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EUROPEAN AGRICULTURAL CLUSTERS: HOW CAN EUROPEAN AGRICULTURAL CLUSTERS BE MEASURED AND IDENTIFIED?

Arnold Looijen, Wim Heijman[1]

Abstract

This article contains a research into the agricultural clusters of the EU. The clusters are identified on the level of NUTS1 regions. The agricultural clusters are identified by main type of farming and by their contribution to the regional gross value added.

Key words: *Agricultural Clusters, Location Quotient, Farm types.*

JEL: *Q13, Q19*

Introduction

In his book "The Competitive Advantage of Nations" Michael Porter describes what competitive advantage is and how this results in the origin of clusters. Porter used a diamond shaped diagram to illustrate which factors determine competitive advantage. All the four factors are essential ingredients for successful local, regional, international or global competition. The importance of a cluster rises with the sophistication of competition. This means that clusters tend to increase as economies develop (Porter, 1990).

Competition depends on several aspects: personal relationships, face-to-face communication, and interaction between networks of individuals and institutions. It is obvious that both networks and clusters depend on each other. The existence of clusters makes relationships more likely to develop and become more effective and efficient in one place (Porter, 1998), (Buccirossi, Marette, et al., 2002).

In this article the main research question is: "How can European agricultural clusters be measured and identified?"

Section 2 contains the theoretical part of this study. Section 3 describes the different types of clusters. In Section 4 the methodology of measuring clusters will be described. Sections 5 and 6 contain the results. This article is concluded by Section 7.

1 Wageningen University, Department of Social Sciences, Wageningen, the Netherlands, E-mail: wim.heijman@wur.nl arnold.looijen@wur.nl

Theoretical Framework

Michael Porter introduced the term cluster in economical context in his book: *The Competitive Advantage of Nations (1990)*. However, its history goes back to 1890 where Alfred Marshall was one of the first persons to describe the geography of economic activities and the analysis of clusters in his book: *Principles of Economics (1920, revised edition)*. The theorem of clusters was further developed by economists such as Perroux (1950), Hirschman (1958), Jacobs (1961) and Krugman (1991), (Breschi and Malerba, 2006).

Porter's definition is: *"Clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular fields that compete but also cooperate. Critical masses of unusual competitive success in particular business area's, clusters are a striking feature of virtually every national, regional, state, and even metropolitan economy, especially those of more economically advanced nations"* (Porter 2008).

There is a variety of clusters. Bottazzi et al. presented in 2002 from an Italian perspective the following forms: Horizontally Diversified (e.g. "Made in Italy" luxury goods); Vertical Disintegrated ("Smithian" with a local value chain); Hierarchical (oligopolistic); Research Driven (science-based); and Path Dependent (a Detroit-type agglomeration), (Breschi, Malerba, 2006), (Bottazzi, Dosi et al., 2002).

Another term, which is occasionally used for business clusters, is the term *economy of agglomeration. Economies of Scale* and the *Network Effect* are two related concepts to *economy of agglomeration. Economies of scale* appear when the costs decrease when a company size increases, this can be internal economies of scale or external economies of scale. Lower costs per unit produced are the result of scaling up. This is because of lower transport costs, competing suppliers and specialization. When competing firms are clustered, there can be positive effects; clusters can attract more customers and services than a single company can attract. However, when the cluster becomes congested due to the appearance of to many firms or industries. Therefore external diseconomies of scale may be generated (Heijman and Schipper, 2008).

The *Network Effect* occurs when the value of a product or service increases. It increases when it is used by more actors. An example of a network effect is the use of the telephone. The more telephone users, the more valuable it is for each owner. Another recent example of the *network effect* is social media and internet.

The determinants of Competitive Advantage are described underneath by way of illustration of the four facets of Porter's diamond:

- With *Factor Conditions* we mean the technology, labor and infrastructure (and other conditions) needed in order to be able to compete in a certain industry.
- The *Demand Condition* is the size and character of the home-market influences the growth, innovation and quality of the produced goods (Example: the popularity of

sailing boats in the Netherlands due to the presence of many recreational lakes).

- *Related and Supporting Industries* give a competitive advantage because clusters provide more effective and innovative inputs (The most famous example of this is Silicon Valley, where a lot of high-tech businesses are located close to each other).
- The *Firm Strategy, Structure and Rivalry* are influenced because the conditions of a nation or region influence the way that companies are organized and managed (For example the competition in (South-East)Asia in the electronica industry due to the presence of many large producers), (Porter, 1990).

A cluster becomes stronger by affecting its competitors, this is possible in three ways: first, by increasing the productivity of supporting firms or industries; second, by increasing their capacity for innovation and thus for productivity growth; and third; by stimulating new business formation that supports innovation and expands the cluster (productivity), (Porter, 1998; Porter, 2008).

Those influences on competition depend on several aspects: personal relationships, face-to-face communication, and interaction between networks of individuals and institutions. It is obvious that both networks as clusters are dependent of each other, the existence of clusters makes relationships more likely to develop and become more effective and efficient in one place (Porter, 1998), (Obadic, Zivadinovic, 2011).

Static Productivity

For increasing the productivity of supporting firms or industries, Porter chose the term *Static Productivity*. Static productivity is a covering term of the following principles: access to specialized inputs and employees, access to information, complementaries, access to Institutions and Public Goods, and Incentives and Performance Measurement.

- *Access to specialized inputs and employees:* Companies located within a cluster have access to specialized inputs such as machinery, components, business services and employees that are superior or have lower costs compared to input alternatives from distant locations. The presence of a cluster does not only increase demand for certain inputs but also increases the supply. Competition of supply increases the quality of the supply of inputs. The cluster represents a spatial organizational form that can be more effective or efficient (Porter, 1998).
- *Access to information and knowledge:* Information accumulates within a cluster, whether it is extensive market information, technical information or other specialized information. (Accumulated) Information can be accessed better or cheaper from within the cluster. This allows firms within the cluster to enhance their productivity and get closer to their productivity frontier. The information benefits of clusters have a special case about the availability of information on their current buyer's needs. Sophisticated buyers are often part of the cluster and other participants often gain and share information about buyer needs (from other clusters), (Porter, 1998).
- *Complementaries:* Firms or industries within a cluster are dependent on each other. When a part of the cluster performs badly it affects the performance of the other parts

within the cluster. A simple but good example is tourism: when a hotel in a specific area is very bad, it will negatively influence the souvenir shops and restaurants in that region in the future, because the visitor shares the knowledge and experiences of his/her holiday. Furthermore, the visitor's experience of the hotel depends not only on the primary attraction (the hotel) but also on the comfort and services of the other facilities. So when the hotel and the other facilities are not fulfilling the visitor's needs, he/she will rate the entire cluster negatively. Marketing is a form of a complementarity; a group of related firms and industries can efficiently work together in joint marketing. It also enhances the reputation of a certain location of region (Porter, 1998).

- *Access to institutions and public goods:* Firms and industries can benefit from local public goods (e.g. Infrastructure) and/or benefit from locally situated institutions at low costs (e.g. Research by students from a nearby university). Firms and industries also benefit from information built up within a cluster, this is a quasi-public good. Public or quasi-public goods within clusters are often the result of private investment. Private investments are common because cluster participants perceive the potential for collective benefits (Porter, 1998).
- *Incentives and Performance Measurement:* Clusters can give incentives to improve the efficiency of firms and industries. The main incentive is competitiveness, because local competitors have similar general circumstances. General circumstances make it easy to compare your rivals constantly (labor costs, wages and market access). Measuring the performance is also important for clusters. There are opportunities to compare performances within similar firms. This results in wider opportunities for the firm. The accumulation of knowledge in a cluster should make decisions easier for the firm and the cluster (Porter, 1998).

Capacity for innovation

Information is an important aspect for firms. Clear information about the buyer's needs is the result of knowledge and relationships within a cluster. Cluster participants have the ability to learn early about technological changes and technical possibilities. This results in great opportunities for innovation (within the cluster). Another advantage which clusters have is the fact that the possibility of innovation is faster than firms outside the cluster because firms which supply the input are likely to be located closely. Competitiveness stimulates innovation and vice versa; when a firm innovates, a rival firm cannot stay behind. Isolated firms (firms outside the cluster) are less likely to have the opportunity and/or the incentive to innovate (Porter, 1998).

Clusters and new business formation

Many, if not most, new businesses choose to form within existing clusters. They prefer forming in a cluster above isolated locations because of a couple of reasons. First, the clusters provide incentives to entry through better information about opportunities within the cluster and/or industry. The existence of a cluster in itself indicates signals for opportunity. Individuals within a firm or industry perceive problems in the products, the process, the services or the suppliers. Those individuals are likely to start new firms aimed at filling the perceived problems.

The barriers to entry are lower than elsewhere. Needed assets, skills, inputs, and staff, are often already available within the cluster. Risks of entry are lowered because of: lower entry barriers, multiple potential local customers, established relationships, and the presence of other local firms (which can lower production costs).

These mentioned advantages of establishing a new business formation within a cluster can play a major role in speeding up the process of (cluster) innovation. Because of these innovations, clusters often grow in depth and breadth over time, which further enhances the advantages of the cluster (Porter, 1998).

Cluster identification

Clusters can be identified by kind of knowledge of by form of development. In this section we will discuss the types of clusters identified by different kinds of knowledge and the types of clusters that can be identified by different forms of development.

The knowledge clusters can be differentiated by five types: the factor endowment clusters, the techno clusters, the historic knowhow-based clusters, the low-cost manufacturing sectors and the knowledge service clusters. The *Factor Endowment Clusters* are the regions which have comparative advantages due to the presence of certain factor endowments. This could be the amount of land, natural resources, the availability of labor and the population size of a certain nation or region (Porter, 1990).

As stated in Section 2, business clusters will most likely be formed within a cluster or in area's where the companies can achieve comparative advantages due to geographical location. For instance the harbor of Rotterdam, a main port in the Netherlands, is a good example of a geographical location where a lot of transportation companies are clustered due to the geographical advantages of the appearance of the Rhine and the North-sea.

Techno Clusters are clusters with high technologically orientated businesses. Networking and sharing knowledge is a very important aspect in the techno clusters. These clusters are often linked to universities, research centers or ICT-clusters. Silicon Valley is one of the greatest techno clusters in the world. There are more than 20 universities, including San José State University, Stanford University and San Francisco State University. Furthermore is Silicon Valley known for their high technology companies such as: Yahoo, Adobe Systems, eBay, Google, Intel, Hewlett-Packard and Apple Inc. Wageningen University and Research Centre is also a techno cluster, it is mainly focused on the domain of food (security) and (living) environment (Ianca, Batrinca, 2010).

Historic knowhow-based clusters are the clusters which are based on traditional activities. Traditional techniques in for example management are the result of centuries of know-how of the previous entrepreneurs. A good example of a historic knowhow-based cluster is the financial center in London, with the world's greatest foreign exchange market (Ianca, 2010).

Low-cost manufacturing clusters are clusters which are typically emerged in developing countries within particular industries. The drivers of these clusters are: availability of low-cost

labor and geographical proximity of clients (e.g. Mexico and Eastern Europe), (Altenburg and Meyer-Stamer, 1999).

Knowledge service clusters are like low-cost manufacturing clusters emerged in developing countries. These clusters are characterized by the availability of lower-cost skills and expertise. Those clusters serve a globally growing demand for electronics, engineering, software-development and analytical services (e.g. Shanghai, China and India), (Manning, et al., 2010), (Bronisz and Heijman, 2008).

There are four types of clusters that can be identified by their different forms of development: *Geographical* clusters, *Horizontal* clusters, *Vertical* clusters and *Sectorial* clusters. The *Geographical clusters* exist because of a geographical reason; a locations where certain types of resources are available that attract firms that need that type of resources for their production process.

With *Horizontal clusters* we mean the interconnections between firms and industries on a horizontal level, this is the sharing of resources and knowledge. The *Vertical clusters* are the clusters with interconnection between firms and industries on a vertical level, mostly supply chain clustering. A *Sectorial cluster* is a cluster where firms and industries operate together from within the same sector. This type of interconnection can occur horizontally and vertically (Isbasoiu, 2007), (Matopoulos, Vlachopoulou, et al. 2005).

Location quotients

There is no standard method of measuring a cluster. When we want to measure a cluster, we try to identify, define, locate and describe the cluster. There are a couple of methods to analyze the competitiveness of a certain area, of which the *Location Quotient-method* is widely used (Heijman and Schipper, 2008). Cluster analysis is based on local and regional employment statistics in various industrial sectors. For this article we used two notable databases which provided us the data on clusters and industrial agglomeration: *The European Cluster Observatory* and *Eurostat.*

The European Cluster Observatory is managed by the Center for Strategy and Competitiveness at the Stockholm School of Economics. The European Cluster Observatory is a platform which provides an access point to information and analysis of clusters, cluster competitiveness and cluster policy in Europe. The European Cluster Observatory has three main target groups: Policy makers and government at the European, national, regional and local levels; Cluster Management staff; and Academics and researchers. The European Cluster Observatory database is based on regions and sectors. Their method is to combine geography and industry, in order to statistically trace regional agglomerations in Europe. The European Cluster Observatory designed a framework whose aims are to provide a basis for analysis and benchmarking of regional competitiveness.

The framework which they use for identifying clusters is divided in four layers: outcome indicators, intermediate performance indicators, competitiveness drives and fundamentals. The outcome indicators sit at the top of the framework. The outcome indicators are the

indicators of ultimate performance primarily to gross domestic product per capita. The intermediate performance indicators are about the performance in a range of areas such as patents, productivity, employment rate, exports and growth of firms. The competitive drivers are the core of the framework. The drivers are indicated to clusters, behavior and quality. These sets determine the measurement of economic performance. The fundamentals are about the geographical location, the endowment of natural resources and the size of the economy. They provide opportunities for each region (Observatory, 2012).

Eurostat provides statistical information about institutions of the European Union, furthermore it promotes the harmonization of statistical methods across the member states of the European Union. In the statistical database of Agriculture Eurostat have the following main activities: agriculture, forestry, fisheries and Food: from farm to fork (Eurostat, 2012).

The location quotient is an easy to compute tool for measuring the economic strength of a firm or industry in a region. It calculates the ratio that describes the regional share of an economic activity in a firm or industry compared to the national share of economic activity in that sector. The tool is used to identify specializations in a(n) (local) economy.

The location quotient is equal to the relative share of the sector in the total added value of a region divided by the relative share of the sector in the total national added value. A location quotient under 1 means that a region is not specialized in that computed industry, a location quotient above 1 means that the region is specialized in that sector (Heijman and Schipper, 2008). The formula for the location quotient (LQ) is the following:

$$E_i^j = \text{Gross Value Added in Activity } i \text{ in Region } j$$
$$E_i = \text{Gross Value Added in Activity } i \text{ in nation}$$
$$E^j = \text{Total Gross Value Added in Activity } i \text{ in Region } j$$
$$E = \text{Total Gross Value Added in Activity } i \text{ in nation}$$

$$LQ = \frac{E_i^j / E^j}{E_i / E} \quad \text{or} \quad LQ = \frac{E_i^j / E_j}{E^j / E}.$$

The location quotient will be computed in Excel and eventually in a GIS-software program which will generate maps of the location quotients in Europe.

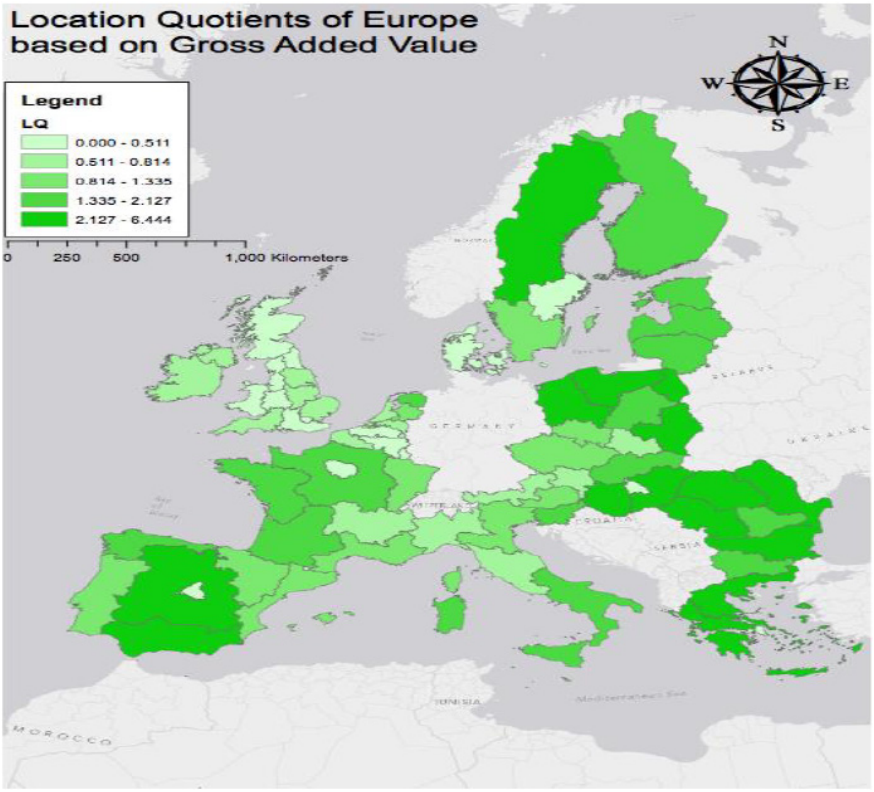
In Figure 1 an overview of the location quotients of gross added value in agriculture in the European Union is displayed. The location quotients of some countries (e.g. Germany) could not be computed due to lack of data or the absence of EU-27 membership. If we take a look at Figure 1, then we notice that the location quotients in Eastern Europe and in Southern Europe are higher than in Western Europe. If we take a look at the top ten location quotients based on Gross Added Value in Europe, we see that Romania has three regions

represented in the top 10. Greece has two regions represented in the top ten, and the other 5 regions are all from Eastern Europe (with ES4 as an exception). See Table 1 for the top ten regions in Europe with highest location quotient.

Table 1. Top ten NUTS-1 regions in Europe with highest location quotients for agriculture based on Gross Added Value (Eurostat, 2007)

NUTS1	Region	LQ
BG3	Bulgaria, Severna I Iztochna	4,5400
HU3	Hungary, Great Plain and North	4,0090
GR2	Greece, Kentriki Ellada	3,5850
ES4	Spain, Centre	3,4220
GR1	Greece, Voreira Ellada	3,1240
RO2	Romania, Nord-Est, Sud-Est	6,4440
RO4	Romania, Sud-Vest, Vest	4,9190
PT2	Portugal, Azores	4,7780
RO1	Romania, Nord-Vest, Centre	4,4470
PL3	Poland, East Region	3,2100

Figure 1. Location Quotients for agriculture based on Gross Added Values (Eurostat, 2007)



Farming types

The second aspect needed for the measuring clusters is the type of farming in the given region. The type of farming is defined as: "the agricultural activity has a higher standard gross margin than two-third of the total" (Eurostat 2012). There are six different categories for the type of farming in Europe:

- *Specialist Field Cropping:* the dry-land and irrigated production of crops, typically on a large scale. The choice of the cropping depends on soil, climate and precipitation.
- *Mixed Holdings:* different kinds of farming types are represented in the given NUTS1 region. Neither livestock nor crop production is the dominant activity. None of the farming activities has a higher standard gross margin than two-third of the total.
- *Specialist Permanent Crops:* one crop produced from plants which last for many seasons, rather than being replaced after each harvest (e.g. citrus, olives, coffee and rubber).
- *Specialist Grazing Livestock:* domesticated animals raised in an agricultural setting to produce food, fiber and labor
- *Specialist Horticulture:* science, art, technology and business involved in intensive plant cultivation (e.g. Fruit, vegetables, floriculture, etc.).
- *No Specialization:* no specific type of farming in that NUTS1 region. There is no type of farming which has more than two third of the total of the standard gross margin. The difference with mixed holdings is that mixed holdings are firms and industries which have different kinds of farming within their firm or industry and the no specialization type of farming accounts for the given region.

Not all categories will be discussed in the further analysis of the agricultural clusters in the European Union. This is for specialized horticulture due to the low appearance of specialized horticulture NUTS1 regions

The critical location factors for field cropping as main type of farming are proper physical production circumstances. Soil, climate, precipitation and low ground prices are some very important factors which determine whether field cropping is possible or not. Thus the potential areas for Field Cropping are parts of: France, Italy, Greece, England, Germany, Denmark and Scandinavia.

The grazing livestock areas in the European Union are mainly in Western Europe, with as an exception Northern Spain and Middle Europe (South-East Germany and Austria). The appearance of grazing livestock areas is especially because of the low ground prices and the proper physical production circumstances. The dairy business can be expected in areas with grassland areas with a low urban pressure and thus low ground prices. Therefore is the dairy business especially located in the coastal areas of England, Wales, the Netherlands, Denmark, parts of Germany, France and Poland (Rienks, Hermans et al. 2004).

A mixed-farming holding is an agricultural firm or industry where there is no specialization in livestock or crop production. There is no dominant activity, which means that none of the farming activities provides more than a two-third part of the standard gross margin (SGM), (Eurostat 2012).

In Eastern Europe we see a lot of mixed holdings as type of farming. Furthermore, the areas with mixed holdings as farming type are only in Eastern Europe. The question now rises, why only in Eastern Europe and why is the only other type of farming in Eastern Europe no specialization?

A reasonable explanation for the appearance of many mixed holdings is that mixed holdings are a low-risk and a risk spreading agricultural activity. This is important because those farmers can not afford to have failed harvest because they only focused on one type of crop. On the other hand it might have to do with the need of self-sufficiency of the Eastern European agricultural entrepreneurs. The lack of good logistics and infrastructure might result in the fact that it is more difficult for Eastern Europe to import agricultural products, therefore it is a simple choice to have different types of crops in order to be self-sufficient. Therefore it can be stated the agriculture in Eastern Europe can be described as mostly low-risk and self-sufficient.

When we take a good look at the appearance of permanent crops as type of farming in Europe, then we see that it is mostly located in Southern Europe. A reasonable explanation for this appearance is the climate. The production of olives, grapes, corn and maize has some certain pre-requisitions, such as temperature, humidity and soil structure. Southern Europe has these pre-requisitions and is therefor perfectly for cropping olives, grapes, corn and maize (Silvis, Slangen, et al. 2002).

Agri-clusters based on Type of Farming and Gross Value Added

By combining the findings in the previous two sections it is possible now to identify agricultural clusters. Regions with agricultural clusters of a certain farming type are characterized by a high agricultural location quotient.

In this section we will discuss the location quotients based on type of farming in the different NUTS1 regions. Based on the gross added value and farm type we will identify the top five NUTS1 regions per type of farming. The range of location quotients for each type of farming is different because we chose to divide the ranges by quantiles with five different classes. The order of type of farming is the same as in Section 5.

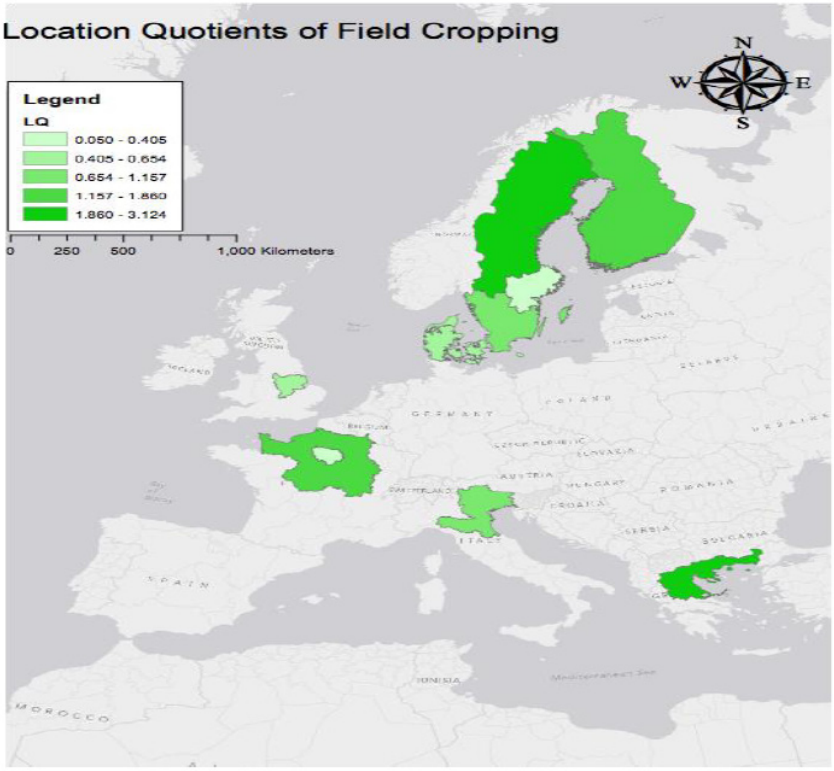
The field cropping areas in the European Union appear in France, Italy, Greece, England, Germany, Denmark, Finland and Sweden. The top five NUTS1 regions for highest location quotient based on type of farming and gross added value are displayed in Table 2 and Figure 2.

The top five regions for field cropping are located in Greece, Sweden, France, Finland and Italy. Because there are not many areas in Europe where field cropping is the main type of farming, it is difficult to make any assumptions about field cropping clusters in Europe.

Table 2. Top five Location Quotients of Field Cropping based on numbers of Eurostat (2007)

Field Cropping	Region	LQ
GR1	Greece, Voreia Ellada	3,12
SE3	Sweden, North	2,16
FR1	France, Île-de-France	1,86
FI1	Finland, Mainland	1,59
ITH	Italy, North East	1,16

Figure 2. Location Quotients of Field Cropping based on numbers of Eurostat (2007)



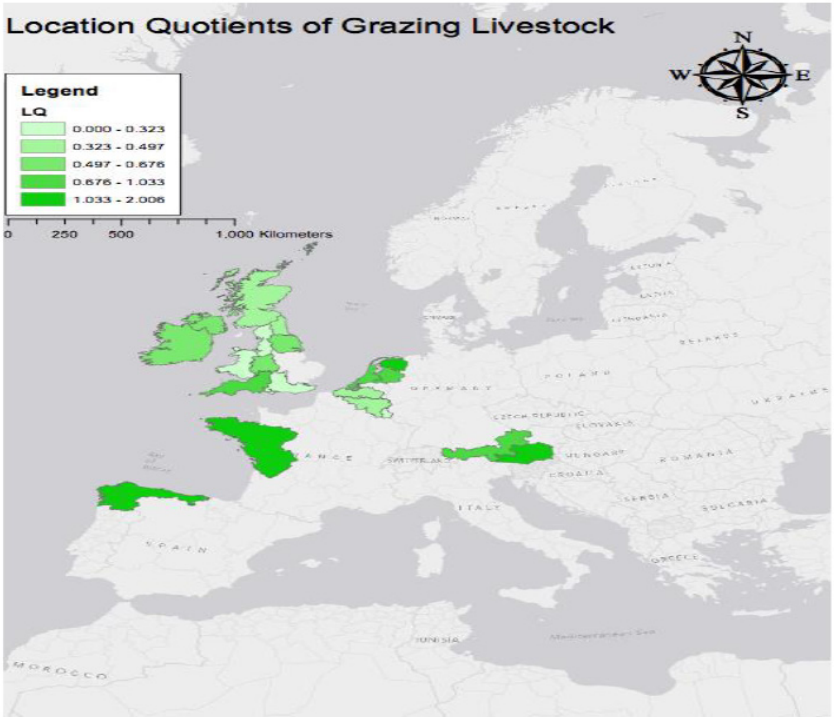
The Grazing Livestock area's in the European Union appear in England, the Netherlands, France, Spain, Germany and Austria. The top five regions for highest location quotient based on type of farming and gross added value are displayed in Table 3 and Figure 3.

The top five regions for grazing livestock are located in Spain, France, The Netherlands and Austria. One thing that is noticeable is that these location quotients are sufficiently lower than field cropping for example. The grazing livestock area's have the same problem as field cropping regarding drawing any conclusions for the appearance of clusters.

Table 3. Top five Location Quotients of Grazing Livestock based on numbers of Eurostat (2007)

Grazing Livestock	Region	LQ
ES1	Spain, North West	2,01
FR5	France,West	1,49
NL1	Netherlands, North	1,46
AT2	Austria, South	1,21
NL2	Netherlands, East	1,03

Figure 3. Location Quotients of Grazing Livestock based on numbers of Eurostat (2007)



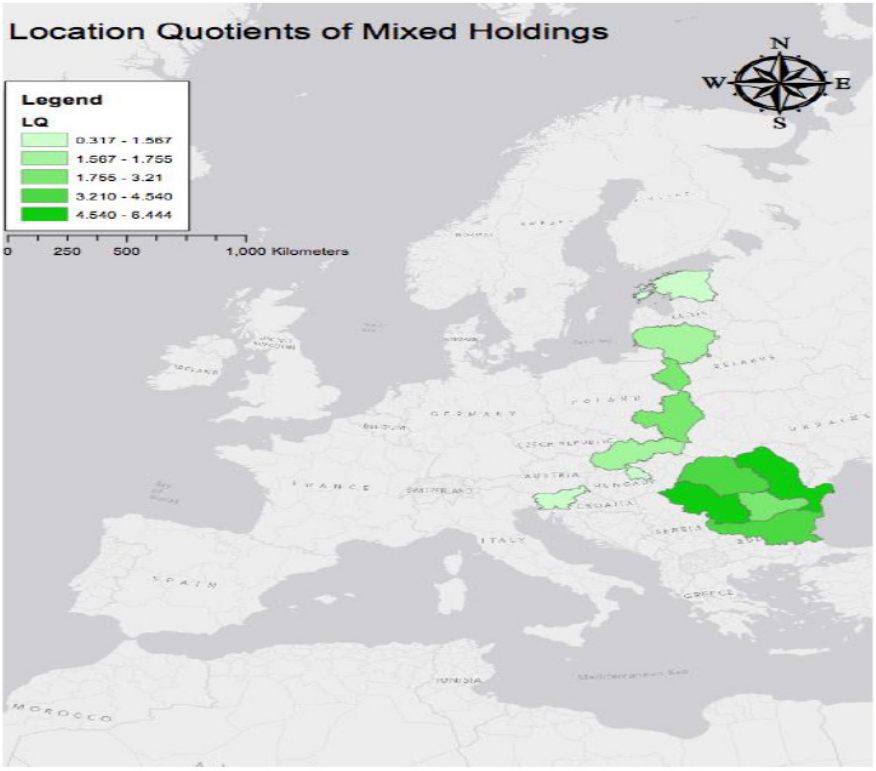
The Mixed Holdings area's in the European Union appear only in Eastern Europe, with in particular Romania, Poland, Bulgaria, Estonia, Slovenia and Slovakia. The top five NUTS1 regions for highest location quotient based on type of farming and gross added value are displayed in Table 4 and Figure 4.

The top five regions of the gross added value of mixed holdings are in Romania, Bulgaria and Poland. The location quotients of the mixed holdings areas are significantly higher than the other types of farming. This might be due to the fact that this type of farming is very diverse. It has a high added value because their production meets their needs in stead of that their needs exceed their production which will lead to importing other agricultural products. Being self-sufficient resulted in high gross added values and thus a high score on the location quotients.

Table 4. Top five Location Quotients of Mixed Holdings based on numbers of Eurostat (2007)

Mixed Holdings	Region	LQ
RO2	Romania, Nord-Est, Sud-Est	6,44
RO4	Romania, Sud-Vest, Vest	4,91
BG3	Bulgary, Sverna I Iztochna	5,54
RO1	Romania, Nord-Vest, Centru	4,44
PL3	Poland, East Region	3,21

Figure 4. Location Quotients of Mixed Holdings based on numbers of Eurostat (2007)



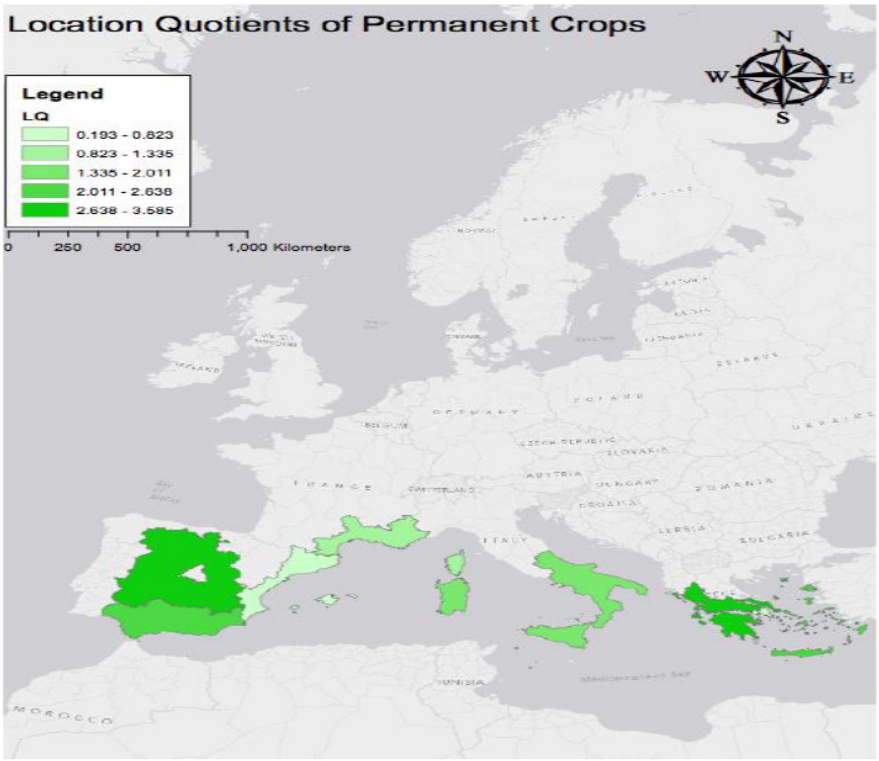
The Permanent Crops area's in the European Union appear only in Southern Europe, with in particular Spain, Italy and Greece. The top five NUTS1 regions for highest location quotient based on type of farming and gross added value are displayed in Table 5 and Figure 5.

The top five NUTS1 regions for permanent crops are located in Greece, Spain and Italy. Based on the location quotient based on labor and the location quotient based on gross added value we might state that there are some permanent crops clusters Southern Europe.

Table 5. Top five Location Quotients of Permanent Crops based on numbers of Eurostat (2007)

Permanent Crops	Region	LQ
GR2	Greece, Kentriki Ellada	3,58
ES4	Spain, Centre	3,42
ES6	Spain, South	2,63
GR4	Greece, Nisia Aigaiou, Kriti	2,41
ITG	Italy, Islands	2,01

Figure 5. Location Quotients of Permanent Crops based on numbers of Eurostat (2007)



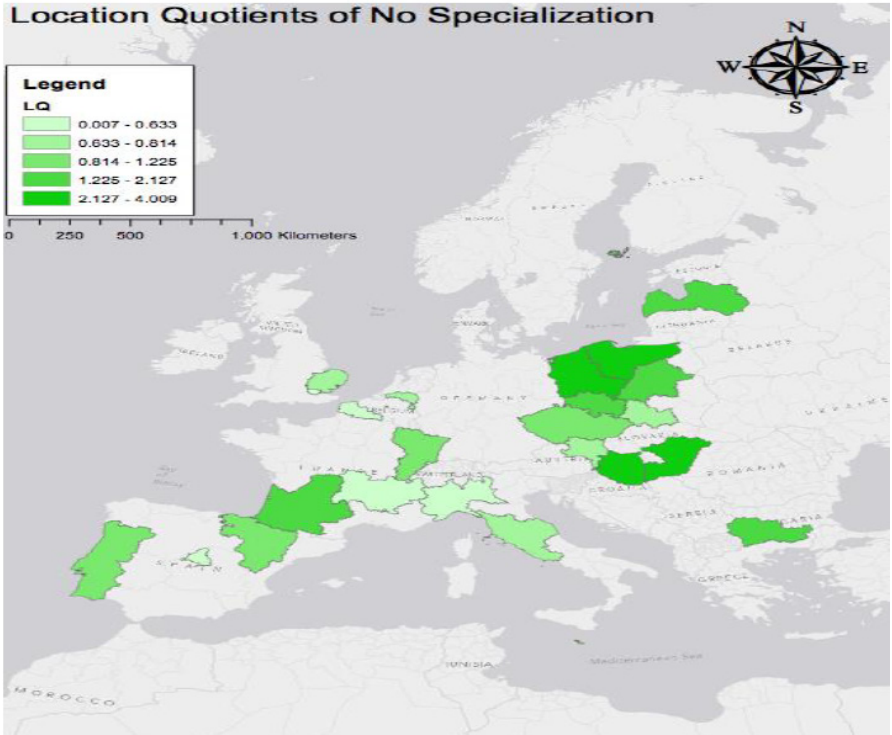
The Permanent Crops areas in the European Union appear in diverse area's in Europe. The no specialization areas are spread through the European Union. The top five NUTS1 regions for highest location quotient based on type of farming and gross added value are displayed in Table 6 and Figure 6.

The top five NUTS1 regions for no specialization are located in Hungary, Poland and Latvia. Because there is no specialization in this type of farming it is difficult to determine whether there are agricultural clusters because there is no data available on any specific farming types in those given areas.

Table 6. Top five Location Quotients of No Specialization based on numbers of Eurostat (2007)

No Specialization	Region	LQ
HU3	Hungary, Great Plain and North	4,01
HU2	Hungary, Transdanubia	3,01
PL4	Poland, Northwest Region	2,69
PL6	Poland, North Region	2,56
LV0	Latvia, Latvia	2,13

Figure 6. Location Quotients of No Specialization based on numbers of Eurostat (2007)



Conclusion

The main research question of this article was: *"How can European agricultural clusters be measured and identified?"*. Location quotients combined with farming types on the NUTS1 level gave us an overview of the spatial distributions of the different types of agri-clusters throughout the European Union.

Mixed holdings have the highest location quotients, followed by the no specialization areas, permanent crops, field cropping and finally grazing livestock.

Especially the mixed holdings and no specialization types of farming area's can be identified as low-cost manufacturing clusters or factor endowment clusters. Eastern

Europe is, in comparison with Western Europe, less developed, there is a high availability of low-cost (agricultural) labor, there is a high geographical proximity of clients and the amount of land and natural resources are also present as their comparative advantages. Given these properties and the calculated location quotients, a number of NUTS1 regions in the east part of the EU may be identified as factor endowment clusters or low-cost manufacturing clusters.

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CONTENT