

The geometric models of Europe's core area

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Abstract

This study focuses on the spatial structure of the European Union. The aim of the research is to analyse the geometric models of Europe's core area. We have a lot of flat shapes for the spatial structure: we have axes, polygons (triangles, squares, a pentagon) and they have a lot of different geographical extensions in Europe. These formations have been collected from numerous studies and they have been compared based on different statistical data.

Key words: Europe; core area; spatial structure; geometric model; GDP per capita

1 Introduction

We create and use various geometric formations (flat shapes) during the analysis of geographical areas, most of them are axes and flat shapes (triangles, squares, rings etc.). They show the spatial structure of an area in a simple way, that is why they are used not only in scientific researches but also in educational publishing, in education and in regional policy.

The social and economic attributes of the macroregions of Europe are discussed in numerous studies. Some of them focus on developed zones: where they are and what kind of spatial form is characteristic of them. Sometimes the result is such a spatial picture in which the core area is illustrated by a geometric shape. The aim of my research is to analyse these flat shapes. I have collected them from different studies (books, reports, conference papers, articles) and I have compared them based on different statistical data (GDP per capita etc.; source: Eurostat database).

There are a lot of views of Europe's spatial organization, but I have focused on the geometric formations (the names, the geographical position and the comparison), so I have not quoted the studies in which there is not any polygons or in which there is another formation (for example the 'European megalopolis', the 'golden plateau', the 'blue banana', 'nord des suds', the 'golden banana', the 'yellow banana', the 'Central European boomerang', the 'Japanese corridors', the 'blue star', die 'Kreuzbanane', der 'europäischen Champignon', la 'pieuvre rouge', the 'blue orchid', the 'bunch of grapes') for the core area. Probably this collection of shapes is not complete, but it presents some types and some opinions.

2 The formations/models and the comparisons

First of all we have to mention that probably we should make a difference between a flat shape which illustrates a part of an area (with a concrete name) and a geometric model. In the first case there is a concrete geographical area (for example London–Bristol axis, Milan–Turin–Genoa triangle) and in the second case there is a general spatial formation (for example the development axis or the development triangle). But the terms are mixed, some authors use the model and others use the shape, the formation, so these words are used with the same meaning. However, the difference might be important if we study the ‘evolution’ of the formations: for example originally the ‘Sunbelt’ was the name of the southern zone of the USA (a concrete geographical area), but nowadays this name is used for more and more territories to identify the emergent core zone, so the ‘sunbelt’ has become a model. In this case if we want to name the concrete area, we have to add an adjective: ‘American sunbelt’, ‘European sunbelt’ e.g. This situation is important in the case of the geometric shapes and models.

2.1. The axis

The *axis* is one form in modelling. It is often used to symbolize development corridors, linear urban and traffic zones etc. (Sometimes the axis is used to represent an area including some countries, regions which are in the same political, economic position).

In several studies which focus on Europe’s economic, social geographical picture we find an axis across Europe with different names, for example the Manchester–Rome urbanized axis (Sárfalvi 1968); “Europe’s vital axis” from Greater London to Northern Italy (Dunford–Perrons 1994); “the economic axis” from London to Rome (Gorzalak 1997); “the axis from London to Turin” (Lever 1999); “a dominant urban axis from London to Milan” (Taylor–Hoyler 2000), “the great European development axis”.

These axes are in the same geographical zone, they extend from England to Northern Italy but these are not linear axes, so “the curved development axis” (Cairncross et al 1974) “the curved zone” or “curvilinear zone” (Lever 1995) is a better name for the development economic zone of Europe, across Benelux-countries, Rhine-valley, the Alps, and not across the ‘French desert’. (“Link London, Frankfurt, Milan”.) (Cairncross et al [1974] state that this zone covers 20% of the area of EC9 and gives 50% of the GDP of EC9.) But most of the people know this zone as ‘dorsale’ (‘backbone’) due to Brunet (1989), or the ‘blue banana’ after a journalist’s comment (Lever 1995). (In some of the quoted studies the authors connect the axis with the ‘blue banana’.) This zone is also known from the economic history of our continent as the ‘backbone of Europe’ (Pounds 1997, Braudel 2003).

There is another name used as well, the spine; for example “metropolitan spine” (Burtenshaw et al 1991), “central spine” (Carter 1995). In the studies we find another axis which is used for a new economic development area in Southern Europe: ‘Mediterranean axis’ from Milan to Barcelona (Gorzalak 1997, Lever 1999), but its well-known name is the ‘European sunbelt’ or ‘North of the South’.

In this case there is no good opportunity to analyse the numerical attributes with regional statistical data, because the axis has not extension and the spines, backbones have not concrete borders (in these studies), similarly to the cases of non-geometric formations.

2.2. The triangle

The *triangle* is a very popular spatial model in geographical, regionalist circles. This flat shape may have different attributes depending on the function of the model: gold, black, industrial etc. A very frequent model is the golden triangle, it is usually used for a developed area (e.g. Milan–Turin–Genoa in Italy [Hall 1977], Columbus–West Point–Starkville in USA) or a region with high income from illegal activity (e.g. the triangle based on opium in Thailand–Myanmar–Laos; the Kecel–Soltvadkert–Kiskőrös golden triangle in Hungary).

In the case of the core area of Europe maybe the first triangle is in J. Gottman’s book from 1962 (“A Geography of Europe”). (But we cannot find this form in his book written in 1954.) The author deals with Europe’s centre and he mentions the Amsterdam–Paris–Ruhr triangle. The name of golden triangle referring to Europe can probably be attached to P. Hall (most of the authors quote him). In his book (Hall 1992) the London–Frankfurt–Paris golden triangle is described. But in an earlier edition of this book (Hall 1977) we find the form with another vertices: Birmingham–Milan–Paris (it rather seems to be an axis), moreover there is another shape, a little golden triangle: Birmingham–Dortmund–Paris. Does it reflect the development of Europe’s economy? Or did Hall come to another conclusion after researches on the topic of the core area of Europe?

Beyond the golden triangle another names are used in different studies, for example “Central Triangle” (Cheshire–Hay 1989), the “Central European triangle” (Faíña et al 2000), “Major Triangle”. The territorial dimensions of the forms are more varied than the names. If we want to group them, we can make four groups (*Table 1.*) if we take geographical attributes into consideration. These triangles are in the centre of the continent and the environs of Brussels is included in the most of the triangles.

The economic development and the changing spatial structure resulted new forms (in different studies): for example the Munich–Stuttgart–Milan triangle (Rechnitzer 1998, Tóth 2003), the Barcelona–Munich–Milan, the Barcelona–Lyon–Bologna triangle (Cséfalvay 1999). These formations represent the new development zone: the ‘European sunbelt’.

	The vertices are cities	The vertices are not only cities
On the continent	Amsterdam–Cologne–Lille (Smeets 2000) Brussels–Amsterdam–Frankfurt (Conti 2000, Hall 2002) Brussels–Amsterdam–Paris Frankfurt–Amsterdam–Paris	Amsterdam–Ruhr–Paris (Gottman 1962) Belgium–Netherlands–West-Germany (Keeble et al 1982) Benelux–West-Germany–North-France (Horváth 1998)
The form extends over England	Birmingham–Milan–Paris (Hall 1977) Birmingham–Dortmund–Paris (Hall 1977) London–Frankfurt–Paris (Hall 1992, Baudelle–Guy 2003) London–Amsterdam–Paris (Rechnitzer 1998, Nagle–Spencer 1999) Manchester–Hamburg–Milan (CE 1991)	London–Ruhr(Cologne, Düsseldorf)–Paris (Cséfalvay 1999, Faíña, A. et al 2000)

Table 1. The triangles of Europe’s core area

Of course this great variety of formations is based on different considerations and depend on the researchers, the authors’ points of view. But there are possibilities to compare these triangles, for example if we calculate the GDP per capita of the shapes’ areas. We get the data of a formation if we identify those NUTS 2 regions which are included in the triangle and we average the data of the regions. (The source of the data is Eurostat.) The problem of this analysis is that the calculation is based on the whole territories of the regions but the areas of the regions usually lap over the borders of the triangles.

In 2004 the Amsterdam–London–Paris formation had the highest GDP per capita (EU27=100%; a=in euro; b=in PPS), the value is about 155% (a) and 142% (b). If we enlarge the triangle a little bit towards Brussels (‘quasi square’) then the value will be higher. (In those cases when one of the vertices is in England the triangle doesn’t include the territory of the North-Sea and La Manche.) In 1995 the situation was different: Amsterdam–Brussels–Frankfurt (a) and Amsterdam–Brussels–Paris (b) were on the top. In 2004 out of the triangles of the European sunbelt the Munich–Stuttgart–Milan has the highest GDP per capita and this value is close to the Amsterdam–London–Paris formation’s value. (But this shape does not include Swiss regions.)

The GDP density is also an indicator of an economic centre. The indicator includes two components: the economic development and the population density. [GDP/area = GDP/population * population/area.] In Europe the GDP density is the highest in the Amsterdam–Brussels–Frankfurt triangle (in 1995 and in 2004 also, in euro and in PPS also).

2.3. The square and the pentagon

In modelling the *squares* are used formations, but in the case of the core area of Europe there are only a few squares. London–Amsterdam–Frankfurt–Paris (Lever 1995) and Leeds–Lyon–Hamburg–Milan (Horváth 2006) are in the collection. The economic development (GDP per capita) is also calculated in these cases but these values don’t reach the best triangle’s values. (As it has been written previously if we create the London–Paris–Brussels–Amsterdam ‘quasi square’ we get the highest GDP per capita.)



Figure 1. The pentagon (Schön 2000)

However, the pentagon (Figure 1.) is a well-known model due to the ESDP document (1999): “the core area of the EU, the pentagon defined by the metropolises of London, Paris, Milan, Munich and Hamburg.” (EC 1999, p.20.). Later the formation got attributes: ‘European pentagon’ (Baudelle–Guy 2003, Gren 2003), ‘20-40-50 pentagon’. The numerical attribute is due to the data of the formation: “This area represents 20 % of the total area and contains about 40 % of EU citizens producing about 50 % of the EU’s total GDP.” (EC 1999, p.61.) The non-detailed calculations of Gren (2003) show 15%, 30%, 50%. The results of my calculation are (with data from 2004): EU27 – 13% (area), 30% (population), 42% (GDP, euro). The GDP per capita (EU27=100%) was 138% (a) and 129% (b). These values are close

to the squares' values and lower than the best triangles' values. (But this shape does not include Swiss regions.)

At the end of our analysis we have to emphasize one more point of view. If we study the map based on the regional GDP per capita, we don't find a geometric form for the development area. Moreover the economic centre is not outlined well because for example some regions of Northern Europe have high values. However, if we make the regional GDP density map, then we can establish the main zone of Europe extending mainly continuously from Middle and Southeast England to Northern Italy and it shows the well-known 'blue banana', the historical backbone (Probáld–Szabó 2005) and not a geometric shape. (The Alps and some regions with economic problems in Southern Belgium and in Germany break the formation.) (Figure 2.)

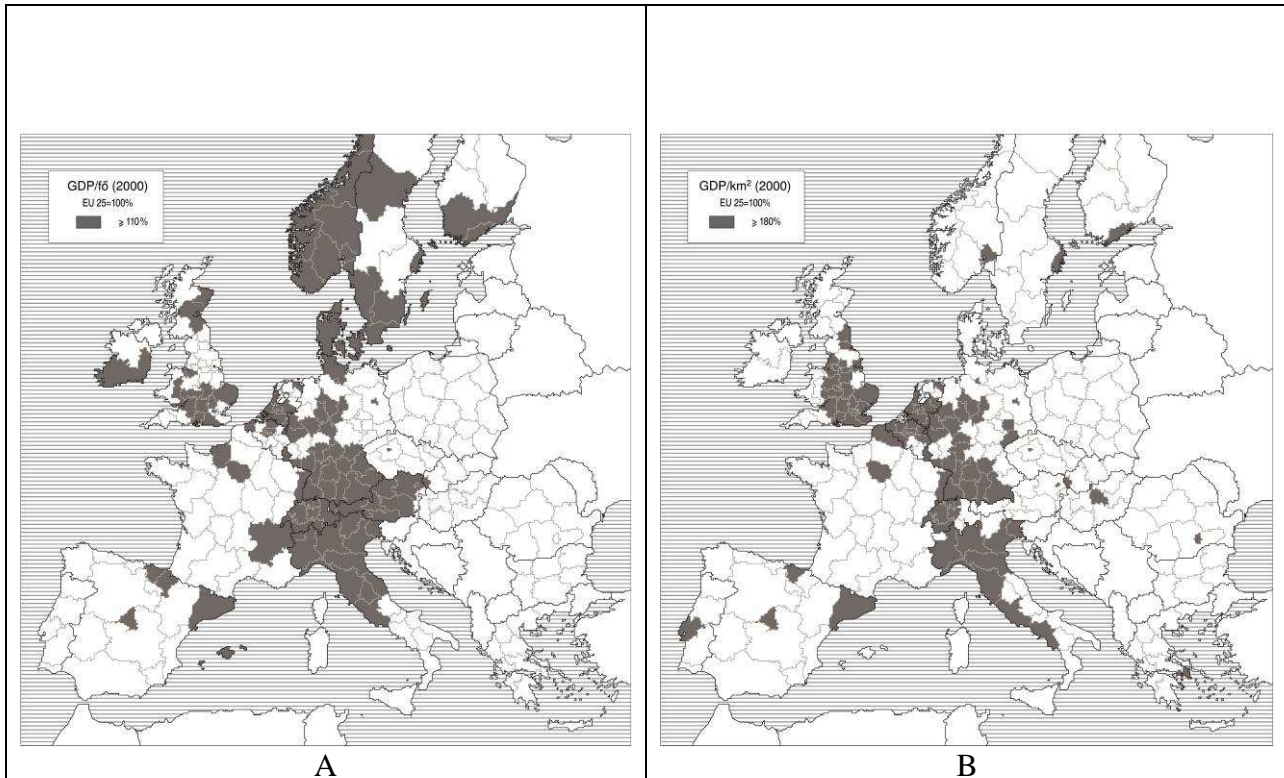


Figure 2. The economic centre in Europe based on GDP per capita (A) and based on the GDP density (B) (Probáld–Szabó 2005)

3 Conclusion

According to the examinations of the geometric models of the European core area we came to the conclusion that the London–Paris–Brussels–Amsterdam 'quasi square' has the highest GDP per capita among the published geometric formations, and the Munich–Stuttgart–Milan formation is close to it. In the case of the GDP density the Amsterdam–Brussels–Frankfurt triangle is on the top, but the economic centre of Europe outlined by this indicator shows the classical zone, the backbone of Europe.

Of course it is only one way to compare the models and this analysis may cause some disputes. We didn't generate new formations, only the published models were tested. It is also important that the areas of the shapes are not homogenous: cities, great agglomerations and rural areas are included in one formation. This fact may cause that these geometric formations nowadays are not frequently used in the regional circles, the new mainstream is the polycentric spatial structure and the polycentric development in the case of the spatial structure of the EU. (The geometric forms and the other geographical zones [for example

‘blue banana’] portray Europe as having a core and periphery and the polycentric structure [for example it is illustrated by the symbol of European ‘bunch of grapes’] reflects the contrast of cities and rural areas in Europe, and some researchers’ opinion is that the ‘blue banana’ thinking is no longer acceptable.) Moreover some studies (e.g. Conti 2000, Brunet 2002) emphasize that there is not one simple model for Europe’s spatial structure, so we have to use complex graphic models. Other authors’ opinion is that there are no models (neither geographical abstractions, nor geometric models): “the corporate map of Europe may look more like a bowl of fruit salad than a banana” (Goddard 1995).

Due to these facts the geometric models of geographical areas may be forced back, but we know that the simple models are efficient forms in the publishing of the researches due to the simple form, so we have to use them if we don’t want to close our science and if we want communication and we would like to show the results of our researches to the public and to the politicians, mainly to the decision-makers of regional policy. The spatial models have important roles, but we have to create them carefully, because if we make a lot of formations and give them to the public and the politicians without strong scientific coordination it will cause a chaos.

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