

## IO 5: CLUSTER-ANALYSIS

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## INTRODUCTION

Cluster-analysis is a scientific statistic method which is used for concentrating complex elements from a high of items to clusters by using different characteristics. These characteristics enable to detect similarities or separating lines between these elements and to cluster them into similar groups (University of Vienna, Website 2014).

European project consortia are complex structures and the TOI TOI TOI project team used simplified MS EXCEL-based cluster analysis to detect clusters within 237 Leonardo da Vinci / Transfer of Innovation (LdV/Tol) projects which had been conducted in Austria, Germany and Hungary from 2007-2012. Basic data and findings had been generated in the so called "Pre-Analysis Reports and these reports were the important part in defining the field of research. In this regard the development partners of TOI TOI TOI (Danube University Krems, Forschungsinstitut Betriebliche Bildung, Széchenyi István University and Goce Delchev University) decided corporately how to organise and conduct cluster analysis.

So the project team analysed 237 LdV/Tol project consortia from 2007-2012 and used the European project database ADAM ([www.adam-europe.eu](http://www.adam-europe.eu)) in defining characteristics to detect similarities or separating lines. In this regard methods of network analysis (Anuba Online, Website 2014) were used to pre structure the high number of projects. Finally, cluster analysis of LdV/Tol projects from the EU-Lifelong Learning program generated findings which will be a part of the following qualitative analysis by doing semi-standardised interviews with project coordinators from Austria, Germany and Hungary.

This report aims at describing the field of research, the workflow, the results and the estimation of these results from a European point of view and the further scientific work in the project TOI TOI TOI – Tools fOr Impact<sup>3</sup>.

## 1. FIELD OF RESEARCH

As detected in the first pre-analysis tasks on a national level Leonardo da Vinci / Transfer of Innovation projects had been conducted in Austria, Germany and Hungary. Because of the fact, that there were still some projects running or had just been finished, the team decided not to analyse projects from 2013. Furthermore, the Republic of Macedonia was a program country for doing Mobility projects only. Furthermore, the number of projects per country and year was very different and the German national agency conducted and supported an above average number of LdV/Tol projects (see Fig 1). So the project team decided corporately that the Macedonian partner would have to analyse German projects together with f-bb from Germany.

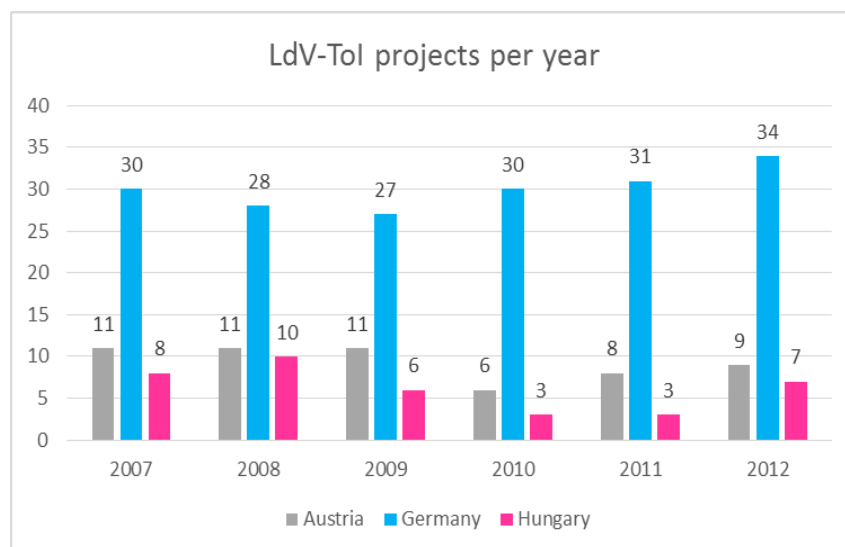


Figure 1: Number of LdV/Tol projects per country and year

All in all the development partners of TOI TOI TOI analysed the following number of LdV/Tol projects from 2007-2012: Austria 56, Germany 180 and Hungary 37.

**N = 237 project consortia (2.127 organisations)**

## 2.NETWORK - ANALYSIS

As mentioned before TOI TOI TOI used the European project database ADAM ([www.adam-europe.eu](http://www.adam-europe.eu)) for clustering by using methods from the scientific methods of network analysis. First it had been planned to use proposals from closed LdV/ToI projects but the Austrian national agency denied access to these documents.

During a transnational project meeting in Berlin the team decided to use the following criteria which could be extracted from data entries in ADAM for network- and cluster analysis. Both criteria described the structure of a consortium and can be fully used for cluster analysis:

- a) Size of a consortium
- b) Geographic distribution of project partners

The scientific workflow started with defining a common format and layout for data collection which could be done by preparing MS EXCEL based templates which were programmed for data collection and first evaluations by using different formulas. Each partner had to transfer the data from ADAM to these MS EXCEL templates to ensure the comparability of the results. Except Swiss partners which had been silent partners until 2011 by using special national funding instruments the team considered core partners and external coordinators only. Strategic and silent partners hadn't been taken into account.

Code	Contract Number	Title	beneficiary of contr.	Partners		
HU 001-11	2011-1-HU1-LEO05-03626	SME 2.0 - PROACTIVE NETWORKING IN THE BUSINESS MANAGEMENT OF EUROPEAN SMEs	ITStudy Hungary Számítástechnikai Oktató- és Kutatóközpont Kft. Hu-Ungarn			
				Nyugat-magyarországi Egyetem (Közgazdaságtudományi Kar)	HU	Hungary
				CAPDM Ltd	UK	United Kingdom
				Cork Institute Of Technology in Ireland	IE	Ireland
				WireSpider Ltd.	HU	Hungary
				TREBAG Kft.	HU	Hungary
				VisionArt Europe Trading and Servicing Ltd	HU	Hungary
				Libetra Szolgáltató Betéti Társaság	HU	Hungary
				Associazione Italiana Informatica e Calcolo Automatico	IT	Italy
				Széchenyi István Gimnázium és Szakközépiskola	HU	Hungary

Figure 2: Screenshot of MS EXCEL based data collection

The most intensive step in network- and cluster analysis was to validate the transferred data. In many cases the ADAM entries had been incomplete or wrong. So each single project partner and each consortium had to be validated in a web-based way by comparing the respective ADAM entry with other documents like publications or press releases from the internet. In some projects it had been nearly impossible to verify each core partner and it had been a must to establish a personal contact to the respective project coordinators or the coordinating institution or even other partners to get the used information via email.

After quite intensive work all projects could be verified and fully used for network analysis and clustering. The results of network analysis describe the European dimension of cooperation in LdV/ToI projects in Austria, Germany and Hungary from 2007-2012 and these results are the basic data for final cluster analysis and naming of different clusters.



## 3. RESULTS AND CLUSTERING

### 3.1 Results

After finishing validating of all 237 project consortia from Austria, Germany and Hungary each partner started evaluating the results in terms of quantitative statistic data. For this reason, Danube University Krems had prepared MS EXCEL based templates including prepared formula which ensured a homogenous and standardised calculation and presentation of the respective results and the final clustering.

As shown in Figure 3 the first part of network analysis aimed studying the size of project consortia in LdV/Tol projects from 2007-2012. In this case the beneficiary, possible external coordinating institutions and all core partners were counted. The main finding concerning the size of teams was the fact that Hungarian LdV/Tol consortia had been significantly smaller than Austrian or German ones. By the years LdV/Tol consortia in Austria had become significantly smaller. As its presented in Table 1 the average Austrian LdV/Tol consortium, which had been the biggest team, consisted of about 8 core partners and Hungarian project teams had been 6 partners in average.

Country	Average size 2007-2012
<b>Austria:</b>	8,19
<b>Germany:</b>	8,01
<b>Hungary</b>	6,18

Table 1: Average size of LdV/Tol consortia in Austria, Germany and Hungary

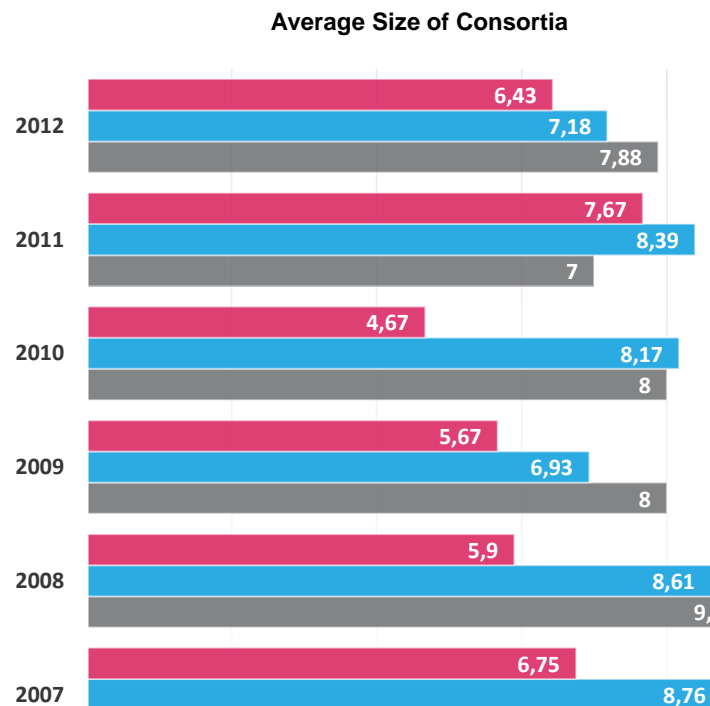


Figure 3: Average size of LdV/ToI projects in Austria, Germany and Hungary 2007-2012

Searching for the reasons of the differences in the size of the project teams had to be done in combination with estimating the results of the second part of analysing the structure of LdV/ToI project consortia. This second part of doing quantitative analysis aimed at detecting and describing the geographic distribution of partner in the consortia and used network analysis to answer the question: Which countries cooperate preferentially with whom?

The templates from Danube University Krems had been prepared to calculate the results in percent and the following Figures 4, 5 and 6 present the national results of network analysis of LdV/ToI projects from 2007-2012 on a national level in Austria, Germany and Hungary.

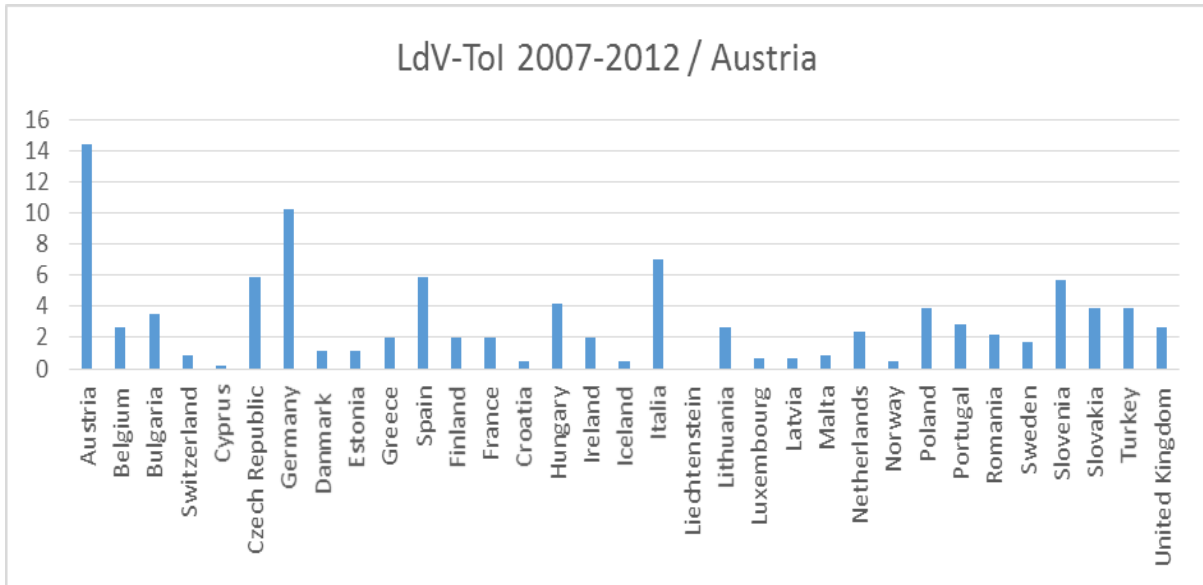


Figure 4: Network analysis Austria

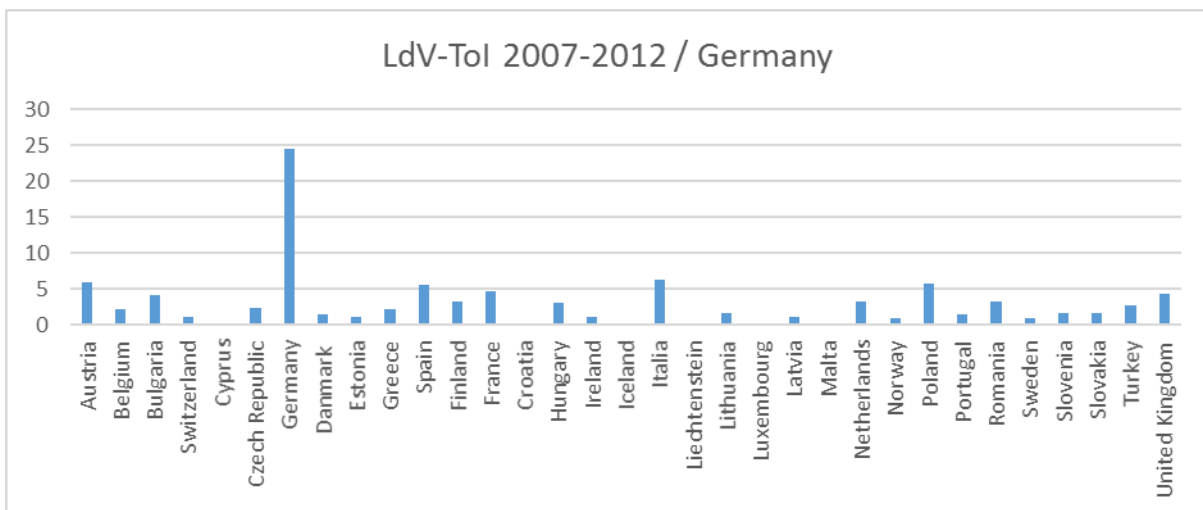


Figure 5: Network analysis Germany

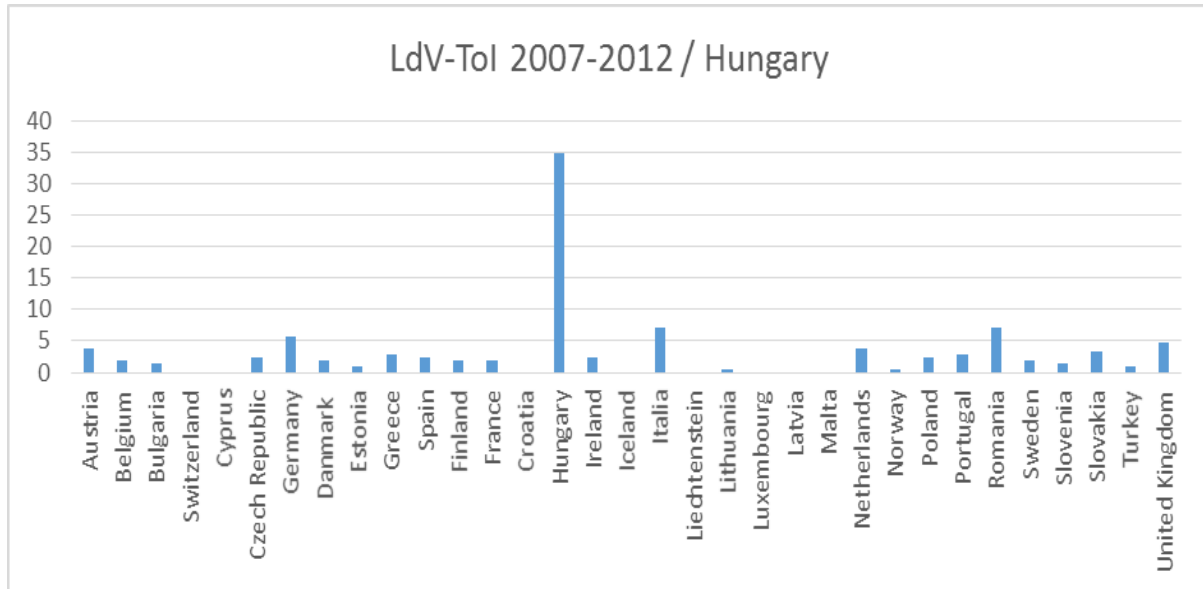


Figure 6: Network analysis Hungary

As shown in Figures 4, 5 and 6 network analysis generated two significant results which can be summarised in two concise theses:

- a) Beneficiaries / coordinators prefer cooperating with domestic partners

In all three researched countries partners from the own country had been most chosen and so the number of domestic partners was significantly high. Especially Hungarian project teams mainly consisted of partners from Hungary itself. Austrian (about 14%) and German (about 24%) consortia showed significantly lower data than the high number of domestic partners in Hungarian LdV/ToI projects.

- b) Beneficiaries / coordinators prefer cooperating with partners from neighbouring countries

The second finding showed similar data for all three researched countries and evaluating all data results in above average cooperation with partners from neighbouring countries or countries near by

the coordinating institution. Some European regions like the Baltic countries or Scandinavia were underrepresented. In this case Figure 7 pictures the “Hot-Spots” of cooperation in LdV/ToI projects conducted by Austrian, German or Hungarian lead partners.

Describing detailed numbers, frequencies, variances and changes in terms of domestic partners and other detected results will have to be a task for all development partners in writing the “National TOI TOI reports” which will combine all quantitative and qualitative research on a national level.



Figure 7: Geographic distribution of project partners in Austrian, German and Hungarian LdV/ToI projects

Finally, some possible reasons for the different sizes of project consortia had to be named. Of course different aims and objectives had required different numbers of partners of a project team. For instance, projects dealing with secondary or vocational school systems often consisted of many schools as test partners. Different national habits in project management or maybe some recommendations of the respective national agencies could have been further reasons. Finally,

economic reasons had to be named because smaller consortia allow higher budgets for each single partner.

In terms of the above average cooperation with domestic partners and institutions from neighbouring countries all three researched countries show similar frequencies. Missing language skills, different habits in project management, personal contacts and economic reasons could have been the main reasons for these facts. Especially economic

It will have to be a task in planning the semi structured or semi standardised interviews in qualitative research to validate the results of quantitative analysis. So the interviews will have to be structured in a way that they allow to validate the size of a consortium and the geographic distribution of the partners by creating some certain questions.

### 3.2 Clustering

Finally, the project team clustered all analysed consortia during a transnational project meeting together by using two characteristics: the size and the geographic distribution. All in all six clusters, two per country, were defined and will analysed by using qualitative interviews:

- a) *“Conservative or traditional”* consortia are typical project consortia which fit to the results of network analysis on national level and which are within a small range in the number of partners and the chosen partner countries.
- b) *“Innovative”* consortia are significantly smaller or bigger than the defined range and they consist of institutions from countries which are underrepresented in the network analysis’ results.

## LIST OF SOURCES

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