



CHALLENGES OF THE TRANSBORDER STATISTICS WITHIN THE INFORMATION SYSTEM OF THE OFFICIAL STATISTICS

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ABSTRACT

Paradoxically, recent years have seen a dramatic increase in integration as well as disintegration processes in contemporary world. Dynamics and interdependence of socio-economic phenomena are becoming especially evident in the case of transborder areas. Here we can observe different kinds of asymmetries of potentials between countries and regions – technological, economic and institutional in particular. These differences in potentials have multidimensional and supranational nature and implications. What is worth stressing, is the surprisingly high influence of processes in transborder areas on the economy, not only on micro-meso level but also their significant impact on the economic growth.

Therefore, the unique character of transborder areas requires creating a uniform information infrastructure as a base of knowledge on transborder areas. Establishing this information infrastructure should include a wide spectrum of methodological issues, which will be useful both in the countries covered and not covered by liberalization of the rules of crossing the border (it will be particularly helpful in the countries with both kinds of border crossings, e.g. internal and, at the same time, external borders of the European Union). Effective functioning of such a system requires support from standardized sources of information (statistical databases, official registers, administrative sources of data, bank registers, automatic measurement of traffic, other Big Data sources), as well as creation of projects which will not only include surveys on borders, but will primarily concentrate on processes ongoing around the border.

In order to meet the demand for information, Polish official statistics undertake various actions concerning the use of different sources of information, monitoring socio-economic phenomena in transborder areas, and above all, improving and designing new surveys for these areas. The results revealed some important differences in the behaviour of both households and enterprises as well as the need to use innovative methodological solutions in research system for transborder areas. What is also important is the practical use of such an information infrastructure on the local, regional, national and international level. Therefore, it is necessary to distinguish transborder statistics in the information system of official statistics.

Key words: information infrastructure, Big Data sources, transborder information system

1. Introduction

Economic development processes undoubtedly change the socio-economic space, but in a different way affect the local spatial units. As a result we can observe significant structural welfare discrepancies. These discrepancies are of course reflected in spatial inequalities. Many authors identify the reasons for such a situation pointing at, among other things, physical location, institutional (resulting from the development of civilization), legal, cultural and mental factors.

In the frame of the sustainable development model we should ensure sufficient level of welfare distribution. Therefore, a number of efforts have been undertaken in the field of regional convergence including not only indirect support for the poorest regions but also innovation strategies in order to encourage close cooperation between industries and research community (technology transfer) above all. Progressing processes of decentralisation cause the region to become a space which can create business oriented-environment for various kinds of units and simultaneously to become an object of a competitive networked knowledge-based economy.

In the literature, knowledge is seen as an important determinant of competitiveness and at the same time of the regional development. Creation and exploitation of regional knowledge base require development of information infrastructure which consists of information standards, resources, systems and processes. Information has become the basis for the smooth functioning of a modern society, business and public administration. Information and communication technology, enabling information management, penetrate into the various fields of human activity, changing the conditions of life of individuals and the functioning of the whole organizations. They influence the way business is

conducted and how much it is efficient, transform the public administration in order for it to better serve their citizens, influence the culture and change our attitudes, transform our lives.

The aim of this article is to point out on specificity of transborder processes that can influence asymmetry in regional development. Therefore, the unique character of transborder areas requires creating a uniform information infrastructure as a base of knowledge on transborder areas.

2. Necessity of creating information system for transborder areas

The region is an extremely diverse area because its development is influenced not only by specific local, regional and national factors but in the case of border regions it is subject to strong transborder processes which take place under regulations, laws, in natural, social, economic conditions of different neighbouring countries. Here we can observe different kinds of asymmetries of potentials between countries and regions – technological, economic, institutional and social in particular. These differences in potentials are of multidimensional and supranational nature and carry implications primarily (as in physics and chemistry) resulting in increased interactions between objects (households, business, government, self-government institutions, non-profit sector), and exerting influence on the effectiveness of the social-economic processes. In many cases, it strengthens the self-organization of the region, starting the adaptive mechanisms of this spatial unit and synergy effect. In addition, if it is supported by a rational regional policy some actions produce usually the result of catalysis effect. It is worth noting that, especially in those parts of the world where we see the intensification of disintegration processes (currently in Ukraine, Syria, etc.) regions operate not only within problem areas but also just within areas of conflict. This results in a more dynamic economic and social phenomena as well as the greater uncertainty and unpredictability in the regions.

Thus, the region must be characterized by a unique flexibility and "wisdom" because it is also subject to supranational influences. Therefore, many authors emphasize that the region is a learning object which is its key attribute and which often arises from the need to gain or maintain a competitive position in the global market (region as an object which also means a competitive position of enterprises or clusters, research institutes, etc.). Often learning takes place through a communication networks of and knowledge bases. To ensure proper transformation of knowledge and knowledge transfer, effective management of resources (human, material) and to enable the formation of business networks one need adequate information infrastructure. The infrastructure serves the learning process of regions for both individuals of knowledge (research institutes, universities, etc.), businesses, households, government, local government and non-government authorities.

A great progress in the area of information and communication technologies and, more importantly, the spread of these technologies to an unprecedented scale have given rise to information society or information economy. As a result, this has led to the creation of network society, which is characterized by information exchange processes observed to previously unprecedented degree, knowledge sharing as well as processes of exchanging resources and shared support carried out by means of a network of mutual contacts. For networking, it is important to build long-term relationships based on mutual benefits. Establishing and running the network is crucial in regional learning, which aim is to help gaining competitive position (preferably dominant position) mainly through quick access to data banks on the competitive environment, quick access to innovation financing sources or raising strategic resources.

The information environment of the transborder areas is some kind of linkage of information systems from several countries. Despite of spatial proximity, information stakeholders often come across different problems of, among other things, limited availability of data for areas located on both sides of the national border, lack of information on a certain level of aggregation in individual countries and low level of data comparability, especially those pertaining to economic issues. Sometimes seemingly similar systems of legal rules, institutions and customs generate noise-contaminated transborder information environment.

Such a situation reveals information imperfections to a greater extent, with regards to asymmetric information in particular. With real transactions it is rare that we have to deal with symmetric knowledge of all the players in the market, i.e. lack of information advantage of one unit over any other. As a rule, asymmetry of information is observed and thus some aspects of uncertainty are revealed. In the case of transborder areas of information imperfections increases significantly. Thus, the risk of economic or social activity in the conditions of incomplete information is higher. On the other hand, there is a huge demand for information due to the increased trade, joint establishment of companies, joint investment, economic activities in special economic zones and technological parks, or the use of various forms of support for collaborative projects implemented by entities on both sides

of the border. Therefore, there is a need for an information system for transborder areas in order to build the transparent information environment for all stakeholders.

Creating information order for transborder areas should start with establishing integrated metadata system – transborder metadatabase which enables identification of the information resources and the information gaps. Firstly, inventory of transborder information environment is needed. It means collecting and taxonomy all important information resources, processes, systems and characteristics of stakeholders with pointing information (hyperlinks, addresses, etc.) redirecting to our own metadata. Thus, the final result will be the development of transborder metadata shell.

3. Actions undertaken by official statistics in the field of transborder areas

Delimitation of transborder areas

There exist, of course, numerous ideas for setting transborder area. Thus, its delimitation is pre-arranged to a large extent and depends on the purpose it serves. The delimitation can be carried out based, for instance, on morphological criterion, with geographical features taken mainly into consideration (in particular the lie of the land), or on functional criterion, viewed as a commonly dependent production and consumption actions, and those related to exchange and administration. Delimitation in the institutional sense does not denote a compact area — it creates a kind of a network because it is determined by locations of units cooperating within the transborder area (units of territorial division on LAU level 1, entities etc.). As part of these criteria, common problems to solve, e.g. areas of ecological threat or common chances for development, for instance, creation of transborder touristic area, are also taken into consideration. Groups of indicators reflecting various processes of socio-economic development can be also used for delimitation. It should be stressed, that, as a result of numerous criteria the boundaries of transborder area are fuzzy since spatial scope of individual features does not coincide with each other. In practice, preliminary delimitation is carried out first. It is based on limited, not finally coherent list of variables that include law, administrative, political and factual aspects. Systematic analysis of socio-economic phenomena in preliminary defined transborder area, which mainly focuses on labour market, entrepreneurship, tourism, environmental protection or institutional infrastructure, usually leads to changes of the outlined area, what can be named as dynamic delimitation.

Monitoring of socio-economic phenomena

All sorts of information which we can find in statistical databases and administrative registers adjusted to transborder areas fall within the ambit of the monitoring. In this case inventory of information resources is often fruitful. It may happen that we have unknowingly a lot of information concerning transborder areas. Sometimes only a deep insight into statistical databases or a little modification in statistical forms is required so as to adapt survey to our needs. Based on this the monitoring has been carried out by Polish official statistics on the website since March 2008. Besides, publications dedicated to euroregions and transborder areas in book and electronic forms have been issued for several years. What is important they cover external and internal border of the European Union including therefore integration and disintegration processes (Germany, The Czech Republic, Slovakia, Ukraine, Belarus, Lithuania and Russia). Obviously, the monitoring requires maintaining comparability, and this can be achieved in the first step by creating a uniform set of variables concerning individual socio-economic fields (e.g. demography, entrepreneurship, environmental protection), which will be based on joint glossary of terms, often relating to various classifications. Only a set of variables prepared in this way allows to use a great number of data analysis methods.

Data sources

Administrative and statistical databases can be the primary data sources used in monitoring of transborder areas. Data of customs service and border guards, which are exceptionally important in generalizing results of sample surveys, plays a special role here. As part of the modernization of official statistics, especially in the organization of surveys, the use of alternative data sources is significant, as such sources are not limited only to administrative data, but also concern other sources available in electronic form and modern technology (so-called Big Data). We have to bear in mind that employing data from mobile telephone operators, data on passenger air traffic, rail traffic, travel agencies, regional offices (permits to work issued for foreigners), employment agencies assisting in employment of citizens abroad by foreign employers and foreign administrative sources cannot be overestimated for surveys in transborder areas. Because of the fact that the transborder research system is based mostly on sample surveys, data from mobile phone operators are extremely fruitful above all to get appropriate estimation of movements (people, goods, funds, etc.) and simultaneously

various kinds of social-economic measures especially in the areas with open borders. A potential source of information is also outcomes of automatic points of road traffic measurement, which can estimate its intensity (by selected days of a week, month, etc., including seasonal fluctuation), and also cover categories of vehicles. In some countries, the automatic measurement system can precisely identify a vehicle (e.g. registration number, number of persons travelling), and its localization at any point of time. Collecting of data used in transborder surveys may be carried out also through bank system. Information on the usage of credit cards might be particularly useful. It should be emphasized, though, that in most countries reports on this matter made by central banks for the purpose of payment balance are of virtually no use for transborder areas (e.g. in accordance with the EU regulations, transactions not higher than 12.5 thousand euro are not registered). Due to confidentiality of bank data, functioning of an independent information system, powered by commercial banks for regional purposes, appears, however, difficult to realize. The next interesting path to follow is combining information from the registers and sample surveys especially in terms of budget constraints.

Sample surveys

Analysis of processes observed in transborder areas requires creation of such a system of sample surveys that covers the possibly broadest scope of socioeconomic phenomena. Among the most important areas, the following should be mentioned: surveys of households, enterprises, tourist accommodation facilities and questionnaire surveys on borders.

In the household survey, the module concerning changes which occur in the labour market, with focus on non-registered employment (reasons, kind and frequency of starting non-registered work, socio-demographic characteristics of persons performing such work, incomes from non-registered work, etc.) is very important. Another important module is the survey of non-registered shopping level in households (characteristics of households buying in non-registered zone, shopping frequency, amount of expenses on goods from non-registered zone made by households, structure of selected purchased goods, etc.). The module which is also important, is the one connected with migration of population, of which foreign tourism in particular (aim, time and directions of migration, amount of expenses made, etc.). In surveys of enterprises located in transborder areas, a greater attention should be paid to the module of non-registered transactions (size and costs of employment, basic balance data and financial indicators concerning grey area, etc.). As regards the survey of tourist accommodation establishments it should be first and foremost addressed to foreign visitors (number and structure of visitors by country of permanent stay, place of crossing the border and means of transport, aim of travel, kind of accommodation, expenses on goods and services, frequency of crossing the border, duration of stay, etc.)

In most of the countries such surveys are being carried out. Their disadvantage is, though, the size of the sample because it does not allow to generalize the results for transborder areas delimited on the LAU level 1 and 2. A good example is a survey of economic situation in enterprises and households, economic activity of population or household budgets. Moreover, in different countries they are conducted under different methodology, what results in the lack of comparability of results. A reasonable solution would be increasing the sample and modification of methodology in the frame of transborder projects financed by external sources.

A separate group is questionnaire surveys on borders. In order to maintain the quality of collected information and low level of “non response”, border surveys require experienced and professional pollsters. The most challenging part of such a survey is to recruit a respondent since they are in the course of journey, often annoyed by awaiting customs and passport clearance for a long time. In such conditions, the pollster usually works under time pressure.

Due to the nature of questionnaire surveys on borders, it is desirable that pilot test and surveys are prepared with care. They will allow, for the most part, to assess to feasibility of the survey’s objectives, sample design, estimation methods, precision, data collection methods and their analysis. At this stage, it is particularly important to prepare a programme for maintaining a proper quality level of each stage of the survey. Sets of indicators for assessing sampling errors and minimizing non-sampling errors are usually used for this purpose. Practice proves that indices of “non response” and procedures for dealing with respondents who refuse to answer are especially important.

Synthetic measures

In order to investigate differences in development of territorial units at various levels of aggregation, we can use a synthetic indicator. This index, as it is well known, is constructed based on partial indicators which may come from different fields. They can be used to analyze a specific area of research (e.g. economy, human capital, environment) or the general socio-economic development of a given region. In the selection of partial indicators both substantial and formal criteria are taken into

account. A properly selected set of variables should describe the phenomenon under study as precisely as possible, and at the same time be not too numerous.

It is always difficult in these kind of studies precisely specify these factors that is to select appropriate variables, which is often subjective in character. In the selection of variables the clustering scheme for regional competitive advantages has been used. From the wide array of factors especially three broad factors, which have significant influence on regional and national competitiveness should be considered - infrastructure and accessibility, human resources as well as productive environment. Under the procedure of creating the index we should use various statistical methods to eliminate the variables that contain the same or very similar information on the investigated phenomenon, or showing little variability. To obtain the taxonomic measure of development a number of steps should be taken (standardization, set of the taxonomic patterns, distances).

It is worth stressing that spatial models are especially useful in transborder analysis (e.g. AHP method). They allow us to assess the validity of the factors affecting the development of local units, to determine their synthetic assessments of internal and external conditions, and on this basis, to identify the types of developmental units. Construction of two hierarchical structures related to the external and internal conditions of socio-economic development – specification of the strategic fields and an appropriate choice of sub-indicators for them (selected elements of a SWOT analysis of administrative unit) is an important step in developing this method. Spatial models (spatial error models, spatial delay models), allow for tracking demand and supply shocks both in time and space. Taking into account the location and neighbourhood one can evaluate quite precisely and comprehensively the position of the surveyed territorial unit as compared to others – whether, e.g. it is an island among completely other ones, or a part of a greater territorial structure. It also allows for detecting whether there is diffusion, exchange, interaction - whether other regions become infected or whether local changes are a response to exogenous shocks.

4. CONCLUSION

The dynamics of social changes and economic situation is significantly influenced by infrastructural resources, not only in the field of energy, transport and communications, but also in the information infrastructure, which in the age of global information society is a prerequisite for sustainable development.

Research shows that in the past two years mankind created more information than in the previous history. It should be noted, however, that the mass production of information does not respect the standards of quality and that the decisive role in replacing better information with the worse one is largely played by the media. Additionally, deepening of information asymmetry can be noticed in many areas, primarily due to failures of the information market.

Thus, being aware that the global social information order is becoming today one of the most important determinants of socio-economic development, and the market mechanism cannot establish procedures for self-regulation in the information market, some kind of interventionism seems to be required on this market. The official statistics, which produces, disseminates and enforces standards for information (meta standards, concepts and definitions, classifications, nomenclatures, typologies, codes, etc.), can be considered a natural regulator and coordinator in this area. So, official statistics should act as a beacon in the contaminated information environment of today's world.

Dynamics and interdependence of socio-economic phenomena caused mainly through integration and disintegration processes in contemporary world are becoming especially evident in the case of transborder areas. Here we can observe different kinds of asymmetries of potentials between countries and regions – technological, economic and institutional in particular. These differences in potentials have multidimensional and supranational nature and implications. What is worth stressing is the surprisingly high influence of processes in transborder areas on the economy, not only on micro-meso level but also their significant impact on the economic growth.

Therefore, the unique character of transborder areas requires creating a uniform information infrastructure as a base of knowledge on transborder areas. Establishing this information infrastructure should include a wide spectrum of methodological issues, which will be useful both in the countries covered and not covered by liberalization of the rules of crossing the border (it will be particularly helpful in the countries with both kinds of border crossings, e.g. internal and, at the same time, external borders of the European Union). Effective functioning of such a system requires support from standardized sources of information (statistical databases, official registers, administrative sources of data, bank registers, automatic measurement of traffic, other Big Data sources). Official statistics should play all-important role in the process of creation transborder metadata shell and transborder

metadatabase in order to guarantee standardization, identification, consolidation, integration, interpretation, evaluation, documenting of data and deliver process data.

In order to meet the demand for information, Polish official statistics undertake various actions concerning the use of different sources of information, monitoring socio-economic phenomena in transborder areas, and above all, improving and designing new surveys for these areas. The results revealed some important differences in the behaviour of both households and enterprises as well as the need to use innovative methodological solutions in research system for transborder areas. What is also important is the practical use of such an information infrastructure on the local, regional, national and international level. The results of Polish coherent research system for transborder areas proved that transborder processes have significant impact on the economic growth. Therefore, it is necessary to distinguish transborder statistics in the information system of official statistics.

REFERENCES

- CIERPJAŁ-WOLAN, M., (2008). Cross-border surveys – some methodological aspects. “Statistic in Transition new series”, Vol.9, No. 2, pp. 361–366.
- CIERPJAŁ-WOLAN, M., (2009). The measures of adaptability in Poland’s system of official statistics under crisis, *Statistics in Transition new series*, Warsaw, Vol. 10, No. 1, pp. 163–170.
- CIERPJAŁ-WOLAN, M., (2011). Directions for development of transborder areas – state and prospects, *Statistics in Transition new series*, Warsaw, Vol.12, No. 3, pp. 537–545.
- CIERPJAŁ-WOLAN, M., WIERZBINSKI B., (2013). Importance and directions of regional development in the context of competitiveness within Carpathian euro-region, *Institutional Vector of Economic Development*, Melitopol Institute of Public and Municipal Administration of the “Classical Private University” Melitopol, pp. 141–155.
- CIERPJAŁ-WOLAN, M., MARCINIĄK, G., OKRASA, W., WITKOWSKI, J., (2014). Contemporary problems of statistics – theory and practice in a global perspective. 59th World Congress of Statistics, Hong Kong 2013, *Statistical News*, Warsaw, No. 4, pp. 42–55.
- CIERPJAŁ-WOLAN, M., (2014). Contemporary challenges to official statistics at international, national and regional levels, *Forum Statisticum Slovacum 4/2014*, Bratislava, pp. 11–17.
- CIERPJAŁ-WOLAN, M., LIBERDA, Z. B., ŁAGODZIŃSKI, W. W., (2014). Integration and matching of survey data and administrative data for monitoring and analysis of economic processes in transborder areas, *Foundations of transborder economics and statistics*, Rzeszow, pp. 218–226.
- GEENHUIZEN, M. van, NIJKAMP, P., (1998). *Regional and Urban Policy Beyond 2000: New Approaches with Learning as Device*. FEWEC, Free University, Amsterdam. Geenhuizen, M. van, Nijkamp, P. and Zuylen, H. van (1998) *Limits to Predictability in Traffic and Transport*. AW, Rotterdam.
- GEENHUIZEN, M. van, NIJKAMP, P., (2000). *The Learning Capabilities of Regions, Knowledge, Innovation and Economic Growth* (F. Boekema, K. Morgan, S. Bakkers and R. Rutten, eds.), Edward Elgar, Cheltenham, pp. 38–56.
- OLEŃSKI, J., (2014). Transborder economy and transborder economics in globalized world, *Foundations of transborder economics and statistics*, Rzeszow, pp. 10–14.
- OLEŃSKI, J., (2014). Transparency of international information environment as the prerequisite of transborder cooperation and development, *Foundations of transborder economics and statistics*, Rzeszow, pp. 95–107.