefore reveals a main weakness of the cluster scene in Romania: the lack of cooperation. Again, we should not over interpret the results of the workshops. Particularly the summary in table 1 with two decimal digits may pretend a certain accuracy which is certainly not (!) the case. However, we see that in six of the eight regions the peers identified an average cooperation number of below 1.5! That means that on average not even two cooperation projects could be identified in those cases. In the South West we see an average of two cooperation projects per cluster, which is hardly better. And – as a special case – in the region North West an average of 5.5. The latter result was however influenced by one cluster in the region, namely the Geo Thermal Energy Cluster, where the peers recognised 25 cooperative research projects within the cluster. Without taking into account this specific case, the region would have scored in this criterion only 2.0.

To summarise: as far as the important issue of actual cooperation is concerned, the Romanian clusters are weak on average. This raises the question, to what extent we can really speak about clusters. Or whether we have identified more a

kind of potential clusters in economic sectors which are dominant/strong in a given region. We must admit however, that particularly this criterion of deliberate cooperation is rather difficult to be assessed by external peers. The results we have yielded by now should thus be taken with some caution. To some extent the clear picture of lack of cooperation, coming from our peer review exercise, need to be further consolidated before drawing too far reaching conclusions and recommendation.

- A final point summarised in Table 1 is the issue of specialised service providers in the technology fields the identified clusters are covering. The data compiled here reveals further weaknesses: (1) the lack of innovation service providers available/active in the country as well as (2) the reluctance of Romanian firms in using business services, particularly innovation support services. This is particularly regrettable as international good practice (e.g. in the Silicon Valley) shows that especially those innovation service providers can make the difference between success and failure of cluster strategies.

It is not only the bare figures which supported our finding of an insufficient pervasion of innovation service providers in the country. When taking a closer look to the actual entities recognised by the peers, we see to a large extent players like regional development agencies and chambers. Without questioning the quality of the services provided by those actors, still It is clear that these service providers usually do not offer highly specialised services for businesses in a given cluster field. That makes them less relevant as drivers for successful cluster activities. Therefore we have to conclude, that the availability and utilisation of specific innovation services in the clusters identified is insufficient.

The overall findings so far can be summarised as follows:

- (1) In total 55 clusters were identified; i.e. seven clusters per region
- (2) The labour and human capital endowment is rather favourable and can definitely be regarded as an asset of the Romanian clusters. Deficits were identified in tourism, in the wider agriculture and food sector (incl. wood and wine) as well as in the glass industry.

Table 2: Identified Regional Clusters

Region	Workshop Location	Identified clusters
Bucharest Ilfov	Bucharest	<ul style="list-style-type: none"> ▪ Furniture ▪ ICT ▪ Clothes, shoes and fashion ▪ Audiovisual services ▪ Construction materials ▪ Food industry ▪ Logistics ▪ Publishing
West	Timisoara ²⁹	<ul style="list-style-type: none"> ▪ Automotive ▪ ICT ▪ Construction & Material ▪ Printing ▪ Tourism ▪ Agro Food ▪ Machinery Production ▪ Textile
Centre	Sibiu	<ul style="list-style-type: none"> ▪ Wine ▪ Automotive Sibiu ▪ Automotive Brasov ▪ Pharmaceutical Industry ▪ Pottery
North West	Cluj	<ul style="list-style-type: none"> ▪ ICT ▪ Electro Technology ▪ Medical Services ▪ Geo Thermal Energy ▪ Bio Products ▪ Bio Nutrients and Cosmetics ▪ Bio Fuels
North East	Piatra Neamt	<ul style="list-style-type: none"> ▪ Clothes and Footwear ▪ Bio Medicine ▪ Tourism ▪ Agro Food ▪ Wine ▪ Pharmacy ▪ ICT ▪ Wood
South West	Craiova	<ul style="list-style-type: none"> ▪ Automotive ▪ ICT ▪ Energy ▪ Tourism ▪ Chemical Industry and Biotechnology ▪ Agriculture
South	Calarasi	<ul style="list-style-type: none"> ▪ Automotive ▪ Agriculture ▪ Petro Chemical Industry ▪ Bio Fuels ▪ Tourism ▪ Glass Industry ▪ Electro Technical Industry ▪ Metallurgy
South East	Braila	<ul style="list-style-type: none"> ▪ ICT ▪ Agro Food ▪ Tourism ▪ Ship Building ▪ Alternative Energy

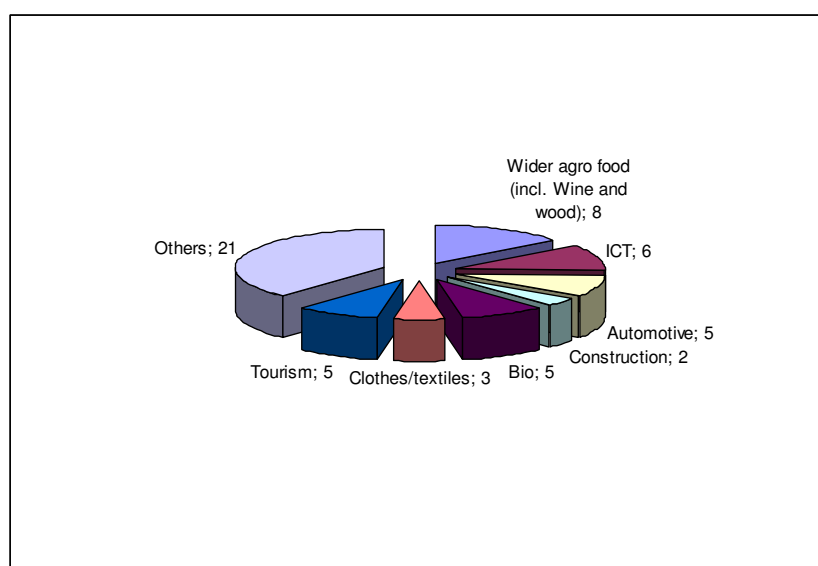
²⁹ In the frame of the workshop in Timisoara detailed information was only provided for the two clusters automotive and ICT

- (3) As far as the actual deliberate cooperation amongst the players in a cluster is concerned, we found a rather weak situation. Generally we can say, cooperation is hardly taking place amongst the actors in the clusters identified. A question mark was put concerning the validity of this finding (difficult to assess by peers).
- (4) The availability and utilisation of specific innovation services in the clusters identified is insufficient.

2.2.2 Clusters in the Regions

In Table 2 above we are displaying the identified clusters/cluster themes in the eight regions. On the one hand the result reflects a very heterogeneous situation concerning clusters. On the other hand, we see some cluster topics to be more common than others: clusters in the wider agro-food field (including wine and wood) were mentioned eight times. Then we find six clusters in ICT, five in automotive and also five in tourism. If we summarise all bio-orientated clusters in one category we come up to another five cases.

Figure 4: Absolute Occurrence of cluster themes



Source: Own calculation and own figure

We argue that this picture reflects also very well the structure of the Romanian economy in general.

The question still remains whether we regard the clusters recognised by the peers as real ones. Our cluster model is building on the five elements (1) concentration, (2) R&D units, (3) labour force, (4) cooperation and (5) service providers. The results elaborated in the eight regions (see annex 1 for details) and displayed in Table 1 have shown that we can generally find regional concentration of the clusters identified (some of the key business actors even being mentioned). R&D units are

also in place and peers could often recognise some of them by name. The labour endowment was generally assessed as favourable. In three out of five elements the nominated clusters generally fulfil the theoretical requirements.

More difficult is the situation concerning the cooperation and the service issue. We therefore suggest, as a first approach, to regard these two vectors as critical for the acknowledgement of a cluster in a region. As a selection criterion we propose an over average score (relative to the region) in both these elements.

When applying this rule (see annex 2) we come to the following results, as shown in Table 3.

From the 55 clusters identified in the peer work shops, only 19 passed the criteria of actual cooperation and availability/usage of innovation services. In the eight regions we have recognised between two and four clusters. Leading region is Bucharest/Ifov with four recognised clusters.

Generally the results are quite surprising. Most of the cluster themes are really local.

Table 3: Clusters recognised

Region	Workshop Location	Identified clusters
Bucharest Ifov	Bucharest	<ul style="list-style-type: none"> ▪ Clothes, shoes and fashion ▪ Construction materials ▪ Food industry ▪ Publishing
West	Timisoara	<ul style="list-style-type: none"> ▪ Automotive ▪ ICT
Centre	Sibiu	<ul style="list-style-type: none"> ▪ Wine ▪ Pottery
North West	Cluj	<ul style="list-style-type: none"> ▪ Geo Thermal Energy
North East	Piatra Neamt	<ul style="list-style-type: none"> ▪ Tourism ▪ Agro Food
South West	Craiova	<ul style="list-style-type: none"> ▪ Automotive ▪ Tourism ▪ Agriculture
South	Calarasi	<ul style="list-style-type: none"> ▪ Agriculture ▪ Tourism ▪ Electro Technical Industry
South East	Braila	<ul style="list-style-type: none"> ▪ Tourism ▪ Ship Building

Only the wider agro-food topic and the tourism sector have been recognised in five respectively in four regions. The automotive in two of the development regions. It is thus for the most part (wider agro-food and tourism) those clusters which face under-average labour endowment.

Again we should mention here the difficulties we were facing in the regions West (Timisoara) and Centre (Sibiu). It is obvious that the results of the respective peer workshops determined the final recognition. The results of those two regions thus may need a second look.

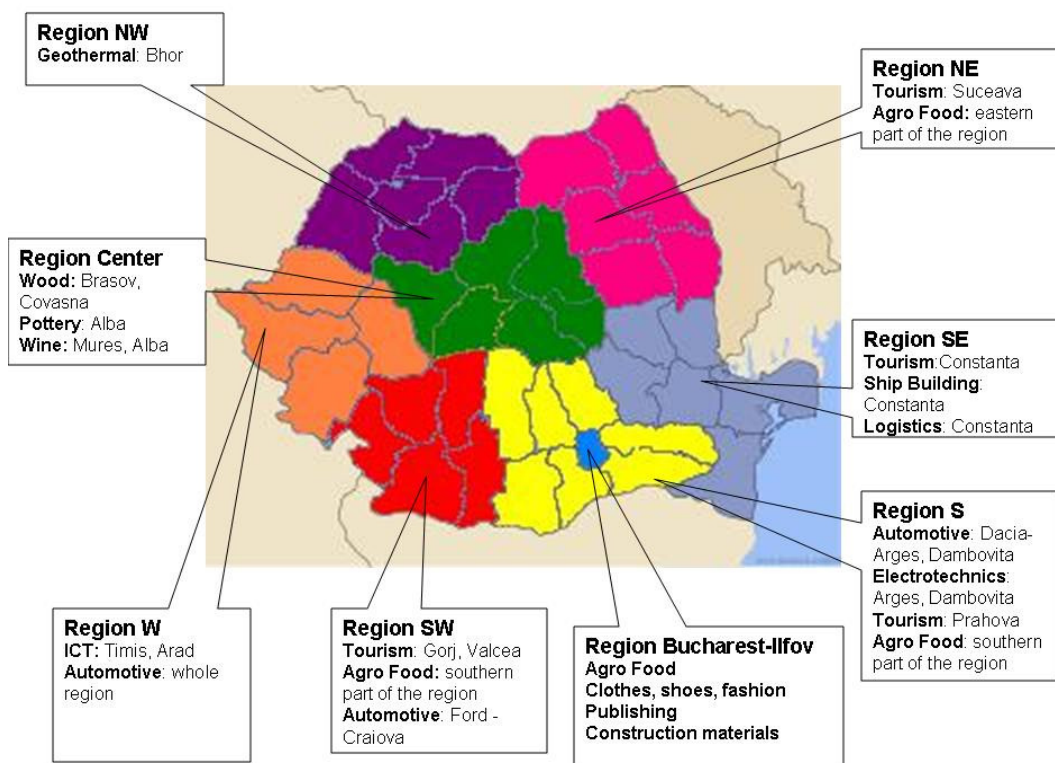
2.3 PEER WORKSHOPS IN THE LIGHT OF PRE-IDENTIFIED RESULTS

As we have already pointed out above, the current mapping exercise was preceded by a desk research in which regional development papers and other relevant publications (also internet) and projects were screened. In the light of this survey, some three additional clusters (i.e. in addition to the clusters identified in the current project) were recognised:

- Region South: Automotive
- Region South East: Logistics
- Region Centre: Wood

Joining these pre-findings to the results of the current exercise we come to the following 22 clusters distributed regionally and thematically as it is shown in the map:

Figure 5: Map of Romanian clusters



3. RECOMMENDATIONS

Against the background of the peer exercise in combination with the desk analysis performed we can now draw some recommendations. We differentiate thereby between a more strategic policy level and some operative recommendations with concrete steps for the next future.

3.1 RECOMMENDATION FOR A COHERENT CLUSTER POLICY IN ROMANIA

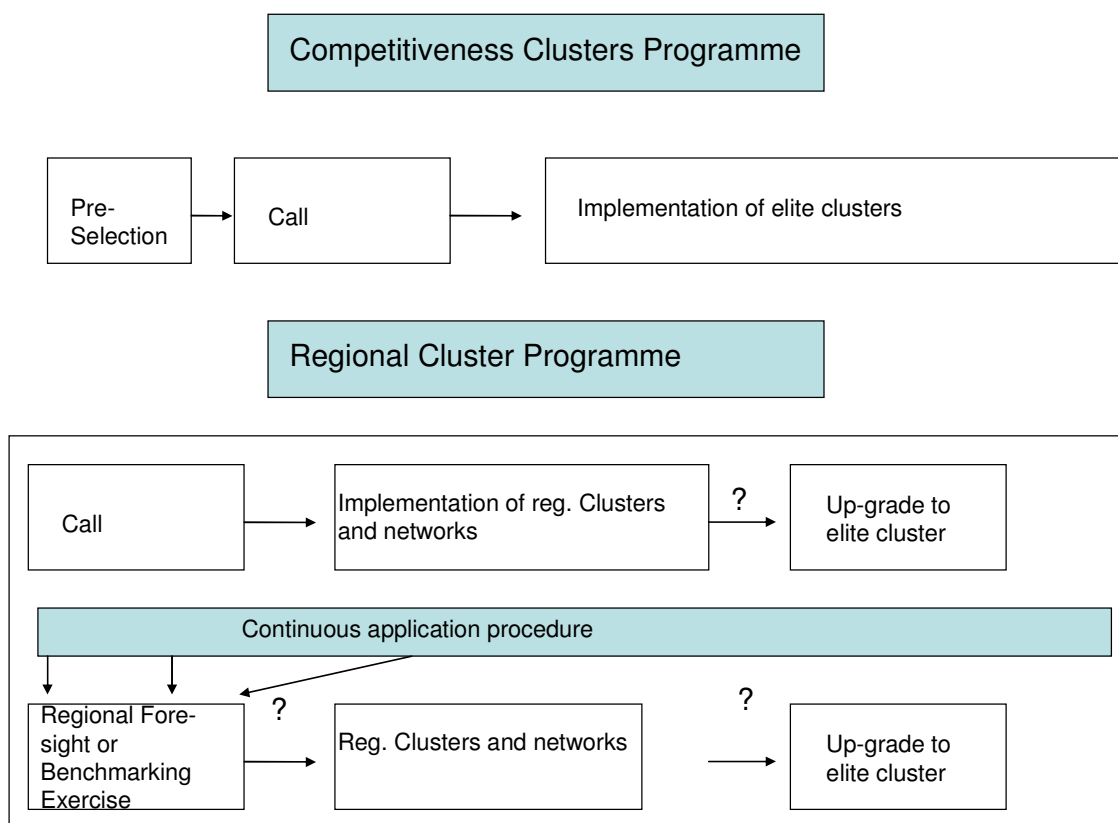
The cluster mapping revealed that in Romania the situation concerning clusters is still rather ambivalent. On the one hand important stakeholders are in favour of the concept and there is much hope for this instrument being able to foster the transition and economic catching up process of the country. And indeed we have identified some economic fields in which cluster-like structures can be seen. Important sectors are the wider agro-food industry, tourism and automotive. Significant regional concentrations, specialised R&D institutions and often a good human capital endowment could be found. On the other hand, when it comes to other important elements of clusters, particularly the actual cooperation amongst the actors and the availability (and use) of specialised (!) service providers, the situation is very weak. Both these weaknesses speak for a significant lack of trust between the different economic actors. Any comprehensive cluster policy in Romania must take this into consideration.

Against this background we propose a setting which builds upon the identified strengths but at the same time attempts to overcome the deficits. Elsewhere, we have already elaborated a three layer concept for the Romanian cluster policy.³⁰ This proposals foresees to install elite clusters at national level, in addition to that some regional clusters and at a third layer even pre-cluster projects which particularly aim at building trust amongst the actors.

- (1) The clusters recognised in the current mapping exercise represent a good basis for pre- identifying both national elite clusters and regional clusters. We recommend to apply a simple set of quantitative indicators. Examples are
- share of employment in the cluster relative to total industrial employment in RO/region
 - Number of firms in the sector relative to total number of firms in RO/region
 - Export value of the sector as compared to total national/regional export value

For the national clusters the relative benchmark is the country figure whereas in the regions it is regional data. The thresholds would need to be decided upon.

³⁰ MINISTRY OF ECONOMY and GTZ (2009)

Figure 6: Three Layer Model for Romanian Cluster Policy

- (2) Only the pre-selected clusters shall be invited to propose a national elite cluster project. The selection should be done within an open call procedure. Maximum three to six national elite clusters shall be selected. Due to the weak starting conditions of the clusters we propose a rather long funding period of up to five years.
- (3) The regional clusters shall equally be pre-identified. The clusters there will have the chance to upgrade to national elite clusters.
- (4) In the third layer we have projects which facilitate the creation of regional networks (e.g. regional benchmarking or foresight exercises). This level is particularly important for developing trust amongst actors and shall be regarded as a pre-cluster exercise.
- (5) Although the human capital issue generally turned out to be sufficient, the Romanian cluster policy should establish a strong training component. The training should be twofold: (i) on the one hand there must be traditional vocational training components (particularly in those sectors which are comparatively weak). And (ii) on the other hand, efforts are needed towards life-long-learning strategies. As the international perspective revealed, successful

clusters facilitate learning processes both on individual as well as on institutional level.

- (6) As far as the financing is concerned we propose to finance mostly the cluster management, PR activities and internationalisation. For the concrete cluster projects (joint R&D activities, international research actions, infrastructures like incubators, and similar) the clusters should apply for in the respective national and/or EU programmes. A major source of funding represent the structural funds programmes in Romania. We thus see the clusters also as *project facilitation tools* particularly in the context of structural funds. We could imagine for example the following amounts for financing the different action in the three layers:

- National/elite clusters: 100,000 EUR per year; max. five years
- Regional clusters: 50,000 EUR per year, max. three years
- Pre-clusters: 30,000 EUR

If we assume six national clusters (6 x 100,000 EUR = 600,000 EUR p.a.), three regional clusters per region (24 x 50,000 EUR = 1,200,000 EUR p.a.) and in a first round also three pre-cluster exercises per region (24 x 30,000 EUR = 720,000 EUR) this would cost approximately 2.5 Mill. EUR p.a. We assume a leverage for structural funds projects of at least 15 – meaning that the elite and regional clusters, together with the pre-cluster exercises will generate projects of some 37.5 Mill. EUR.

3.2 NEXT STEPS

- (1) **Robustness of the data:** The information gathered in the frame of the mapping exercise is valid enough to regard the clusters finally recognised (peer review plus prior desk research) as "real" ones. With regard to any reporting obligations toward the European Commission the data compiled here can be used.
- (2) **Verification through a quantitative approach:** However, some methodological issues occurred (e.g. peer assessment of cooperation, time constraints in the workshops, participation at the workshop). Against this background it seems to be reasonable to verify the results through a statistical proof. This possible exercise should not be too complex. The objective is to provide some empirical evidence for the results stemming from the peer process. In addition to that, the set of selection criteria for clusters (including the respective thresholds) need to be decided upon according to the Romanian socio-economic framework conditions.
- (3) **Towards concrete policy making:** The results and the considerations presented in this paper must now be translated into a coherent policy action. A strong cooperation between all departments concerned within the ME is thus necessary.

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- (4) **Animating a public discourse:** The summarised results of the peer review exercise should be published as soon as possible. The easiest way would be an internet presentation where the profiles of all regions including clusters recognised would be displayed. Particularly against the background of the dynamic situation in the cluster scene, the internet seems to be the most adequate tool. This is because this medium can cope quickly with changes and it offers bottom-up communication channels.

This internet presence can then (later) also be used to start a public discourse about the achievements of cluster initiatives in Romania (exchange of experience).

4. SUMMARY

Background and Methodology

- (1) The current report was elaborated in the frame of a bi-lateral cooperation agreement between the German Government (represented by the GTZ) and the Romanian Ministry of Economy (ME). The objective was to identify, to analyse and to map clusters and potential clusters in Romania.
- (2) In order to identify the clusters, so-called peer review workshops were implemented in all eight development regions. With the experts (=peers) regional clusters were identified and analysed. The analytical background for the review of the clusters represents a cluster concept which was developed for the purpose of this exercise and which is based on a modified Triple Helix approach. In the core of this model we find five vectors, which can be regarded as drivers for success of clusters and which we subsequently used as structure for the peer assessment: (1) concentration, (2) R&D units, (3) labour force, (4) cooperation and (5) service suppliers.

Findings

- (3) Within the peer process a total of 55 clusters could be found. On average, there are seven clusters per region. The analysis revealed that in the 55 clusters identified in the first round, the labour and human capital endowment is rather favourable. In contrast, it came out that cooperation is hardly taking place and that the availability and utilisation of specific innovation services is insufficient. Against this background it needed to be decided, which of the clusters identified through the peer process can be regarded as real clusters.
- (4) In a second review round thus, the two vectors of "cooperation" and "service suppliers" were further monitored. Only those clusters were actually recognized which performed in both issues higher than the regional average. Only 19

clusters passed this second selection round. Still we have a rather even regional distribution of the clusters (between two and four clusters per region).

- (5) In a last fine-tuning round this preliminary mapping result was modified against the background of the results of a preceding desk research. Here, three further clusters were identified so that in total some 22 clusters were recognised.

Recommendations

- (6) Against the background of the findings presented in this paper a three layer policy approach was proposed. The first level is aiming at national elite clusters whereas the other two levels focus at regional level. The second layer is supporting regional clusters, which do not yet have the performance of being nationally recognised. The third level is focussing on pre-cluster exercises in order to facilitate cooperation amongst the partners.
- (7) Training and learning should establish a crucial element for cluster policy.
- (8) Financing should be provided for cluster management, PR and internationalisation activities. For the concrete projects (e.g. research projects; infrastructure, training) the clusters should seek financial contributions from other programmes (most likely from structural funds). In our calculation model, the clusters could generate projects of around 37.5 Mill. EUR p.a.

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ANNEX 1: RESULTS OF THE PEER WORKSHOPS

Bucharest/Ilfov

Cluster	Concentration	R&D Units	Labor Force <ul style="list-style-type: none"> • Quantity • Quality • Qualification 	Cooperation	Third party service supplier <ul style="list-style-type: none"> • TTI • Consultancy
FURNITURE	Pipera Militari	INL	Quantity: 4 Quality: 3 Qualific. 3	Distribution	2 ?
IT&C	SEMA PARK Northern Bucharest Siveco, Softwin, UTI, Oracle	ICI, ITC, IPA, UPB (Faculty of Automotive, Electronics)	Quantity: 4 Quality: 4 Qualific. 4	INFINEON within UPB	ARIES
WEARING APPAREL, SHOES & FASHION	APACA	INCDTP	Quantity: 3 Quality: 4 Qualific. 4 (CIFETEX)	common equipment logistic order placing	FEPAIUS TTI: INCDTP
AUDIOVISUAL SERVICES	BUFTEA ROMEXPO all Televisions MAGURELE	MEDIA PRO UATC	Quantity: 4 Quality: 4 (actors, film producers) Qualific. 5		Rating Monitoring Companies
CONSTRUCTION MATERIALS	Militari Catelu	UTC-F/UPB INCERC – ICECON CEPROCIM PROCEMA INS	Quantity: 4 Quality: 4 Qualific. 4	(distribution price establishment)	INCERC (Certification) PROCEMA INS CEPROCIM
FOOD INDUSTRY	Fundeni: Danone Popesti: Tnuva	Apicola Gymnasium USAMV	Quantity: 4	(supply chains)	APIMONDIA INMA-ITA

	Bragadiru: Rostar, Icecream Buftea: Avicola, Canning factory	INMA ICA	Quality: 3 Qualific. 2		TETRAPAK LAREX
LOGISTICS	Militari Buftea Otopeni	Faculty of Transports ICTRANS	Quantity: 4 Quality: 3 Qualific. ?	bottleneck	?
PUBLISHING COMPANIES	Bucharest	Philology Institute Calinescu Institute Faculty of Philology (Literature, Foreign Languages)	Quantity: 4 Quality: 4 Qualific. 4	joint fare participation	Literary Review Magazines, ICR, Romanian Writers Association, Romanian Academy

Region West

Cluster	Concentration	R&D Units	Labour Force Quantity, Quality, Qualification	Cooperation	Third party service supplier
Automotive	Timisoara and Arad	<ul style="list-style-type: none"> • Polytechnica TM • University Arad • Joint Laboratory (HTC) • Joint Master Programmes (Siemens, Continental, Univesity) 	<p><i>Quantity:</i> 3</p> <p><i>Quality:</i></p> <p>Engineers: 4</p> <p>Under graduate techn. Staff: 5</p> <p><i>Qualification:</i> 5</p> <ul style="list-style-type: none"> • Firms (internal training) • University (special Masters) • Special Training providers (Automotive West, Chamber) 	Joint Projects Cluster	Arad Incubator Automotive West Tech Impulse
ICT	Timisoara	<ul style="list-style-type: none"> • University of West Timisoara • Polytechnica Timisoara • “Aurel Vlaicu” University Arad 	<p><i>Quantity:</i> 4</p> <p><i>Quality:</i></p> <p>Engineers: 4</p> <p><i>Qualification:</i> 5</p> <ul style="list-style-type: none"> • Firms (internal training) • University (special departments) <p>Special Training providers (Automotive West, Chamber)</p>	Joint Projects Cluster	IT Park Timisoara UBIT – Software Business Incubator Timisoara

Construction & Material					
Printing					
Tourism CS					
Agro Food					
Machinery production					
Textile					

Region Centre

Cluster	Concentration	R&D Units	Labour Force Quantity, Quality, Qualification	Cooperation	Third party service supplier
Wine Cluster	Alba (JIDVEI) Ajud (Ciumbrud)	<ul style="list-style-type: none"> Wine research centre in Blaj 	<i>Quantity: 4</i> <i>Quality: 4</i> <i>Qualification: 2</i>	Driven by the association (Country of Wine)	County Council Alba Association (Country of Wine)
Automotive Sibiu	Sibiu (Continental, TAKATA)	University Lucian Blaga (Sibiu)	<i>Quantity: 4</i> <i>Quality: 4</i> <i>Qualification: 5</i>	Joint projects university industry	Industry Park Sibiu
Automotive Brasov	Brasov	University of Transsilvania Brasov, Faculty of machinery building)	<i>Quantity: 5</i> <i>Quality: 4</i> <i>Qualification: 5</i>	prototyping	CIT Brasov
Pharmaceutical Industry	Mures (Gedeon Richter)	Medical University of Tirgu Mures, Faculty of Pharmacy	<i>Quantity: 4</i> <i>Quality: 4</i> <i>Qualification: ?</i>	n.a.	n.a.
Pottery	Corund Hargita (traditional local cluster)	No	<i>Quantity: 5</i> <i>Quality: 5</i> <i>Qualification: 3</i>	Cooperation activities at local level	City Hall Association of pottery firms

North West

Cluster	Concentration (Where, who)	R&D Units	Labour Force Quantity, Quality, Qualification	Cooperation	Third party service supplier
ICT	Cluj and Baia Mare and Oradea (Net Brinell, IQUEST, ARODS)	<ul style="list-style-type: none"> • University Babes Balyai • Technical University • Univ. Baia Mare 	<ul style="list-style-type: none"> • Quantity: 4 • Quality: 3 • Qualific. 4 	Transylvania Cluster (6 Enterprises) Master Programmes and Scholarships, Curricula Adapting Cooperation with local council and RDA	ARIES Transylvania, TETAROM (Industrial Park), Chamber Cluj, Technology Transfer Centre Brinell, Business Centre Transylvania
Electro Technology	Cluj and Bistrita, Zalau and Baia Mare (Emmerson, Energobit, Elelectro Group)	<ul style="list-style-type: none"> • Technical University Cluj • Energetical High School Cluj 	<ul style="list-style-type: none"> • Quantity: 4 • Quality: 3 • Qualific.: 4 	Scholarships, Practical stages of students in Enterprises, Association: Electro Transylvania, ARIES Transylvania Cooperation between firms on specific issues	TETEROM, Chamber of Commerce,
Medical Services	Cluj <ul style="list-style-type: none"> • County Hospital • Emergency Hospital • Cardiological Hospital • Oncological Hospital • Institute of Transplantations 	<ul style="list-style-type: none"> • University of Medicine and Pharmacy • Medical Institutes in each Hospital • IPA 	<ul style="list-style-type: none"> • Quantity: 4 • Quality: 3 • Qualific. 4 	Practical stages in Hospitals,	Association of physicians, Association of pharmacists, Association of Nurses Centre for analyses and examinations

Geo Thermal Energy	Cross Border Cluster RO-HU-UA County of Bihor and Satu Mare, Oradea (Transgex, University of Oradea, Municipality of Oradea, Tourism Felix)	<ul style="list-style-type: none"> • National Centre of Geo Thermal Research (only one in RO) • University of Oradea • Transgex • FORADEX 	<ul style="list-style-type: none"> • Quantity: 3 • Quality: 4 • Qualific.: 3 	25 research projects ClusTherm (ADR, Trangex and University of Oradea) Cooperation between Chamber of Debrecen (HU) and University of Oradea	Transgex Technology Transfer Centre Oradea Regional Institute for Research, Education and Technology Transfer (ADR, Regional County councils and regional Universities)
Bio Products	Romania: Sighet UA: Solotvino www.marmatia.ro	<ul style="list-style-type: none"> • Research Institute for animal farming and fruit trees • University Babes Balyai 	<ul style="list-style-type: none"> • Quantity: 5 • Quality: 3 • Qualific.: 4 	Cooperation between administration and producer associations Association of Eco-Producers	Consultants in the field of agriculture and energy Chamber Mara Mures
Bio-Nutrients and Cosmetics	Cluj (Framec, Cosmetic Plant, Plant Extrakt, Terapia)	<ul style="list-style-type: none"> • University Babes Balyai • Agricultural University (USAMV) • Technical University • Medical University • Pharmaceutical University 	<ul style="list-style-type: none"> • Quantity: 4 • Quality: 4 • Qualific.: 4 	Programme REACH, Product Manager Training	Chamber Cluj Employers Association RDA North West
Bio Fuels	Cluj, Mara Mures, Bihor (CAA SRL, Reviva SRL)	<ul style="list-style-type: none"> • Research Institute for analytical Instruments • USAMV • Technical University 	<ul style="list-style-type: none"> • Quantity: 4 • Quality: 4 • Qualific.: 4 	Partnership between Chamber Cluj, USAMV and Technical University and PETROM	Technology Transfer Centre CENTI Certification Laboratory for Quality of Bio Fuels (Cluj)

North East

Cluster	Concentration (Where, who)	R&D Units	Labour Force Quantity, Quality, Qualification	Cooperation	Third party service supplier
Clothes and Footwear	Bacau, Neamt, Iasi, Botosani, Vaslui (ASTRICO, DINASTY, Alb & Negru)	<ul style="list-style-type: none"> Textile faculty Techn. Univ. Iasi. 	<ul style="list-style-type: none"> Quantity: 3 Quality: 3 Qualific. 3 On-the job qualification. Other training providers: labour office, Industrial High Schools,	ASTRICO, Cooperation between the high schools and industry (industry provides schools with equipment which is no longer used)	
Bio Medicine	Iasi, Bacau, Neamt (Hospitals in Iasi, Some private medical centres)	<ul style="list-style-type: none"> Medical University, Iasi Petru Poni Institute Radiology Inst. St. Spiridon Hospital 	<ul style="list-style-type: none"> Quantity: 3 Quality: 4 Qualific.: 4 	AMI4Europe, FP7 project proposal International cluster cooperation with Madrid, Italy and Hungary	ADR North East
Tourism	Suceava, Neamt, Iasi, Bacau	<ul style="list-style-type: none"> Faculty for Tourism in Suceava Cuza University in Iasi Institute Gheorghe Zane in Iasi 	<ul style="list-style-type: none"> Quantity: 4 Quality (tertiary): 3 Quality (second.): 2 Qualific. 3 	Trainings offered by Bucovina Tourism Association, University, Rural Tourism Association Informal cooperation between hoteliers	Bucovina Tourism Association, Tourist Information Centres
Agro Food	Botosani, Iasi, Vaslui (Avicola Iasi, KOSAROM, Agricola International, Trei Brazi)	<ul style="list-style-type: none"> USAMV Iasi University Suceava Agricultural Research Centre Suceava Specific Research Centres (Fruits) in Sirca and Iasi 	<ul style="list-style-type: none"> Quantity: 4 Quality: 2 Qualific. 4 E.g. High school for Agriculture in Podu Iloaiei	Telelearning project: USAMV Iasi, Agricultural High School Podu Iloaiei, Internet Site www.agra.ro	Agricultural Support offices of the County Other Experts

Wine	Cotnari, Bucium, Husi,	<ul style="list-style-type: none"> • USAMV Iasi • Wine Research Centre in Iasi 	<ul style="list-style-type: none"> • Quantity: 3 • Quality: 3 • Qualific. 3 <p>In Iasi and Husi: High Schools specialised in Wine</p>		
Pharmacy	Iasi (Antibiotice), Piatra Neamt (Plantavorel)	<ul style="list-style-type: none"> • Medical and Pharmaceutical University in Iasi • Private research centres of Antibiotice and Plantavorel 	<ul style="list-style-type: none"> • Quantity: 4 • Quality: 4 • Qualific. 4 	Cooperation between Antibiotice and Medical/Pharmaceutical University	Highly specific sector. Needs international consultants/experts
ICT	Iasi, Bacau,	<ul style="list-style-type: none"> • Cuza University Iasi • Technical University Iasi 	<ul style="list-style-type: none"> • Quantity: 5 • Quality: 5 • Qualific. 5 	Cooperation projects between universities and enterprises	Tehnopolis (=Technology Centre Iasi) Business Incubator Iasi Industrial IT Park in Bacau
Wood	Suceava, Neamt, Bacau	<ul style="list-style-type: none"> • University Suceava 	<ul style="list-style-type: none"> • Quantity: 3 • Quality: 2 • Qualific. 2 <p>Wood High School in Piatra Neamt Vocational training centre in Roznov.</p>	Pro Forest in Bacau	County Chambers

South West

Cluster	Concentration (Where, who)	R&D Units	Labour Force Quantity, Quality, Qualification	Cooperation	Third party service supplier
Automotive	Craiova Ford, Popeci	<ul style="list-style-type: none"> Faculty for Mechanics, Craiova ICMET, Craiova INAS, Craiova Hella Research Lab. for electro-mechanical compatibility for automotive industry 	<ul style="list-style-type: none"> Quantity: 4 Quality: 3 Qualific. 4 	Faculty of Mechanics and Ford: equipment for labs. IPA/ROCKWELL/Ford: further qualification	Industrial park Craiova Chamber Dolj Regional Automotive Association (Prodmas) Employers Association of SMEs
ICT	Craiova, Ramnicu Valcea More than 100 firms	<ul style="list-style-type: none"> IPA ITC University Craiova 	<ul style="list-style-type: none"> Quantity: 5 Quality: 4 Qualific.: 4 	ARIES,	ARoTT, ARIES
Energy	The whole region south west Coal power plants: in Rovinari, Turceni and Craiva Water power plant: Iron Gates 1 & 2 at Danube Brown Coal exploitation Tirgu Jiu Popeci	<ul style="list-style-type: none"> Universities in Craiova and in Tirgu Jiu IPA ICMET ICITPML ICSI Ramnicu Valcea 	<ul style="list-style-type: none"> Quantity: 5 Quality 5 Qualific. 5 Industrial high schools specialised in energetics	FP 7 projects Cooperation in production	County councils, chambers, Mining Employers Association, SOCER, ARCE

Tourism	Mehedinti, Gorj, Valcea Horezu, Calimanesti, Olanesti, Govora (= Spa locations) Danube regions	<ul style="list-style-type: none"> • University of Craiova • University Ramnicu Valcea 	<ul style="list-style-type: none"> • Quantity: 3 • Quality: 2 • Qualific. 2 <p>Industrial High school specialised in tourism: Gheorghe Chitu</p> <p>Vocational training providers in tourism (CRFPA, CNIT, THR-CG)</p>	Cooperation between tourism operators Between local authorities and chambers: organising fairs Regional tourism association Oltenia	Regional Development Agency and other Associations : ATO, ANTREC, ANAT
Chemical Industry and Biotechnology	Ramnicu Valcea and Craiova OltChim, Popeci, SALROM	<ul style="list-style-type: none"> • Chemistry Faculty, University Craiova • ICSY Ramnicu Valcea • Platform Technoplat Oltenia • One private research institute 	<ul style="list-style-type: none"> • Quantity: 4 • Quality: 3 • Qualific. 3 	Between ICHECIM, ICSY and university Bucharest,	Eurochlor Association (European association) Vinyl Chloride
Agriculture	Dolj, Olt, plus regions in Bulgaria Agricultural associations, farms, canneries, agricultural machineries, etc.	<ul style="list-style-type: none"> • University Craiova with branches all over region • Research entities in Dabuleni, Banu Maracine, Ramnicu Valcea, Vanju Mare 	<ul style="list-style-type: none"> • Quantity: 4 • Quality: 2 • Qualific. 2 <p>Agricultural High School in Cala Fat, Dabuleni, Corabia</p>	Professional association within the Chamber of Dolj. Agricultural consultancy agencies in the county councils Association of Irrigation Romanian/Bulgarian agricultural association Organisation of cross border fairs	County Councils in Dolj and Olt Chambers of Commerce Agricultural chambers Consultancy centres at county councils IPA

Region South

Cluster	Concentration (Where, who)	R&D Units	Labour Force Quantity, Quality, Qualification	Cooperation	Third party service supplier
Automotive	Arges, Dambovita Renault Dacia	<ul style="list-style-type: none"> University of Pitesti University of Walachia in Targoviste Renault Centre for Design and testing in Titu 	<ul style="list-style-type: none"> Quantity: 4 Quality: 4 Qualific. 3 	SPRINT Network (FP 6 project)	ACAROM, ADR South AOAR (Business men association)
Agriculture	All region Interagro (storage of products) Firms producing chicken in: Crevedia, Tartasesti, Slobozia Meat production in: Cristim, Aldis in Prahova Milk producers in Gurgiu, Dambovita and Ialomita	<ul style="list-style-type: none"> Institute for bio technology in Fundulea Research units in Maracineni and Voinești 	<ul style="list-style-type: none"> Quantity: 5 Quality: 4 Qualific.: 3 	Association of agricultural producers Regional agricultural consultancy directories (of the district councils)	ANCA (consultancy), APIA, ACIA in Ialomita
Petro Chemical Industry	Ploiesti, Campina, Pitesti, Moreni	<ul style="list-style-type: none"> University of Petrol and Gas in Ploiesti (only one in the country) IPCUP IPIP Weatherford private research 	<ul style="list-style-type: none"> Quantity: 4 Quality 4 Qualific. 3 	MENER: national R&D programme for non-polluting fuels let by the university Civitas project for non-polluting cities	ADR South Chamber Prahova AOAR

Bio-Bio Fuels	Fundulea, Lehliu, Slobozia, Urziceni, Tandarei	<ul style="list-style-type: none"> Institute for biotechnology in Fundulea 	<ul style="list-style-type: none"> Quantity: 5 Quality: 5 Qualific. 4 	Association for bio fuel producers	Chambers, county councils, regional agricultural consultancy offices,
Tourism	Valea Prahovei,	<ul style="list-style-type: none"> Faculty of tourism at University of Ploiesti Faculty of montanology in Targoviste Faculty of tourism at university Pitesti 	<ul style="list-style-type: none"> Quantity: 5 Quality: 2 Qualific. 3 <p>High school for tourism in Targoviste, Centre for vocational training in tourism in Sinaia</p>	Project for qualification between national agency of employment, Chamber and firm from the sector, Practice ships for students in hotels	Regional association of chambers in Ploiesti City Halls in Sinaia and Busteni County Council Prahova
Glass industry	Calarasi: Saint Gobain Ploiesti: Glass wool production	N.A.	<ul style="list-style-type: none"> Quantity: 3 Quality: 3 Qualific. 1 		Chamber of Commerce in Calarasi. County Council Calarasi
Electro technical industry	Arges and Dambovita Emerson, ANA-IMAP, Electro Arges, Arctic Gaesti Comesad Pitesti, BLC components	<ul style="list-style-type: none"> University of Pitesti 	<ul style="list-style-type: none"> Quantity: 4 Quality: 4 Qualific. 3 <p>High school in Pitesti, Vocational re-training units in Pitesti</p>	Cooperation in production between ANA-IMAP and Electro Arges (motors) Arctic and Dacia: Air condition systems ANA-IMAP and university Bucharest	AOA Arges, Employers Association Arges, Chamber of Commerce Arges,

Metallurgy	Dambovita and Tragoviste (Mehell S:A, Erdemir, Cromstil, Samsung)	<ul style="list-style-type: none">• University Walachia Targoviste• University Pitesti	<ul style="list-style-type: none">• Quantity: 4• Quality: 4• Qualific. 3 <p>High school Targoviste</p>	Practical stages between Mehel and university Walachia	ADR, Territorial Employment Pact
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South East

Cluster	Concentration (Where, who)	R&D Units	Labour Force Quantity, Quality, Qualification	Cooperation	Third party service supplier
ICT	Software park Galati, Siveco, Microsoft, Totalsoft	Lower Danube University in Galati	<ul style="list-style-type: none"> • Quantity: 4 • Quality: 4 • Qualific. 3 <p>Qualification: Romanian Business School of the chamber system</p>	N.A.	County council Galati
Agro Food	Whole region, with sub-regional foci on milk, chicken and fish production. To some extent wine and bread	<ul style="list-style-type: none"> • Lower Danube university Galati • National institute for fish research • Danube Delta research institute in Tulcea • Marine research institute in Constanta 	<ul style="list-style-type: none"> • Quantity: 5 • Quality: 3 • Qualific.: 3 	Stud/comp/IMM cooperation project	Chambers of Commerce, ANCA Incubtors in Braila and Medgidia
Tourism	Constanta, Tulcea, Vrancea, Buzau, Braila	<ul style="list-style-type: none"> • Lower Danube University, Galati • Ovidius University in Constanta • Danube Delta Research Institute in Tulcea • Administration of the Danube Delta Reservation 	<ul style="list-style-type: none"> • Quantity: 3 • Quality: 2 • Qualific. 4 	ESF projects: e.g. chamber Braila and city hall Chiscani Between Danube Delta Reservation and County Council Tulcea and firms	National association of tourism (ANAT) County councils

Ship Building	Braila, Galati, Tulcea Lower Danube Naval cluster initiative	<ul style="list-style-type: none"> • Lower Danube university Galati • ICPRONAV • Various SMEs with research focus 	<ul style="list-style-type: none"> • Quantity: 4 • Quality: 4 • Qualific. 4 	Common stands at fairs Collaboration between faculty of naval engineering at university of Lower Danube and Dutch firm (Alewijjnse)	ANCONAV association IPA Galati and EEN network point Employer association Galati
Energy (Alternative)	Galati, Constanta, Tulcea Solaria, Alfabit, Freezone Galati, Profiland Galati	<ul style="list-style-type: none"> • Lower Danube University Galati • Ovidius university Constanta 	<ul style="list-style-type: none"> • Quantity: 4 • Quality: 4 • Qualific. 3 	Between Solaria and Ovidius university: Wind park	

ANNEX 2: COOPERATION AND SERVICE PERFORMANCE

Cooperation and Services in the clusters in Bucharest/Ifov

Cluster	Number of identified Cooperations in the cluster	Average number of identified Cooperations in the cluster	Criterion above average (yes/no)	Number of third party service suppliers	Average number of third party service suppliers	Criterion above average (yes/no)	Cluster recognised (both criteria above average)
Furniture	1	0,9	yes	0	2	no	No
ICT	1	0,9	yes	1	2	no	No
Clothes, Shoes, Fashion	1	0,9	yes	2	2	yes	Yes
Audiovisual services	0	0,9	no	1	2	no	No
Construction Materials	1	0,9	yes	4	2	yes	Yes
Food industry	1	0,9	yes	4	2	yes	Yes
Logistics	1	0,9	yes	0	2	no	No
Publishing	1	0,9	yes	4	2	yes	Yes

Cooperation and Services in the clusters in the region West

Cluster	Number of identified Cooperations in the cluster	Average number of identified Cooperations in the cluster	Criterion above average (yes/no)	Number of third party service suppliers	Average number of third party service suppliers	Criterion above average (yes/no)	Cluster recognised (both criteria above average)
Automotive	1	1	yes	3	2,5	yes	Yes
ICT	1	1	yes	2	2,5	yes	Yes
Construction and Materials							
Printing							
Tourism							
Agro Food							
Machinery Production							
Textile							

Cooperation and Services in the clusters in the region Centre

Cluster	Number of identified Cooperations in the cluster	Average number of identified Cooperations in the cluster	Criterion above average (yes/no)	Number of third party service suppliers	Average number of third party service suppliers	Criterion above average (yes/no)	Cluster recognised (both criteria above average)
Wine	1	0,8	yes	2	1,2	yes	Yes
Automotive Sibiu	1	0,8	yes	1	1,2	no	No
Automotive Brasov	1	0,8	yes	1	1,2	no	No
Pharmaceutical Industry	0	0,8	no	0	1,2	no	No
Pottery	1	0,8	yes	2	1,2	yes	Yes

Cooperation and Services in the clusters in the region North West

Cluster	Number of identified Cooperations in the cluster	Average number of identified Cooperations in the cluster	Criterion above average (yes/no)	Number of third party service suppliers	Average number of third party service suppliers	Criterion above average (yes/no)	Cluster recognised (both criteria above average)
ICT	3	5,5	no	5	2,7	yes	No
Electro Technology	3	5,5	no	2	2,7	no	No
Medical Services	1	5,5	no	2	2,7	no	No
Geo Thermal Energy	27	5,5	yes	3	2,7	yes	Yes
Bio Products	2	5,5	no	2	2,7	no	No
Bio Nutrients & Cosmetics	2	5,5	no	3	2,7	yes	No
Bio Fuels	1	5,5	no	2	2,7	no	No

Cooperation and Services in the clusters in the region North East

Cluster	Number of identified Cooperations in the cluster	Average number of identified Cooperations in the cluster	Criterion above average (yes/no)	Number of third party service suppliers	Average number of third party service suppliers	Criterion above average (yes/no)	Cluster recognised (both criteria above average)
Clothes and footwear	2	1,4	yes	0	1,1	no	No
Bio Medicine	2	1,4	yes	1	1,1	no	No
Tourism	2	1,4	yes	2	1,1	yes	Yes
Agro Food	2	1,4	yes	2	1,1	yes	Yes
Wine	0	1,4	no	0	1,1	no	No
Pharmacy	1	1,4	no	0	1,1	no	No
ICT	1	1,4	no	3	1,1	yes	No
Wood	1	1,4	no	1	1,1	no	No

Cooperation and Services in the clusters in the region South West

Cluster	Number of identified Cooperations in the cluster	Average number of identified Cooperations in the cluster	Criterion above average (yes/no)	Number of third party service suppliers	Average number of third party service suppliers	Criterion above average (yes/no)	Cluster recognised (both criteria above average)
Automotive	2	1,6	yes	4	3,5	yes	Yes
ICT	1	1,6	no	2	3,5	no	No
Energy	1	1,6	no	5	3,5	yes	No
Tourism	3	1,6	yes	4	3,5	yes	Yes
Chem. Ind. & Biotech.	1	1,6	no	2	3,5	no	No
Agriculture	2	1,6	yes	4	3,5	yes	Yes

Cooperation and Services in the clusters in the region South

Cluster	Number of identified Cooperations in the cluster	Average number of identified Cooperations in the cluster	Criterion above average (yes/no)	Number of third party service suppliers	Average number of third party service suppliers	Criterion above average (yes/no)	Cluster recognised (both criteria above average)
Automotive	1	1,5	no	3	2,6	yes	No
Agriculture	2	1,5	yes	3	2,6	yes	Yes
Petro Chemical Industry	2	1,5	yes	2	2,6	no	No
Bio Fuels	1	1,5	no	3	2,6	yes	No
Tourism	2	1,5	yes	3	2,6	yes	Yes
Glass Industry	0	1,5	no	2	2,6	no	No
Electro Technical Industry	3	1,5	yes	3	2,6	yes	Yes
Metallurgy	1	1,5	no	2	2,6	no	No

Cooperation and Services in the clusters in the region South East

Cluster	Number of identified Cooperations in the cluster	Average number of identified Cooperations in the cluster	Criterion above average (yes/no)	Number of third party service suppliers	Average number of third party service suppliers	Criterion above average (yes/no)	Cluster recognised (both criteria above average)
ICT	0	1,2	no	1	1,8	no	No
Agro Food	1	1,2	no	3	1,8	yes	No
Tourism	2	1,2	yes	2	1,8	yes	Yes
Ship Building	2	1,2	yes	3	1,8	yes	Yes
Alternative Energy	1	1,2	no	0	1,8	no	No