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## **TOWARDS COHERENT STATISTICAL SYSTEMS OF TRANSBORDER AREAS - CASE STUDY OF INTERNAL AND EXTERNAL BORDERS OF THE EUROPEAN UNION**

### **1. Introduction**

In recent years we have seen higher dynamics in regional development in many countries. It is due to a sustainable model and development policy as well as decentralization processes often associated with this phenomena. These processes obviously lead to greater autonomy and resourcefulness. Moreover, competitive networked knowledge-based society/economy with information infrastructure release resources (human, material) creating business-oriented environment for stakeholders on local and regional level. Despite of local, regional, national factors of development spatial units located near the border are under strong influence from foreign spatial units. Asymmetry of socio-economic potential trigger specific interactions, which differentiate them even from regional specificity thereby predestining them as distinct objects of surveys.

The unique character of transborder areas requires a great number of various surveys of socio-economic matters to be carried out. Establishing a coherent research system should include a wide spectrum of methodological system. The process of creation of a coherent research system for transborder areas consists in three main interlocking parts: delimitation of transborder areas, monitoring of socio-economic phenomena and data sources and comprehensive survey. Obviously, they require harmonised methodology - methodology applicable for countries covered and not covered by liberalization of the rules of crossing the border.

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Based on experience connected with development of surveys system for the borders and their vicinity at the EU's internal and external border, Polish official statistics launched the coherent research system for transborder areas. The aim of article is to characterise main components of this system with particular focus on the possibility of using surveys results on micro, meso, macro levels.

## 2. The structure of research system for transborder areas

Newly implemented coherent research system for transborder areas consisting of two modules, that is households survey and surveys at the EU's external and internal borders including questionnaire survey at the borders and in the vicinity of the border, as well as traffic intensity survey, was successfully examined during pilot surveys.

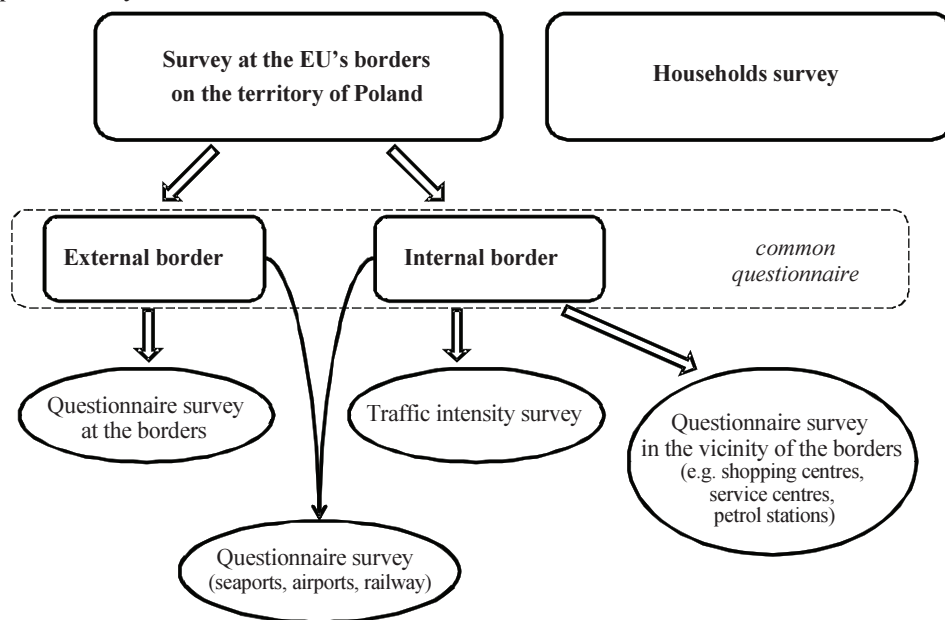


Figure 1. The structure of pilot survey  
Source: own elaboration.

### 2.1 Typology of border crossings

In order to select border crossings for observation their typology was created. In the first stage the crossings were divided by type of the border, with the following three types of crossings: land border – road, rail and river crossings; sea border – ports; air border – airports. The land crossings were divided according to the nature (permeability) of the borders and the neighbouring country, that is the borders located at the EU's external border on the territory of Poland (which includes Polish-Russian, Polish-Belarusian and Polish-Ukrainian borders), and internal border of the EU and Poland (which includes Polish-Lithuanian, Polish-Slovak,

Polish-Czech and Polish-German borders). Then, on the basis of the Border Guard data on border traffic, the profiles of border crossings were made. After a thorough analysis, the border crossings which were selected were the ones whose share in the border traffic of persons at the Polish border with the neighbouring country was higher than 1%, and in the case of ports and airports – the share in border traffic at the sea and air border, respectively. At the internal border these border crossings were grouped, with the use of Ward's method, according to particular sections of the border into subsets characterized with high internal similarity due to selected features. The following features of each crossing were considered: total volume of border traffic of persons, the proportion of foreigners among persons crossing the border, the proportion of passenger cars in border traffic of vehicles, the percentage of trucks in the border traffic of vehicles. In the next step, within the groups, crossings are drawn to the survey. This helps to ensure the observation of diverse traffic of people and vehicles at the internal border. When choosing crossings for the survey geographical distances between the selected crossings, which are another element of stratification, are taken into account. It is important to draw crossings which are not centred around one location, but are spread across the border with of a given country. This is due to the varying traffic on account of the geographical location of the crossing.

## **2.2 The survey at the border and in its vicinity**

**The border traffic survey** covers people and vehicles crossing the Polish border with the countries of the European Union at selected border crossings. It records the number of vehicles crossing the border from and to Poland and the number of people travelling in these vehicles, as well as people travelling on foot (including bicycles, wheelchairs, etc.). The survey is carried out every quarter. The survey of border traffic at the internal border introduced the rotation of border crossings. It means that the selected crossings for a given section of the border included crossings which were surveyed in the previous year. Such an approach will ensure continuity of information on changing conditions on the crossings. The survey of border traffic at the airports and seaports was developed separately due to its specificity and with the use of appropriate data sources (in particular reporting on air and sea transport). Data on border traffic of Poles are estimated on the basis of information from a survey conducted in households and from counting of vehicles and people at selected border crossings. The border traffic of foreigners leaving Poland, however, is estimated using regression analysis for each of the section of the border and on the basis of data from counting of vehicles and people, as well as other available data sources.

**The questionnaire survey on selected crossings on the EU's internal and external border** includes the questionnaire survey of foreigners (non-residents) leaving Poland in order to obtain travel information (including the expenses incurred in connection with travel to Poland, the purpose of visit, the length of stay in Poland) conducted in the vicinity of selected road crossings at the EU's internal and external borders on the territory of Poland and at seaports and airports.

Due to lack of survey frame, the survey of trips made by foreigners to Poland uses elusive population, but owing to the fact the place of the survey is known proper representativeness of the sample is provided. This is a questionnaire survey carried out in the vicinity of selected border crossings on the EU's internal and external border on the territory of Poland, including seaports and airports, in the form of direct interviews made by interviewers. For individual border crossings sampling intervals are determined taking into account the projected volume of travellers traffic on individual crossings and the possibility of interviewer to interview at a certain time. The survey is carried out every quarter. The survey of trips made by foreigners to Poland is a sample survey. It is important, in developing appropriate methods for estimating the border traffic, to select a proper representative sample and obtain good quality data. The survey of this phenomenon must therefore be limited to the necessary group of crossings and certain time periods (days and hours) per year, which at the same time ensure the quality of the results. Information on the size of the total border traffic in Poland is a total compilation of statistics which includes: the results of estimating the border traffic at the EU's internal border on the territory of Poland on road crossings using regression analysis; data of the Border Guard; data of the Civil Aviation Authority on passenger traffic (information on domestic and international traffic, flights directions of target cities); structure of passengers obtained from the questionnaire survey conducted at selected airports. Because data on traffic at the internal border are generalized to relevant border crossings and sections of the border, one should calculate the values for the number of people crossing the border which correspond to different strata that were separated on account of border crossings. It is therefore necessary to define the weights for particular strata. In the border survey a two-stage sampling design with separated strata was used.

### **2.3 Household survey of participation of Poles in travel**

The questionnaire survey is carried out in quarter periods. The surveys covers expenses incurred by Poles and residents on the purchase of goods and services, purpose and duration of stay, frequency of crossing the border, booking of the trip, use of a tour operator or travel agency, number of residents not participating in tourism for personal purposes, etc. The results will be used by the Central Statistical Office, the Polish National Bank, the Ministry of Sport and Tourism as well as for the needs of the balance of payments. It is conducted on a sample of about 0.14%. (over 18 thousand households/13.5 million in whole country)

Households for the survey are selected at random from census sampling frame by two-step sampling with stratification on the first step (strata were defined by subregions and size classes of towns). Strata which include border areas are divided into two parts: the border part (up to 30 km from the border) and the central part. Units of the first step are census enumeration areas and units of the second step are dwellings (from each unit of the first step five dwellings are drawn).

Due to the nature of the survey half of the sample is allocated to the border part and the other half to the central part. Within each of these two parts the allocation is proportional to the number of households in the stratum.

### **3. The specificity of transborder research**

#### **Organizational issues**

Questionnaire surveys conducted at the border are unique. This is a very important issue, which has a large impact on the organization of the survey, as well as to the limit in the selection of survey methods. It is not easy to acquire a respondent in border surveys as the travellers who are surveyed are usually in a hurry. At the EU's internal border it is even more difficult to acquire respondents due to free movement of vehicles and persons after abolition of border controls. For that reason many vehicles do not stop in the vicinity of the border crossing but goes to points distant from the border. In the case of some crossings at the EU's internal border, particularly those characterized by a high share of local border traffic, only foreigners residing in the border area stop in the vicinity of the crossing. They stop to make purchases and it is difficult to capture persons arriving for other purposes (with at least one overnight stay). Hence, it is important to choose and constantly verify places for the survey. Another issue concerning the conduct of the border surveys is the risk associated with the occurrence of a dangerous situation for interviewers, especially in the late hours of the day and night. Therefore, it is important to cooperate with the Police, the Border Guard and to reduce surveys at these times to a minimum. An important problem arising in carrying out the surveys of border traffic of vehicles and people and trips made by foreigners to Poland is all kinds of difficulties in obtaining information on the number of persons in vehicles and the country from which the vehicle comes, as well as obtaining responses from foreigners leaving Poland.

#### **"Random route" technique for collecting questionnaires**

The analysis of the data obtained from border surveys conducted so far by the official statistics shows that border traffic is generated by a small group of vehicles, which implies that the probability of selecting a household whose members travel abroad is small. In other words, the population of people who travel abroad is a small subset of the population of all households in the border area. The survey of trips made by Poles introduced a modified technique of collecting questionnaires, maintaining at the same time the principles of a representative selection of households for the survey. In case the interviewer fails to make an interview during the first visit in the selected flat, he/she is obliged to retry the contact. If, despite retried attempts, a household cannot be contacted or if the selected household was taking part in travelling, the "random route" technique is applied to collect questionnaires. According to this technique, when it is impossible to conduct the interview the interviewer goes to the next apartment to make an interview in ac-

cordance with the appropriate algorithm for the selection of subsequent flats, visiting a maximum of 8 apartments. The number of maximum searches has been determined on the basis of the number of vehicles crossing the border and the number of households in border units on LAU level 1. In the case of households not taking part in travelling, the interviewer writes down the relevant characteristics of the visited household and moves to another flat. If the interviewer finds the flat which is taking part in travelling, he determines the number of households taking part in travelling, but if it was one household, he conduct an interview with it. In case of more than one household he shall draws just one of them according to the following principles - the household whose householder was the last to celebrate his birthday is selected for the survey. Then, he moves to the next starting point. Conversely, when a household which is taking part in travelling is found, the interviewer conduct a survey in the last (eighth) step and proceeds to the next starting point.

#### **Calibration of weights due to generalized results of estimations of border traffic of Poles**

In households surveys of trips usually modifications of parameters are required. In this case the calibration of weights was made using estimated data on trips of Poles and individual data obtained from the household survey. Based on the data obtained from the pilot survey, three categories of households were separated on account of the length of stay of Poles abroad - households with only same-day trips, households with only one or more overnight stays (multi-day trips), households with same-day and multi-day trips. For each of them the number of completed trips was assigned. In the next stage, the estimation of the number of trips taking into account the foreign trips of Poles was made.

#### **Method for estimating for all countries of the world the trips made by foreigners to Poland and their expenses**

In order to estimate the results of the trips made by foreigners (non-residents) to Poland and their expenses the following data are used additionally: data on the use of tourist accommodation establishments, data of the Border Guard on border crossings made by foreigners broken down by country of origin, and data on crossings of the EU's internal border on the territory of Poland based on information obtained in the survey of border traffic and from airports and seaports. The sources of data listed above contain information about the trips made by foreigners to Poland from approximately 193 countries around the world. In the first step all countries of the world were divided into 19 categories due to different specificities of average expenditure, the type and length of stay, purpose of visit, the distance from Poland, etc. Among these categories the countries bordering Poland were separated individually. Other European countries were divided into 4 groups (Eastern Europe, Southern Europe, Western Europe, and Northern Europe), Africa - into two groups (North Africa and South Africa), Asia - into two groups (Middle

East Asia and Far East Asia), America divided into 3 groups (North America, Central America and South America) and Australia and Oceania. In some cases the calculations are performed on the combined categories due to the specific topic (e.g. the calculation of the average expenditure for same-day visitors). Then a comparison of the number of trips for each country on the basis of the border guard is made. These values are then adjusted on the basis of the report which contains information on the number of foreigners using collective accommodation establishments. The next step was to calculate the number of overnight stays of tourists from different countries. The principle was to calculate the average length of stay (number of nights per single trip) for each group of countries. The analysis of the data showed that in several categories the number of nights per trip significantly differs from those in other categories. This was due to the small number of registered questionnaires in a given category, or extreme cases registered (few tourists staying in Poland for a long time). Total expenditure for the country is the product of the average expenditure for the category in which a given country is located and the estimated number of trips for this country.

In general, the coherent research system for transborder areas requires multi-method surveys whose structure can be summarised in the table given below.

	<b>Frame</b>	<b>Sampling</b>	<b>Surveyed population</b>	<b>Research instrument</b>
<b>Household survey</b>	Frame	Simple Random Sampling with Stratification	Sample survey	Questionnaire
<b>Internal/external border</b>	No frame	Systematic Sampling	Sample survey	Questionnaire
<b>Vicinity of the border</b>	No frame	Purposive	Sample survey	Questionnaire
<b>Border Traffic Survey</b>	-	-	Census survey	Register

Figure 2. Summary of the methods

Source: own elaboration.

### **Quality-of-life index**

In order to look at transborder processes in a more systematic way while creating new models of development, two synthetic indicators pertaining to objective and subjective aspects of quality of live were built. Obviously, these synthetic indicators were prepared based on partial indicators – 19 life domains in the case of subjective assessment of life domains on Likert scale; 35 objective indicators. The results of the survey of quality of live in transborder areas reveal a group of spatial units which are characterized by a relatively low level of development in

terms of objective indicators on the one hand and a relatively high level of subjective assessment of quality of life on the other. Therefore, taking into consideration only objective measures we get a distorted picture of spatial units located in trans-border areas. The emphasis should be also put on another evidence of specificity in trans-border areas, namely on focusing only on subjective approach. Using simple measures, and based on statistical tests, there is statistically significant difference in assessing life domains done by individuals between border areas and interior areas. Moreover, this difference is noticeable even within border areas taking into consideration each neighbouring country separately. It is especially connected with such domains as meeting basic needs or available goods and services. It proves that transborder areas are characterised by specific development patterns. The key conclusion here is that if we include subjective quality-of-life aspects into the models the results of our analysis usually change to some extent. In the case of transborder areas this change is a fundamental one.

#### **4. Results of the survey - selected aspects**

The analysis shows that there is a diversity of studied phenomena in each type and section of the border. A vast majority of surveyed people went abroad and returned in one day (with the exception of air and sea border). Expenditure incurred by foreigners in Poland was higher than Poles abroad. Of the total expenditure of foreigners in Poland vast majority was attributable to the inhabitants of the neighbouring countries of Poland. Of this the highest amount for purchases in Poland were spent by the residents of Germany, Ukraine and Belarus.

The value of expenses on the purchase of goods by foreigners in Poland and (to a lesser extent) Poles abroad were significant in comparison with the turnover of Polish foreign trade with neighbouring countries. Due to the amount of expenses on the one hand, and the volume of exports or imports on the other, these relationships were characterized by great diversity. Highest relations related to expenses of foreigners declaring Belarus and Ukraine as the country of residence in comparison with the export of goods from Poland to these countries. What is also important is that the share of foreign expenses in retail and wholesale trade is relatively high which means that transborder processes influence economic situation in these areas significantly. The results of the survey, both among foreigners (non-residents) as well as the citizens of Poland showed that the greatest intensity of the phenomena associated with the movement at the land border of Poland (which covered approximately 92% of all cross-border traffic) occurred in areas around the 50 km along the border. The evidence of this, among others, is a high percentage of people crossing the border who incurred expenses in this area, as well as the fact that the inhabitants of the villages located in this area constituted the vast majority of people crossing the border. It is also characteristic that in the case of the EU internal border on the territory of Poland, the intensity of these phenomena in the area of over 100 km away from the border was higher than in the case of the external border, which is related to, among others, the purposes of travelling



abroad. For areas located at the external border of the European Union on Polish territory, the introduction of local border traffic was an important element facilitating crossing of the border.

### **Entrepreneurship and business clusters**

In general, Polish northern and eastern border area does not have such developed entrepreneurship as Poland on average except the Polish-Russian area. In Poland, there are almost twice as many firms per 1000 inhabitants as by the eastern border. Similar situation can be observed in the number of entities with foreign capital participation – on the western border there are almost four times as many firms as on the eastern border. What is remarkable is that the number of firms in the border area as a whole was increasing better than in Poland. Systematic increase in dynamics of the number of entities per 1000 inhabitants signifies that border areas are becoming more and more attractive place for foreign investments, especially near the Polish-Ukrainian border. An important factor in the process of assessment of financial situation is dynamics of both revenues and export. These phenomena show a clear upward trend in the analysed period (2010-2014). Border area throughout the whole period is characterized by higher dynamics than the national average. The same tendency we can observe in the rate of return on sales as well as return on assets, whereas the debt ratio for the border area was declining from year to year. A complement to business demography and financial health is business tendency survey. It is a set of high-frequency indicators which show current economic situation and reveal entrepreneurs attitude about future. Even in this field a variety of behaviours with respect to border areas may be observed. For instance, entrepreneurs at the Polish-Ukrainian border more often consider their overall economic situation as bad than entrepreneurs in the other sections of the border and in Poland in general due to disintegration processes caused by war. A completely different situation we can observe near the border with Germany. Differences in potentials due multidimensional and supranational nature of socio-economic processes in transborder area and the knowledge-based regional economy with excellent information infrastructure supported by appropriate regional policy are a perfect environment for creation of business networks, and thereby business clusters. Clusters are a new way of thinking about the region, which additionally create exponentially positive externalities.

### **5. Conclusion**

Integration and disintegration processes result in greater interaction within socio-economic phenomena (through the difference of potential) including an increase in the scale of unregistered and illegal transactions. Analysis of the processes of socio-economic development in the modern world clearly indicates the need to study phenomena occurring in transborder areas.

Polish official statistics acknowledging this need aims at developing coherent research system for transborder areas which covers numerous surveys dedicated to

households and businesses (including clusters). Effective functioning of such a system requires to be supported by standardized sources of information (official registers, other administrative sources of data, bank registers, automatic measurement of traffic, etc.), as well as by creation of projects which will not only include surveys on borders, but will primarily concentrate on processes ongoing around the border. It turned out that the results of this large-scale undertaking were unexpected from methodological point of view (modified methods of estimation, calibration of weight, techniques for collecting questionnaires, additional sources of data, etc.). Results of these surveys, were also surprising for users of information, not only for the Central Bank, Ministries and central offices, but also for institutions responsible for regional policy and entrepreneurs.

Hence, we would like to put emphasise on practical use of the coherent research system on different levels, namely on micro, meso, macro and inter levels. Results of the survey on the scale of foreigner's expenditures allow entrepreneurs to set up firms or branches in transborder areas. Simultaneously, local authorities, having this kind of information, can create additional incentives for development of entrepreneurship. On regional level, functioning of such a system makes it possible to lead politics by self-government and government institutions to increase competitiveness of each region. As regards the question of national level, thanks to this system we can more precisely estimate GDP, BoP to be exact. It is interesting to note that thanks to this system, is also the reason for the processes in transborder areas to have significant impact on the economic growth in case of Poland. By means of coherent research system we can take common or compatible decisions on the both side of the border (e.g. common road, bus line based on commuting to work survey, migration survey, new border crossing, legislation on local border traffic). Therefore, research objectives and objectives connected with usefulness of the surveys were achieved.

#### **Abstrakt:**

#### **Spójny system badań statystycznych dla obszarów transgranicznych - wewnętrzne i zewnętrzne granice unii europejskiej**

Obszary transgraniczne w specyficzny sposób koncentrują procesy, które są charakterystyczne dla instytucjonalnie i kulturowo zróżnicowanego świata. Z tego powodu istotne znaczenie odgrywa wielowymiarowa i przestrzenna analiza zjawisk społeczno-gospodarczych, ze szczególnym uwzględnieniem endogenicznych i egzogenicznych czynników wpływających na różne poziomy rozwoju badanych obszarów - dotyczy to przede wszystkim wschodniej, zewnętrznej granicy Unii Europejskiej. Unikalny charakter tych obszarów wymaga zatem przeprowadzenia wielu różnorodnych badań. Funkcjonowanie spójnego systemu badań obszarów transgranicznych pozwoli na zastosowanie innowacyjnych narzędzi modelowania ekonometrycznego, a także wykorzystanie wyników analiz na poziomie mikro-mezo-makroekonomicznym.

Polska statystyka publiczna jest w trakcie tworzenia takiego systemu, który obejmuje liczne badania, dotyczące zarówno gospodarstw domowych jak i przedsiębiorstw, wykorzystując wielowymiarowe analizy przestrzenne (w tym klastry). Okazuje się, że wyniki tych badań w wielu przypadkach są nieoczekiwane i w konsekwencji prowadzą do modyfikacji metodologii (metody estymacji, kalibracja wag, techniki zbierania ankiet, konieczność wykorzystania dodatkowych źródeł danych, itd.). Warto także podkreślić, że skala zjawisk gospodarczych na obszarach transgranicznych wykracza poza poziom lokalny oraz regionalny i może mieć pewien wpływ na procesy wzrostu gospodarczego całego kraju. Jest to szczególnie ważne w okresie spowolnienia gospodarczego, gdy większa aktywność przedsiębiorstw i gospodarstw domowych w tych obszarach działa jako stabilizator sytuacji społeczno-gospodarczej.

**Towards coherent statistical systems of transborder areas  
- case study of internal and external borders of the european union**

Transborder areas often concentrate economic processes typical for modern, institutionally and culturally diverse world. For this reason it is important to analyze socio-economic phenomena from multi-dimensional and spatial perspective, with particular emphasis on endogenous and exogenous factors affecting the different levels of economic and social development of these surveyed areas, as is the case of the internal and external Eastern border of the European Union. Therefore, the unique character of transborder areas requires a great number of various surveys of socio-economic matters to be carried out. The functioning of a coherent research system for transborder areas will provide opportunity to use econometric models, as well as employ the results of analyses on micro-meso-macroeconomic levels.

Polish official statistics aims at developing such a system which covers numerous surveys dedicated to households and businesses, as well as spatial analyses (including clusters). It turned out that the results of this large-scale undertaking were unexpected from methodological point of view (modified methods of estimation, calibration of weight, techniques for collecting questionnaires, additional sources of data, etc.). What is more interesting is that the scale of economic phenomena affects not only micro and meso-scales but also has a significant impact on the processes of economic growth. It is particularly important during economic slowdown when higher activity of enterprises and households in these areas act as a stabilizer of socio-economic situation.

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