ANALYSIS OF THE MAPS OF REGIONS OF THE EUROPEAN UNION PUBLISHED IN THE VOLUME "REGIONS: STATISTICAL YEARBOOK 2004" OF EUROSTAT

VENETA KOTSEVA

Assoc. Prof. Dr., Forestry University, Department of Forestry Management
Bulgaria, 1560 Sofia, 10, Kliment Ohridski Str.
Tel. (+3592)91 907 / 378 and 381; GSM (+359)0887 912943; Home tel. (+3592) 936 1316;
v_kotseva@yahoo.com ; v_kotseva@abv.bg

ABSTRACT

A detailed analysis from cartographic point of view has been performed of 51 color maps of regions in the 25 Member States of the European Union and the 2 candidate countries, published in the special volume of Eurostat "Regions: Statistical Yearbook 2004". The maps are thematic and they incorporate data of the regional economics for population, agriculture, regional GDP, household accounts, regional labour market, structural business statistics, health, tourism and urban statistics.

INTRODUCTION

Across the European Union (EU) there is the understanding that the regional differences of economy are as important as the national differences among the EU Member States and the candidate countries. The development of the regional economy requires perfect and multifaceted knowledge of every region [3, 4, 5].

The special publication of Eurostat (the Statistical Office of the European Communities situated in Luxembourg) "Regions: Statistical Yearbook 2004" [7] is the milestone of the European regional statistics. For the first time this publication contains maps and data collected in accordance with the regional nomenclature established by the EU legislation. The adoption of the NUTS regulation by the European Parliament in July 2003 was an important contribution towards a more stable basis of the regional statistics and reflected the wider recognition of this statistical branch. 2004 was a remarkable year for EU, too. The largest enlargement in the history of the EU took place – the accession to the Union of 10 new Member States and nine new official languages. In fact, the regional statistical yearbook has long foreshadowed this expansion of the Union and has for some years already contained data for these countries, indeed also for Bulgaria and Romania, although they are not scheduled for membership until around 2007.

All 51 maps in this edition [7], that has got a character of atlas of new type, are based on NUTS 2003, whereas the last year's edition still used NUTS 99 of 1999. NUTS 2003 is now the only valid and acceptable regional breakdown for supplying data to Eurostat. No distinction is made in the yearbook between those countries that became Member States in 2004 and those due to join around 2007. Wherever data are available for Bulgaria and Romania, these of course also feature in the maps and commentaries. In the case of Turkey, the situation is rather different. Although a regional breakdown has been agreed between Turkey and Eurostat, there continues to be too little regional data to justify including Turkey in the yearbook analyses.

The maps are devoted to 10 different themes – population, agriculture, regional GDP (Gross Domestic Product), household accounts, regional labour market, SBS (Structural Business Statistics), health, tourism, urban statistics and NUTS 1 statistics. In each chapter, regional distributions are again highlighted by colour maps and graphs, which are then evaluated by experts in text commentaries. In the maps in this yearbook [7], the statistics are presented at NUTS 2 level. A map giving the code numbers of the regions may be found in the sleeve of this publication. At the end of [7] there is a list of all the NUTS 2 regions in the enlarged EU, together with a list of the level 2 statistical regions in Bulgaria and Romania.

NUTS 1, NUTS 2 AND NUTS 3 LEVELS OF REGIONS

In the 1970s, the growing interest in regional data gave rise to the NUTS nomenclature as an attempt to standardize regional statistics. Since its inception, the NUTS classification has comprised a three-level hierarchy – NUTS 1, NUTS 2 and NUTS 3. The greatest attention has been paid to the NUTS 2 level over the past three decades. This was because in a number of countries the NUTS 2 level is a significant administrative unit. The NUTS 2 level was strengthened by its incorporation in European legislation as a level of regional distinction for the purposes of the statistical determination of regions' eligibility for aid under the Structural Funds. Some indicators as GDP and unemployment are now published across the EU at NUTS 3 level. Now the NUTS 1 level is the "forgotten" one of the hierarchy.

The new NUTS regulation came into force in July 2003 and replaced NUTS 99. There were NUTS 1 regions in place in at least 11 from the 15 Member States. In the EU-15, Luxemburg, Denmark and Ireland are too small to subdivide and they are a single NUTS 1 region. According to the regulation, NUTS 1 regions should have a population of between 3 and 7 million. With the accession in May 2004 of the 10 new Member States, the annex to the NUTS regulation is shown in the Fig. 1:

Figure 1. Map 10.1- Typology of NUTS 1 regions

Among the accession countries, Bulgaria has submitted a proposal for two regions and one is awaited from Romania which with its 22 million people is much too large to be a single NUTS 1 region. As can be seen in Fig.1, several administrative NUTS 1 regions are associated with very considerable legislative, executive and even fiscal powers. Non-administrative NUTS 1 regions, by contrast, are a reflection of a perceived need for just such a statistical structure in between nation and NUTS 2. They therefore tend to reflect major physical or geographic zones. For example, in Greece they split the country into Northern Greece, Central Greece, Attica and a forth group – Crete and the Aegean islands. There are similar geographic groupings in mainland France, Spain and Bulgaria, where the mountains running east-west split northern and southern Bulgaria. Coverage of NUTS 1 automatically groups together parts of the larger Member States and the entirety of the smaller ones. The NUTS 1 level smoothes out some of the detail that is available at NUTS 2. The choice rests with the user. For example, from both figures 2 and 3 - the Map 10.4 that shown GDP per capita in PPS (Purchasing Power Standards) 2001 – NUTS 1 and Map 3.1 that shown GDP per inhabitant in PPS 2001 – NUTS 2, can be viewed the same information at NUTS 1 and NUTS 2 levels.

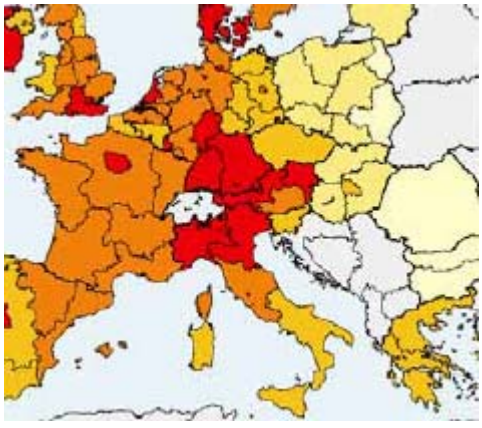

Figure 2. Map 10.4 – GDP per capita, in PPS 2001 – NUTS 1

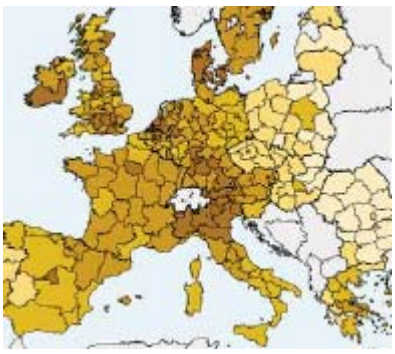

Figure 3. Map 3.1- GDP per inhabitant, in PPS 2001 – NUTS 2

GIS AND THE CARTOGRAPHIC METHODS OF REPRESENTATIO IN THE MAPS OF THE REGIONS AT NUTS 2 LEVEL IN EU

The maps of the EU regions in [7] come under the category of the complex socio-economic maps. By definition the complex maps combine presentation of several elements with close themes, i.e. a set of characteristics (indicators) of a phenomenon – in our case of the regional economy. The language of map is the sign system used in cartography including the conditional symbols, the methods of representation and also the rules for their construction, usage and reading at the map creation and utilization. The 51 maps analyzed here have been prepared with the help of GIS (Geographic Information System) by Eurostat – GISCO, EuroGeographics for the administrative frontiers and based on the statistical data from the Eurostat data base REGIO. They contain the following layers represented by different cartographic methods:

1. The state frontiers are represented by linear arbitrary sign with deep-brown colour and big width;

2. The regional frontiers are represented by linear arbitrary sign with deep-brown colour and small width;

3. The areas of regions at mapping of different themes of the regional statistics – by methods of quantity and quality background (i.e. colouring in different nuances, most frequently by graduation of one-colour's intensity, without usage of hachure), method of points and method of circle diagrams;

4. The hydrography includes only oceans and seas which are represented by background colouring in light-blue colour.

The following is not represented on the maps in [7]:

1. The regional centres as well as the capitals; these could have been represented by abstract geometrical symbols – puncheons with different form (squares or circles); in conditional scale from interval type; with colouring and different size of symbol depending on their population and by appropriate inscribing;

2. The transport network including highways, first-class roads and railways. These elements could have been represented easily by linear symbols with different colours. Ports and airports are not marked either, they could have been represented by illustrative symbols (pictograms);

3. The hydrography does not include the rivers, among which at least the biggest European rivers could have been represented, easily by linear symbols and appropriate qualification of their selection according to their length.

It is known from cartographic science and practice that the complex maps become overburdened and difficult to read at more than 5-6 layers. With the availability of the abovementioned 4 layers of maps in [7] – Figures 1, 2 and 3, the good readability and clarity of the map contents is preserved but the absence of layers of settlements and the lack of any kind of inscriptions in maps create the impression of so-called "silent, mute" map.

The maps of the regional statistics are a special type economical and geographical mapping because they reflect the regional development as a combination of branches of material production and non-production sphere. The economy of each EU Member State and each region is distinguished by a complex territorial organization, hierarchy, multiple external and internal relations. Therefore the presentation of transport and economic relations in the maps of every region and its neighbouring regions shows also the very important relations between the population and economy in the

process of production, consumption, etc. From this point of view the maps of regions of EU at statistical level 2 in [7] are without information about the neighbouring territories of the represented region, which are given without inscriptions of the Members States, capitals, regional centres, big rivers and other elements of map contents.

The combination of 51 colour maps in the field of the regional statistics [7] can be considered also as a new kind of atlas. It is known from cartography the atlas is a specific geo-information system. It serves like a proto-form of the modern computer GIS. Moreover, GIS are frequently created on the basis of atlases. The atlas can be called a special type of encyclopaedia because it concentrates data, knowledge and ideas about the nature and social life [6]. The information in it has been disposed in an illustrative, easy for reading and learning form. For thematic atlases, as [7] could be considered, the possibility to thoroughly study the complex of nature, social and economic phenomena is attractive.

The series of maps allow establishing the mutual relations, dependence and conditions of different phenomena. Of these the most important are the study of the economic status of a given region and definition of perspectives for its economic management and planning.

During the last years the interest towards atlases grows because of the introduction of high technologies allowing to operatively creating maps in computer type. The modern geo-information systems at any level and purpose include various GIS-atlases in the form of series of maps. The volume [7] is a typical example of a modern thematic atlas published both on paper and on CD. It is an original business card of the regional statistics in EU.

ANALYSIS AND EVALUATION OF MAPS OF THE REGIONAL STATISTICS IN EU

It is known that the analysis and evaluation of cartographic production consists in examining its characteristics and quality, its suitability to help in providing solutions and the possibility to serve as a source for mapping [1, 2]. Here the main criteria for cartographic analysis of maps in [7] are as follow:

1. expediently chosen scale and projection;
2. reliability of the map, scientific setting the pattern of the map, logicality of construction of map's legend;
3. complete and up-to-date contents;
4. geometric precision of the objects' location in plan;
5. quality of the map design;
6. quality of the printing et al.

These 6 groups of criteria will be analyzed below.

The analysis and evaluation of maps are always purpose-oriented. Therefore the evaluation criteria have different importance depending on the function of the maps - an illustrative tool, instrument for study, source for mapping or forming of data bases. In [7] the maps have predominantly illustrative quantitative and qualitative character and they are instruments for studying the economic status of different regions in EU. This is a classical example of maps about the status of regions without studying interrelations among them. Such maps do not represent the extent and characteristics of spatial relations between two and more than two phenomena. Most often they have the nature of branch maps which give us an idea about:

- the population of regions – 2 maps with method of quantity background, but without the capitals of the Member States and without the regional centres;
- agriculture – 5 maps with method of quantity background, from them 2 maps are with circular map-grams in conditional scale of the symbols;
- regional GDP (Gross Domestic Product) in PPS – 2 maps with method of quantitative background;
- household accounts in PPCS – 5 maps with method of quantity background;
- regional labour market – 9 maps with method of quantity background;
- health – 8 maps with method of quantity background;
- tourism – 4 maps with method of quantity background; some maps are not on regions but on Member States;
- urban statistics – 3 maps with method of points;
- NUTS 1 Statistics – 4 maps with method of quantity background.

1. The mathematic basis of 51 maps in [7] lacks map projection and it is with two different linear scales corresponding approximately to both numerical scales 1:235 000 and 1:230770. The different scales of

representation of regions are because of formatting A4 of the pages in the publication [7]. The usage of geographic network or coordinate system is not recommendable at such small scales.

2. The reliability of data used for preparation of maps is a matter of fact and it is guaranteed by the Directorates and specialists of Eurostat in Luxemburg and by the data of the National statistical services of the EU Member States and candidate countries. These data are collected in applying the EU legislation in force. The scientific setting the pattern of the map is on the highest professional level. The legends of maps are built logically. They are given in every map in the edition [7]. The following recommendations and specifications could be given, which could be taken into account for the next publications in the field of the regional statistics and also at other similar mappings:

    - Puncheons to be selected for both capitals and regional centres. Inscriptions to be included at least for the capitals of the Member States as well as the abbreviations adopted in 2003 with regard to the NUTS 2 regions and given in a list at the end of [7]. Because of the risk of overburdening the maps with letter inscriptions the input of an unified numeration of NUTS 2 regions is recommended, as well as to enter the numbers of these regions in the maps;
    - A linear symbol has been used in the form of a continuous dark-brown line with different thickness as the thicker line for the state frontiers. From the cartography point of view it would be more illustrative to have the symbols different by colour and type.

3. The complete and up-to-date contents are important factors. The maps' content relates to different years from 2001 to 2004. The degree of completeness is different in the 10 mapping themes and in the various states. The last fact necessitated the use on almost all the maps of the so-called "absolute area" for which a separate colour background and inscription in the legend "no available data" is included. Here has to be noted the very suitable insert into the maps disposition of so-called "maps-inserting" with the territories of the island states and territories like Malta, Cyprus, Guadeloupe, Martinique, Reunion, Canaries, Madeira et al. in different scales depending on the size of the mapping territory.

4. Geometric precision of the objects' location in plan is correct.

5. Quality of the map design is perfect. The backgrounds colouring of the areas is in pleasant light tones. Some recommendations could be given with regard to inserting inscriptions in the form of numbers and abbreviations of the names of EU regions.

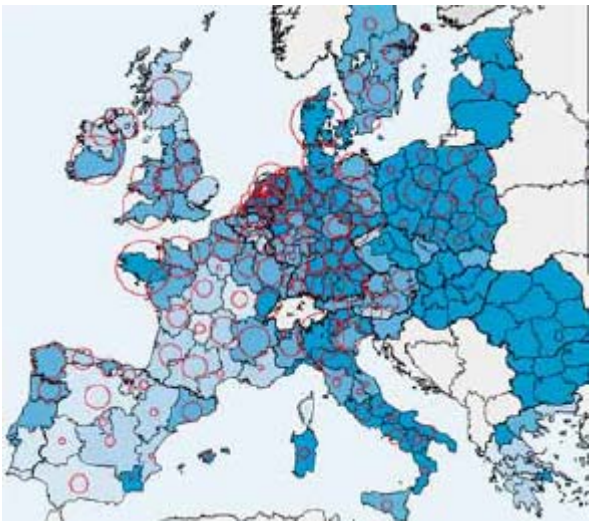

Figure 4. Map 2. 5. Dairy cows. Production of cows' milk and share of dairy cows 2002 – NUTS 2

On the Figure 4 there is a serious overweighting of the map by circular map-grams. The last ones have been overlaying many times among themselves. That is way it is not absolutely clearly these data for which NUTS 2 regions have been corresponding. The biggest overweighting is in the areas of Northern and Central Europe – the Netherlands, Belgium and Germany. It isn't a good decision to be used predominantly one-colour' and two-colours' maps with irregular 4 or 5 degrees' conditional scales of symbols at the method of the quantitative background.

6. Quality of the printing and the paper which is white and chlorine-free is very high.

CONLUSION

The creation of thematic maps of the regional statistics is a laboratory mapping, so-called “cameral” mapping which is performed as a rule in medium and small scales in three stages:

- Project of the maps;
- Elaboration of map originals;
- Preparation for edition and the same edition of maps by their dissemination in printed – polygraph or computer forms.

The composition of a thematic map starts with creation of the geographic canvas on which later on the whole content is plotted. In such cases the so-called “blank map”, if available, is to be used [1, 2] or a special composition of the map canvas and the legend, concordance of the content elements, etc. At the computer composition the different layers of the mapping representation are coordinated and there are at least 5 types of concordances, as follows:

- Interrelation of the links between the different elements of the geographic canvas;
- Concordance of both canvas and elements of the thematic contents;
- Concordance of the homogeneous elements of the content in the framework of a single thematic layer;
- Concordance of the heterogeneous elements of the thematic content of the different layers among themselves;
- Concordance of the particular maps in the composition of a single series or edition.

All the 51 maps in [7] indicate an insufficient participation of the cartographer-geodesist as a co-author of the maps, part of the team of authors. As noted in [8], GIS and the computer systems for mapping are easily accessible for many users and therefore it is possible even of non-specialists-cartographers to compose cartographic products. In such a way the influence of the computer technologies on the cartographic practise is enormous but the obtained cartographic products does not correspond to the requirements of the cartography science and practice.

The 51 complex socio-economic maps had as a main source of information for their composition the data containing quantitative information about population, agriculture, tourism, etc. The data collected from the national statistical offices and compiled regularly by Eurostat according to unified methods with confirmed programs and terms [9] are the basic economic-statistical sources. As far as the quality and reliability of the used information in these maps is concerned, it is possible to confirm that they are on a very good level, provided the data from the sources are mapped professionally.

At this point it is appropriate to mention the period of the data incorporated in an atlas of the regional statistics and maps “from year – up to year”. It is possible such an atlas to be a periodic publication and to be published over a long period of time, for example 10 years, as separate series being published yearly. The latter could be collected bit by bit, step by step, in a folder with open mechanism which allows adding new pages and maps in the atlas; the portfolio could have a special titular page and standard contents put on the back side of the titular page, also to be completed annually. For instance, from 2004 to 2014 over a period of 10 years some 500 maps of the regional statistics will be published, on average 50 maps per year.

It is known the maps with social and economic data become “old” faster than the nature maps. Therefore they often have the so-called “base date” which is an analogue of the basic year in determining for example GDP. With regard to such base year, for example 2004, it is possible to attach a major part of quantitative data of the regional statistics allowing for comparison. Moreover, the maps of the different themes of the regional statistics related to the base year could be produced like transparent, on folio, even on colour transparent folio, with the purpose of a faster juxtaposing if needed. Taking into account their mobility in an atlas-portfolio they could be extracted and superposed on another map chosen by the user. This is the so-called “overlay” usage of maps.

When the maps in the atlas lose their value as an up-to-date source of contemporary data and knowledge for the regional statistics, they attain a new quality as sources with historical and cultural value. Moreover they are necessary in studying dynamics of the social and economic phenomena in given NUTS 2 regions in EU. At the end of the past century a new type of atlas appeared, organically combining maps, tables, diagrams, graphical constructions, air-space representations and texts with scientific- methodical and statistical-economic contents. It is possible to publish the atlas as a polygraph product and/or electronic product on a CD or DVD. Both methods of publication have their advantages and shortcomings. The polygraph standards are strictly followed, whereas the computer design is freer. A lot of traditional cartographic rules are difficult to be followed in the computer design. Examples to this end are: smoothness of the curves, disposition of the inscriptions, etc.

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Assoc. Prof. Dr. Veneta KOTSEVA
Forestry University, Sofia, Bulgaria
Faculty of Forestry
Department of Forest Management
1156 Sofia, 10, Kl. Ohridski Str.
Telephone : (+3592) 91 907 / 378 or 381
(+359) 0887 912 943
Fax : (+3592) 622 830
E-mail : v_kotseva@yahoo.com
v_kotseva@abv.bg

Dr. Veneta Kotseva was born on 08.09.1951 in town of Lukovit, Bulgaria. She studied between 1969-1974 at the Faculty of Geodesy at High Institute for Civil Engineering in Sofia and graduated "Geodesy, Photogrammetry and Cartography". She worked for Municipality in Lukovit from 1974 to 1980. She studied regular doctor's program from 1980 to 1983 in Central Laboratory for Geodesy (CLG) at Bulgarian Academy of Sciences and graduated as Dr. (Ph.D.). She worked from 1983 to 1995 for CLG. She started work since 1996 and still working for Forestry University as Assoc. Prof. on "Geodesy" and "Cartography". She graduated also "Economy and Business Administration" in New Bulgarian University in Sofia in 2000 and "Pedagogy" in Forestry University in 2004. She is author of 4 textbooks, 90 scientific papers and 70 popular papers.