

## TRANSBORDER PROCESSES IN FRAGILE COUNTRIES

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### ABSTRACT

In globalized world, in extreme situations, disasters and extraordinary phenomena and processes on national, local and sectoral level, official statistics should realize new tasks - active information support of governments, businesses, population and international organizations in concrete situations. Those new tasks are of special importance in fragile states, countries, regions and branches of national economies.

In the paper there are proposed statistical typologies of extreme social and economic and environmental situations. Official statistics should elaborate statistical categories and variables for describing and measuring those phenomena and processes and should monitor social, economic and environmental processes for all types.

Main theses of the paper are:

- (a) in globalized world the uncertainty and fragility of political, social and economic processes is growing,
- (b) in modern ICT environment official statistics should be an integral subsystems of informational infrastructure of country and governments,
- (c) statistical capacity – methods, staff, organization, infrastructure - should be ready to provide immediately pertinent information in case of extreme processes and events to all stakeholders of those phenomena.

Main methodological approaches tools necessary for active contribution of official statistics in extreme situations are:

- (1) methods, metadata and indicators adjusted to continuous monitoring of extraordinary processes, phenomena and events,
- (2) strong frames enabling immediate collecting of necessary data of very small sample surveys and traced data based estimations of sensitive, non-observable variables
- (3) methods and tools of using and integrating data from different sources, with special reference to relevant traced data, big data resources, primary registers and administrative records,

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- (4) maintenance of statistical capacity ready to in extreme situations for urgent collecting, processing and dissemination of pertinent data to personalized users,
- (5) GIS and domain-oriented databases integrating all available information, covering the territory of the country and the regions influenced by transborder processes
- (6) parainformation system for retrieval of relevant information from statistical and non-statistical sources and for producing pertinent messages for concrete stakeholders and usage situations.

The capacity building of official statistics adjusted to the specificity of fragile countries and regions, disasters and extraordinary situations should be an integral part of the NSDS.

## **1. *Si vis pacem para bellum* – new challenges of official information systems and services in fragile countries and transborder regions**

- 1.1. The objective of this paper is to answer the question, what and how active information policy of official institutions may help governments, businesses, social organizations and households in fragile countries, in the situations of disasters, catastrophes and shocks under uncertainty and incomplete information.
- 1.2. In modern ICT environment the information infrastructure of countries has obtained powerful technological tools enabling to realize new functionalities that were not possible in the past:
  - a) accessibility of new information sources stored in electronic forms: administrative records, primary records of socio-economic subjects, big data resources, digitized and visualized qualitative information sources (e.g. maps, charts);
  - b) continuous monitoring of dynamic social and economic processes, small areas and extreme events;
  - c) building strong frames and surveys based on very small samples;
  - d) precise estimation of variables on the basis of traced data;
  - e) deep personalization of dissemination of output information matching statistical variables and non-statistical qualitative information.
- 1.3. However, new potential functionalities mentioned above are not commonly implemented in the practice of national statistical offices. In many national statistical offices the priority is given to traditional functions of official statistics: producing of numerical values representing statistical categories standardized on global scale and capturing of input data in the forms of

statistical questionnaires. Even in case of the use of administrative records, primary registers and big data for statistical purposes, the data derived from those sources are usually converted into the structures of statistical questionnaires in electronic form.

- 1.4. Main reason of such conservatism can be explained by the fundamental law of progress in official statistics: *The unique driving force of progress in official statistics is its inertia*<sup>2</sup>. Any real progress in official statistics needs the stimuli from outside statistical offices: from the part of governments, businesses, ICT sector, universities or research institutes. The consequence of that law in practice is the lack of internal initiatives of official statisticians in elaborating and implementing new methods and tools enabling to monitor extremal processes, phenomena and event and their impact on societies, states, regions, branches of national economy.
- 1.5. Majority of statistical standards and methodological tools are not prepared to react in case of unexpected, exceptional and new dynamic social and economic changes, disasters, catastrophes and other phenomena in fragile socio-economic and political systems. Strategies of development of official statistics for next decades should envisage active role of statistics in providing informational and analytical services to governments and other stakeholders in concrete usage situations, with special reference to extreme phenomena and processes.

## **2. Information needs of stakeholders in transborder regions of high uncertainty and instability in fragile countries**

- 2.1. Modernization and harmonization of national official statistics in the global system of official statistics is based on the implementing of international standards: categories, indicators, metadata, methods and national programs of surveys.
- 2.2. However international statistical standards are mainly focused on the needs of international organizations: UN and socialized organizations, IMF, WB, OECD, UE and its directorates, and many other regional and branch-oriented international organizations and associations.
- 2.3. Information requirements of international organizations do not cover all informational priorities of countries, regions and national branches of economy. Methodological approaches and information requirements of international organizations are elaborated as a rule by experts representing

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<sup>2</sup> The structure of the statistical information system and the methodology of surveys in terms of computerization (Proceedings of the ISIS 78 Seminar..., 1979).

statistical experiences of large, developed countries, stabilized, market-driven economies, with properly organized public administration and modern financial systems. International organizations adopt the solutions elaborated in the countries which lead in world statistics.

- 2.4. National statistical offices of countries, that are members of international organizations, are obliged to submit to those organizations many statistical data following exactly methodological recommendations of those organizations.
- 2.5. For many statistical offices the easiest way to meet international requirements seems to be the *transplantation* of international standards, i.e. direct implementing of those standards into national systems. Many national statistical offices adopt statistical requirements and methodological recommendations of international organizations as the basis for their national programs and methods. Even if those solutions do not fit to the needs and specificity of countries.

The consequence of *transplantation* of international standards and foreign *best practices* is – as a rule – the replacing of national methods by international standards and foreign practices. That approach may create methodological and functional gaps between the needs of national stakeholders of statistical processes and the data that can be produced using international standards and foreign best practices. In this situation statistical system is not able to react quickly and efficiently in case of specific extreme situations, disasters and crises that are not taken into account in international standards.

- 2.6. The harmonization of methodology by *direct transplantation* of international standards to national statistical systems is rather common in the countries that are the members of *supranational*, institutionalized structures e.g. free trade zones, common markets or single markets, political and economic unions.
- 2.7. The trap of the *transplantation approach* is hidden in a fact that the methods and indicators adjusted to the specificity of one country are used to describe different social and economic phenomena, processes and systems in other country. It often happens that *best practice* of one country may not be the best for other country, other region or other national economy.

The consequence of the transplantation of international standards and best practices of other countries into national statistical programs and surveys is that many official statistical agencies are limiting their programs of surveys and methods to those standards. They are not developing methods and surveys adjusted to the specificity of country, region, to actual or probable extraordinary situation.

It seems that proper approach to international standards should be the development and implementing of specific national standards, methods and survey programs and the production of data required by international organizations should be achieved by building the “gateways” between national and international standards.

- 2.8. Statistical experiences of countries leading in statistical theories, methods and technologies are recommended as *best practices* for all other countries.
- 2.9. The principle of transplanting *best practices* is based on erroneous assumption that “*what was good for country A, shall be also good for country X*”. Some official statistical systems are accepting the advises and recommendations of foreign experts that offer them to implement “best statistical practices” taken from developed, market driven, stabilized economies, in quite different political, administrative, social and economic conditions, without sufficient criticism, e.g. in transition countries, in fragile states, in small national economies that do not have their own strong scientific and R&D statistical capacity.
- 2.10. *Best practices* and official international standards can and should be implemented in national systems by *critical, creative adoption* of useful experiences of other countries and international requirements to specific conditions of other countries, regions, economies, societies, to political models and to current political situation.
- 2.11. The strategy of adoption of *best practices* of highly developed official national statistical offices by other countries may cause the self-marginalization of national statistical offices in the information infrastructure of governments. For example, some EU-member countries have limited national statistical programs and methods to international recommendations and foreign best practices in some domains of statistics. In consequence national statistical offices are not able to supply relevant, detailed, timely data to institutional users.
- 2.12. Ministries, regional governments, central banks and other national organizations in many countries have noticed that national central statistical offices are not able to meet their specific statistical needs providing pertinent information in due time. Because of that they are developing their own statistical surveys and analyses integrated with their administrative information systems or they are hiring commercial companies for producing data tailored for specific usage situations. Usually the governments and businesses are not able to evaluate or control the methods and reliability of data produced by those commercial companies. National statistical offices

are not needed and are not considered as the informational foundation of governments.

Additional negative effects of that process are: methodological disintegration of official statistics, concatenation of administrative and statistical methods and categories, duplication and redundancy of surveys, and higher costs of official statistics as a whole.

- 2.13. To meet information needs of governments and national businesses in globalized economy and in the situation of “deep detachment” of global financial sector from real sphere of national economies, national official statistical services should build their own information systems obeying the *principle of priority of usage situations* important for local and national decision-makers and actors. Special priority should be given to the information support of decision-makers in critical and extremal situations and processes.

Statistical needs and requirements of international organization and harmonization of national data with international standards could be fully achieved by building on national level the *gateways* between national and international standards. Only in case of full compatibility of international standards with national needs those standards could be directly *transplanted* and used as the unique national standards.

- 2.14. For informational safety and security of governments, enterprises and citizens important duty of national statistical offices is the strategic planning and capacity building of official statistics as the integral part of national information infrastructure of countries. That approach is important especially in fragile states, in countries and regions that are the areas of disasters and extraordinary processes, extremal phenomena and other events deeply influencing economic and social stability, for branches of economy of high uncertainty and incomplete information.
- 2.15. Extremal phenomena, disasters, catastrophic processes (in the sense of a catastrophe defined by Thom) may happen any time in any country or regions. Well organized states and developed economies are in some sense resistant on shocks of different nature and scale. Less developed economies and fragile states may not be so resistant.

The governments, businesses and other organizations should build the systems of safety and security of population, economy and environment of country, regions and branches of economy on the basis of relevant and reliable statistical information. Producing and providing such information to all stakeholders is the duty of modern official statistics.

The stakeholders responsible for safety and security of country, region, branch of economy or social groups of population need two kinds of scenarios elaborated *ex-ante*:

- (a) *information scenarios* describing potential extremal situations and processes, and
- (b) *scenarios of reaction and counter-action* of governments, businesses and society preceding the events or in case of extraordinary events, catastrophes and disasters.

Those scenarios should be used for defining potential information needs of stakeholders, to select or elaborate new indicators, new methods, organization and techniques of collecting and submitting *pertinent* information to the users *just on time*, in proper forms and place.

- 2.16. Official statistics in all countries should be prepared to supply complex, relevant, verified information to all stakeholders – governments, businesses, society, experts and international organizations that may be involved in different actions of help, support or political actions, all what is needed to the stakeholders responsible for reacting *ex-ante* or *ex-post* in extremal situation.

In globalized world official statistics cannot limit its responsibility to the producing of smooth time series and annual aggregated indicators of growth if the part of the country suffers because of wars, millions of inhabitants are refugees, tsunami may destroyed most beautiful tourist regions or critical industrial infrastructure, and ecological catastrophe may eliminate wide areas of country from the use national economy and society.

- 2.17. Official statistics should create and maintain special capacity – tools, methods, information resources, trained and skilled staff, infrastructure - to be able to anticipate or to react immediately in case of the danger of political, social, economic or ecological destabilization of countries and regions, by quick mining, capturing, processing and providing to stakeholders personalized, relevant and pertinent, complex information on extraordinary phenomena and processes.

Those obligations and needs of capacity building for reacting in extraordinary situations, extremal phenomena and processes and active information support of stakeholders, especially governments and specialized international organization, are not specified in national laws on official statistics.

The IAOS and ISI seems to be good forum for discussing this new role of official statistics in globalized world and in modern ICT environment.

### 3. *Fernand cowboy syndrome* – gaps between information standards and reality of transborder regions in fragile countries

- 3.1. Domination of global statistical standards on national level seems to disseminate the phenomenon so-called the “*Fernand Cowboy syndrome*” in national statistical offices.

The concept of the *Fernand Cowboy syndrome* was created by information scientists to describe the phenomenon of *information gaps caused by the limitation of language of unconscious stakeholders*. That means that the stakeholders of information processes are not able to describe or measure the events, phenomena or processes, because the semantics and the pragmatics of their languages do not have relevant terms and concepts that can represent important features of reality.

- 3.2. The concept of the *Fernand Cowboy syndrome* seems to be very useful for explaining to non-professionals the problem of relevance of official statistics to the dynamic processes and phenomena, rapid changes of social, economic and natural environment in globalized world.

Information scientists defining the concept of the *Fernand Cowboy Syndrome* were inspired by French classic pastiche of American western from the period of colonization of American Wild West in the 80<sup>th</sup> of XIX century entitled *Fernand Cowboy* (the film was produced in 1956). *Fernand*, young French dandy, inherited a saloon of his aunt in a little town in Texas prairies. In one of first scenes of the movie *Fernand* is traveling in the stage-coach through the prairies, all the time carefully learning English from his French-English phrase-book, repeating all the time one sentence: *Three red roses are growing in the garden of my aunt*. During the journey the stage-coach is attacked by bandits, after that by Indians, some passengers are killed and wounded, with the earthquake and tornado in between. After arrival to *a little town in Texas* *Fernand* was asked by the inhabitants seeing the coach full of dead and wounded passengers inside, what has happened. *Fernand cowboy* looked into his phrase-booklet and answered: *Three red roses are growing in the garden of my aunt*.

I am very sorry for referring to the tragic example, but the indicators “*Quarterly regional GDP per capita in Aleppo region in 2016 in constant prices*” are much less informative for local and national governments of Syria and for the NGOs trying to help the inhabitants of Aleppo, than *Three red roses growing in the garden of the aunt of Fernand Cowboy* in a little town in XIX century Texas prairies.

- 3.3. Standard statistical methods and indicators are adjusted to describing, measuring and analysing social and economic processes of most typical



usage situations of different types of stakeholders in most typical, stabilized countries and economies. In extreme situations and processes, that in globalized world may happen in any country and in any time, those standards are useless and may be misleading.

- 3.4. Many stakeholders of statistical information processes accept that fact. Unfortunately they are not expecting from statistical offices active information support. They know that statistics will give them correct, precise, but incomplete, useless or non-timely information taken from statistical phrase-book of standard methods and indicators. The data will be correct from the point of view of statistical language and methods, however from the point of view of pragmatics of the language of users and in the context of reality of countries and societies, and concrete usage situations, may be useless or incomplete.

For example, in the language of the SNA it is not possible to represent the phenomena of economy in the country that is suffering because of war. In the situation of mass migrations of war refugees and economic migrants the demographic statistics based on population censuses and rates of births and deaths from previous decade will be useless for the regions of countries that are basic places of uncontrolled immigration.

3.4. The duty of modern statisticians is to include to statistical standards also the monitoring and measuring of extremal situations, phenomena and processes.

- 3.5. In all countries official statistical agencies should develop and implement statistical methods, concepts, surveys, information resources and capacities necessary for information support of governments, economy and society in extreme situations. Information systems of official statistics are obliged and should be ready to supply pertinent information to respective stakeholders.

#### **4. Typology of extremal situations and phenomena in transborder economies and regions of fragile countries**

- 4.1. Key issue of proper functionality of official statistics in fragile countries and the implementation of statistical monitoring of extreme situations, phenomena and processes is the elaborating of statistical typological classifications of:
- (a) normal social, economic and environmental phenomena and processes in which may appear extremal values (e.g. *social* – extremely high epidemic, *economic* – hyperinflation, *environmental* – seasonal exceptionally high flood in floodland, seasonal exceptionally strong hurricanes ),

- (b) extremal, unpredictable events, phenomena and processes destabilizing their social, economic, ecological and political environment (e.g. wars, terrorism, earthquakes, tsunamis, discovery of precious soils, uncontrolled transnational and transcontinental mass migrations etc.).
- 4.2. In fragile countries relatively small anomalies of regular phenomena and processes may cause serious consequences, while in rich, developed and well organized countries the resistance against extreme situation is stronger. Anyway, in any country may appear or happen the events and phenomena that have the character of catastrophe. Information systems, especially official statistics, should be prepared to support governments and other services by delivering pertinent information and providing information services.
- 4.3. The methodological foundation of official statistics to the function of informational potential of governments in extreme situations is the *multi-criterial facet classification* of extreme situations. Each social, economic or environmental systems, phenomena or processes can be characterized from different aspects that are defined as *facets*. For extreme situations main aspects or *facets* are:
- Facet A - Behavioural types of extremal events, phenomena or processes,
  - Facet B - Scale and scope of effects and consequences,
  - Facet C - Duration of processes,
  - Facet D - Duration of consequences of processes,
  - Facet E - Frequency of processes or events,
  - Facet F - Reasons and causes,
  - Facet G - Fragility of political, social, economic and environmental systems of extreme processes and events.

For each facet the classification or typology of possible appearances (items) should be elaborated. The preliminary proposal (for discussion and re-elaboration by branch specialists is presented below (4.4. – 4.8.).

4.4. **Facet A.** Behavioural types of extremal events, phenomena or processes.

The following behavioural types of extreme situations that are not covered by general statistical standards should be considered:

- a) natural environmental disasters
- e.g. flood disasters, inundations, avalanches, droughts, hurricanes, tornados and typhoons, earthquakes, tsunamis, earthquakes, eruptions of volcanos, water balance on local, regional and macrolevel etc.;
- b) social shocks and disasters

- e.g. rapid migrations, flows of refugees, displacement of national or social groups, victims of disasters, genocides, epidemics, pandemics, disturbances of systems of safety and security, health care, education, local, regional or macroeconomic disturbances of labour market, anomalies in living conditions and social aid, etc.;
- c) industrial shocks and disasters
- e.g. industrial pollution of environment, industrial catastrophes, huge investments with regional or macroeconomic impact, deep technological changes, disturbances in agriculture;
- d) economic shocks
- e.g. disturbances and crises of financial markets, disturbances of public finances, price shocks caused by processes on global markets, hyperinflation, disturbances of branches depending on external factors (e.g. in economy depending on foreign tourism, changes of demand and supply for certain products in monoculture economy);
- e) wars, home wars, terrorism
- e.g. open military conflicts between countries, hybrid wars, home wars and internal conflicts, terrorism;
- f) political fragility and instability of institutions
- e.g. dysfunctions of some domains of local, regional or central governments and public administration and public services, dysfunction of political system (e.g. elections and voting system), corruption.

Usually one extreme situation, disaster or catastrophe is initiating a chain of shocks, disasters and catastrophic processes.

For example, the forecasted eruption of volcano is generating the processes of evacuation of population of surrounding areas, need of preparation of resources for evacuated people, need of resources for the reconstruction of territories. At the same time the event even causes the disturbances of all economic and social processes in the area of direct and indirect influence of the event, in tourism, industry, agriculture etc. The governments and other organizations should be supplied by integrated and reliable statistical information relevant for elaborating the scenarios of actions before (if possible), during and after the event.

For example the war in some regions of the country is influencing the functioning of all population and national economy. For organizing humanitarian aid for population living in the areas suffering because of war, central government, regional and local governments of such country need

integrated and concatenated information on population, housing, communal infrastructure (on supply of water, energy, food, medical care, for providing safety and security), migration of refugees, need of most important social services, economic situation on local level. Official statistics can and should build the pre-war information resources, and elaborate methods and tools for collecting additional data and reliable estimates in case of disasters.

The chains of events and processes characterizing the socio-economic, political and ecological systems in extreme situations of wars, terrorism, environmental catastrophes, industrial disasters or social disturbances shall be built for each type extreme event or process for each country, social group of population, region, branch of economy, for which such event or process may happen with non-negligible probability.

**4.5. Facet B.** The scale and scope of effects of extreme situation are:

- a) global
  - e.g. financial crises, global information systems, disturbances and crises in global markets for goods and services (oil, gas, strategic metals, global markets for food products, maritime and sea transport);
- b) supranational
  - e.g. crises of public finances in several countries of the Euro-zone, tsunami hitting many countries, uncontrolled migration of millions of migrants from Africa and Asia to the countries of the European Union, large-scale earthquakes, large-scale ecological and industrial disasters,
- c) transborder
  - e.g. transborder labour markets influenced by institutional changes of wages and salaries, exchange rates of currencies and conditions of life of neighbouring countries, changes of access and availability of complementary infrastructure and natural resources used by neighbouring countries, like water, energy, roads and railways, social services, transborder floods, earthquakes, polluting of air, water or land,
- d) national
  - e.g. high inflation or hyperinflation in a country not using international currency, industrial and environmental disturbances that have the impact on the territory of the whole country;
- e) regional
  - e.g. industrial and environmental disturbances that have the impact on the territory of single region, regional natural catastrophes (e.g. tourist region, industrial region, agricultural region);
- f) local

- e.g. events and processes covering the territory of single town, city, locality, factory;
- g) branch and sector
  - events and processes covering sector or branch of economy, e.g. epidemic diseases of livestock or plants, administrative regulations of technological processes by supranational or national organizations (e.g. anti-carbon policy of EU).

#### 4.6. Facet C. Duration of extreme situations

- a) continuous situation or process
  - e.g. conditions of life of population and economic activity depending on climate and of stable environmental conditions;
- b) long-term (multi-annual)
  - e.g. conditions of life and economic activity depending on technical infrastructure, social capital and human capital, social infrastructure;
- c) middle-term
  - e.g. level of technologic progress, quality of political and social institutions, social infrastructure; institutional reactions on financial market;
- d) short-term
  - e.g. economic shocks influencing business cycles, factors influencing the processes of inflation or deflation;
- e) events
  - e.g. local disasters.

#### 4.7. Facet D. Duration of consequences of extreme phenomena and processes

- a) continuous
  - e.g. changes of territory of country as the consequence of war or political agreements, change of quality of land because of desertification (Aral see region) or radiation (result of Tshernobyl catastrophe in Belarus and Ukraine, catastrophe of Ficusshima nuclear power station), deforestation, depopulation because of economic, social or political processes;
- b) long-term (multi-annual)
  - e.g. long occupation of part of the territory on one country by other country, long-lasting military conflicts in transborder regions or inside countries, depopulation of region because of industrial or environmental catastrophes, deep changes of economic and environmental situation of region as the result of discovery of natural resources, building or devastation of infrastructural constructions, demographic processes, economic consequences of political decisions

(taxes, technological standards, environmental regulations, laws referring to transborder cooperation);

- c) middle-term (annual and similar)
  - e.g. consequences of seasonal environmental processes (floods, typhoons, droughts), effects of seasonal fluctuations of industrial and agricultural production processes, impact of demand and supply shocks on prices, wages and salaries, employment and unemployment;
- d) short-term (month, quarter)
  - e.g. shocks on financial markets;
- e) incidents
  - e.g. transport accidents, terrorist actions, local industrial catastrophes.

#### 4.8. **Facet E.** Frequency

- a) unpredictable frequency (random, incidental), e.g.
  - unpredictable natural disasters (earthquakes, tsunami, eruptions of volcanos)
  - unpredictable global or regional economic shocks caused mainly by political and institutional decisions of international organizations
- b) seasonal frequency, e.g.
  - seasonal environmental and economic phenomena (daily, quarterly, annual etc.)

#### 4.9. **Facet F.** Reasons and causes of extreme situation

- a) situations generated by political decisions
  - e.g. wars, embargos, customs, taxes, technological and sanitary standards for products, other regulations introduced by governments or supranational organizations;
- b) situations generated by social processes and phenomena
  - e.g. strikes, social protests, immigration and emigration processes, civilizational and cultural changes;
- c) situations generated by economic processes
  - e.g. industrial crises, changes of natural environment caused by economic decisions of governments or large corporations;
- d) situations generated by financial institutions
  - e.g. financial crises, stock exchange shocks, monetary policy of national central banks, decisions of international financial institutions and central banks managing currencies dominating on international markets (USD, Euro, Yuan, Yen);
- e) situations generated by natural factors

- e.g. natural disasters and catastrophes, extremal weather conditions, etc.;
- f) situations generated by technological progress or regress
  - e.g. new technologies and products that have deep impact on political, economic and social polarization of countries, economies and societies (ICT, shale gas technology).

#### 4.10. Facet G. Fragility of political, social and economic systems

The criterion of fragility and stability refers to:

- international organizations,
    - political (e.g. UN, OECD)
    - economic (e.g. OPEC, IATA, free trade zones),
    - social (e.g. Red Cross and Red Croissant, CARITAS)
    - scientific and professional (e.g. ISI, scientific associations)
  - supranational organizations (e.g. UE),
  - states
    - integrated territory
    - exclaves,
    - enclaves,
    - occupied territories
  - regions,
  - branches of economy.
- a) **Fragile systems** (countries, regions, branches)
- *Fragile system* (country, region, branch of national economy) that may lost its equilibrium in case of relatively small extreme event or process. Fragile systems – as a rule - have not sufficient internal capacities and resources for efficient reaction in case of critical or exceptional events or phenomena. If extreme process or event happens, they need external help to reduce and eliminate the consequences of such process for population, economy and infrastructure. E.g. tourist sector in small economy is fragile, depending on external factors (like activity of tourism companies in developed, rich countries, exchange rates of currencies, advertisement and counter-advertisement of competition); a country with non-professional local or regional governments is more fragile than the country with well-organized, educated and professional administration on all levels; countries with relatively weaker economic and military capacity are in politically unfriendly

environment are more fragile than countries with strong military power and efficient, professional administration.

b) **Stabilized systems** (countries, regions, branches)

- *Stabilized system* is the system (political, social, economic) that is able to react on typical or relatively frequent extreme situations. E.g. reaction on seasonal disasters caused by meteorological or climate anomalies (floods, heavy snowfalls) hurricanes), infrastructural catastrophes (blackout, railway and road blockades, collapses of telecommunication and air traffic control systems, electronic banking), reaction on malfunctioning of elements of health care and communal infrastructures. Stability of the system is achieved by duplication of critical elements and subsystems and by building substitutional capacities. However in very extremal situation the stable system may not be able to react properly, e.g. the behaviour of the USSR administration after the explosion of the Tshernobyl nuclear power station in 1986.

c) **Ultra-stabilized systems** (countries, regions, branches)

- *Ultra-stabilized system* is the system resistant for any possible or probable disasters, events and extreme processes. E.g. global telecommunication system seems to belong to that class of the system. Large, well organized and developed national economies seem to be also ultra-stable. They are resistant or they are ready to react quickly and efficiently on almost all probable extreme situations, e.g. reaction of Japan after that has destroyed the Fukushima nuclear power station in 2011, reaction of US services after the typhoon Katrina that destroyed New Orleans and elimination of effects of the attack on WTC in New York .

The fragility or stability of countries, regions and branches depends on the type and scale of extremity of phenomena and processes. One country may be stable for one type of process, while at the same time may be fragile for another type of phenomena or processes. Analysis and evaluation of scale of fragility and stability of countries, regions, branches should be the entire part of analysis of potential needs of users of statistical information by official statisticians.

The typology of extreme processes, phenomena and events and the multi-criterion classification of each type are necessary for building information systems supporting governments and other stakeholders.



## **5. Transborder diffusion of extremal phenomena and processes in fragile political, social and economic environment**

5.1. Any extremal phenomena, processes or events have multidimensional diffusional impact on many social, economic, environmental and political systems and processes. They are causing changes, destabilization or damages of wide spectrum of social subjects, economic activities, infrastructural objects, environmental resources.

5.2. The knowledge needed by the stakeholders of those phenomena and processes should cover many aspects describing the processes and their impacts on social and economic environment.

For example, the information on hyperinformation as economic shock covers the CPI, PPI and other price indexes computed with the frequency relevant to the dynamics of inflation, data on the changes of conditions of life, savings of households and businesses, poverty indexes, real value of assets, special methods of computing macroeconomic indexes in comparable prices, on public finances etc. The information on local extremal flood and its consequences covers hydrometeorological data on the flood, data localities, residential areas, industry, agriculture on the areas covered by the flood, displacement of population, information on losses caused directly by the flood, information on resources needed for providing the assistance for population, for businesses, and ex post data on losses and damages and costs and resources needed for reconstruction and restauration of the region, rebuilding the infrastructure that should protect the region against disasters in the future etc.

5.3. Some extreme events, phenomena and processes have local or regional impact. There are however local or regional phenomena and processes that deep influence on the society and economy as a whole. For example, for small and middle national economy any military conflict has macroeconomic, and – usually – long lasting deep effect. Only in very large countries local conflicts do not have macroeconomic consequences.

5.4. In case of national economies depending on one branch of economy or one type of services (e.g. production and export of oil and gas, production of few kind of fruits or plants for export, seasonal foreign tourism etc.), relatively small change of prices, demand for goods and services in countries importing those products, may cause economic deep shocks. In globalized economy the probability of such shocks leading to economic and social losses is real and should be envisaged by governments and businesses.

5.5. The duty of official statistics in globalized economy and in fragile political, social and economic situation of countries is to take active part in building

the information capacity supporting governments, economy and population to forecast possible extremal events, phenomena and processes and their consequences for the country, economy and society (on local, regional, macroeconomic or branch level), to monitor those phenomena, and to provide information necessary for governments and other organizations that are responsible for reaction on those phenomena.

- 5.6. National statistical offices have the capacity (methodology, know-how, skilled staff, organization, information technologies) to play leading role in defining potential needs of users that are the stakeholders of extremal processes and phenomena, in organizing the collecting and integrating complex data from different, organizing ad-hoc surveys and capturing of data for monitoring of those processes and to help the governments and other users by providing analytical services, simulations and forecasting of results of those processes for economy and society.
- 5.7. In fragile countries statistical offices should develop the capacity enabling to build ex-ante the information bases and parainformation systems that can be used any time in case of appearance of extremal phenomenon and process. Building such capacity is the duty of government supervising and financing national statistical offices in fragile countries in which the extremal phenomena and processes are long-lasting (e.g. military conflicts, economic or social discrimination from abroad, deep instability of markets, insufficient social and economic safety and security, natural disasters etc.).

## **6. Statistical scenarios of potential extremal situations in transborder regions of fragile countries – tool of social and economic policy**

- 6.1. In each country, especially in fragile countries, national statistical agencies should be obliged to elaborate the typology of possible extreme situations for each region, including transborder regions, enclaves and exclaves, for localities and branches of economy, that are influenced by extreme phenomena, processes or events.
- 6.2. For modelling each type extreme events, phenomena and processes, on the basis of existing knowledge and historical data, statistical scenarios are necessary to help to meet following information needs of stakeholders:
  - Simulation the run of probable extremal event, phenomenon or process.
  - Simulation of potential impact of event, phenomenon or process on society, economy country, state on respective levels (local, regional, national, international).

- Simulation of resources that should be prepared in advance for minimizing the effects of extremal phenomena and for effective reaction of stakeholders.
- Dynamic monitoring of an event, phenomenon or process.
- Forecasting of real consequences of the situation on the basis of actual data.
- Forecasting of resources needed for reacting of governments and other institutions (including international help).
- Ex-post monitoring of social, economic or environmental system.

6.3. Practical approach to statistical modelling of extremal phenomena and processes is the building of statistical scenarios.

The basis of *statistical scenario* is the *behavioural model* of social or economic system influenced by respective extreme event, phenomena or processes. The *frame of reference* of the behavioural model is region, economic sector, social group. For example, in case of military conflict, the frame of reference of is the region of military operations (economy, population, infrastructure) and the branches of economy and groups of population outside the region of military operations, that have to change their behaviour as direct or indirect stakeholders (participants) of war. In case of hyperinflation the frame of reference is the whole national economy. In case of environmental extremities the frame of reference is the region of environmental catastrophe (earthquake, flood, industrial catastrophe) and the regions and resources interrelated with that phenomenon or process.

6.4. *Statistical scenario* of real phenomenon or process is the *catalogue of statistical indicators (time series)* representing and measuring the values of all *attributes* of specified in respective *behavioural model*.

For example, for the extremal process of long – lasting draught in a region of country, the list of indicators composing the statistical scenario shall contain inter alia the following indicators (time series – if possible): a) geographic space of the region of draught, b) population, its demographic structure and spatial distribution, c) migrations of population caused by lack of water, d) agricultural use of land, other agricultural resources, e) resources of water of different quality (available and potentially accessible, sustainable, seasonal and incidental availability), f) transport infrastructure, g) infrastructure for organizing the aid (available, needed), h) capacity of central government available for organizing the aid to the region of draught, etc.

The statistical scenarios can be built for all behavioural models of extremal situations that may happen or that are happening in the country.

- 6.4. Three kinds of *statistical scenarios* will meet the needs specified above for each type of extreme event, phenomenon or process, for each branch, locality, region and – if necessary – for country as a whole:
- (1) *behavioural ex-ante scenarios* of extremities of social, economic, political and environmental events, processes and phenomena;
  - (2) *scenarios for dynamic monitoring* of the extremities of events, phenomena or processes and their consequences for social, economic and ecological environment;
  - (3) *scenarios for ex-post monitoring* of the situation of national economies, regions, transborder economies, population and natural environment.
- 6.4. On the basis of the *statistical scenarios* mentioned above, the *potential information needs* of all stakeholders involved in extremal situations (governments, businesses, social organizations, other services) should be defined. Precise specification of potential information needs are necessary to determine what capacity of official statistics and other managers of information infrastructure of countries are necessary. The producers of information, especially the official statistics, should not ask the stakeholders what data do they need, but they should define *ex-ante* the potential information needs and deliver the data as soon as the extreme situation may appear.
- 6.5. Statistical capacity for delivering pertinent information to stakeholders of extreme situation should cover:
- metadata base: catalogues of relevant indicators, classifications, nomenclatures and typologies,
  - databases containing the data relevant describing the extreme situations and their impact on the state, society, economy and environment,
  - organizational and technological capacity of official statistics for urgent collecting of additional data in case of extreme situations,
  - analytical capacity for complex analyses *ex ante* or *ex post* of social, economic, infrastructural and ecological consequences of disasters and extreme situations,
  - statistical staff trained and experienced in acting and re-acting in extremal situations (capturing data, using traced data, elaborating simulations on the basis of traced data, imputation of data on the basis of incomplete and not updated information etc.,
  - *parainformation* (reference information) systems i.e. the data directories enabling to access the data from non-statistical systems (relevant administrative registers, primary records of companies, big data files, other data files).

## 7. Transborder statistics – informational foundations of governments in fragile transborder economies

- 7.1. Governments, businesses and other stakeholders in fragile countries and in extreme situations are expecting information support from the part of official statistics and other organizations managing information resources and processes. They expect to receive reliable, complex, comparable, verified and *pertinent* information adjusted to their concrete usage situations.
- 7.2. It seems that official statistics may play important role in ensuring relevant quality and *pertinence* of information. National statistical offices are the only governmental organizations that have the prerequisites of ensuring proper impartiality and quality of information. Other ministries and producers of information are oriented for specific objectives. The information produces by those organizations are usually tailored, presenting only selected aspects of described phenomena and processes. The information produced by them is usually incomplete, not comparable and not integrated with information taken from other sources.
- 7.3. Official statistics has (should have) the capacity, methodology, know-how, experience and tools for collecting complete information, quality control, integration and adjustment to well-defined needs of stakeholders. Tailored information produced from narrow-profiled information sources may be misleading for users that are not acquainted with details of methodology of production of such information and do not see the gaps caused by incompleteness of information.
- 7.4. The duty of official statistics in close cooperation with other organizations (governments, businesses, research institutes etc.) is to build the information platform integrating the information, metainformation and parainformation (reference information) that can be used any time in case of emergency – appearance of extreme events, phenomena and processes and push pertinent information to all authorized stakeholders.
- 7.5. The building of information platform focused on extremal situations does not mean the building of special information systems, apart from existing surveys, databases and registers. Optimal approach is to add new functionalities to existing statistical and non-statistical information systems by new metadata, with special reference to the defining of extreme situations as specific statistical objects, implementation of facet classification (described above) of those objects (extremal events, phenomena and processes). The proposed facet classification is important for development of methods of statistical monitoring and for integration and bringing to comparability the data on extremal situations from different sources. Official statistics - as the integrator of data from different sources - can ensure the impartiality of describing extremal phenomena and processes and their impact of other systems and regions.

- 7.6. Stages of building the statistical information platform for monitoring extremal situations
- 1) Specification of types of extreme situations that appear or may appear in a country, region or on supranational level.
  - 2) Identification of extreme events, phenomena and processes (existing and potential) in the country: (a) geographic space of a country, (b) sectors of national economy, (c) social system of a country, (d) transborder and supranational sphere.
  - 3) Building behavioural models of extremal situations (see p. 6.3.).
  - 4) Building the statistical scenarios for each identified extremal situation (see p. 6.4.):
    - (a) behavioural ex-ante scenarios;
    - (b) scenarios for dynamic monitoring;
    - (c) scenarios for ex-post monitoring.
  - 5) Defining concrete usage situations of stakeholders that may need information related with in extreme situations (central and local governments, organizations providing social and economic public and commercial services in case of emergency, relevant businesses obliged to take part in actions connected with extremal situations etc.).
  - 6) Elaborating catalogues of indicators characterizing extremal situations on the basis of scenarios specified above (p. 4, a,b,c).
  - 7) Elaboration of methods and procedures of collecting, storing and processing data relevant to extremal situations.
  - 8) Building *strong frames* for additional sample surveys (if necessary) on extreme situations, using the methodology of *very small samples*.
  - 9) Creating the capacity of realization of specific surveys in case of extreme situations, using strong frames and very small surveys approach.
  - 10) [10] Building the metainformation system for retrieval and integrating of information on extreme situations.
  - 11) [11] Building or extending the functionalities of existing statistical database systems to meet the needs of storing the data on extreme situations, events, phenomena and processes:
    - a) Multi-purpose GIS – extended resources, storing more detailed characteristics of regions, branches and social populations in fragile areas (microdata and micro-aggregates);
    - b) Census databases (micro, mezzo and macro databases) with special reference to censuses of population and housing, agriculture and infrastructure (if any);
    - c) Sectoral databases (micro, mezzo and macro databases);
    - d) Domain – oriented knowledge bases (micro, mezzo and macro).
  - 12) Building *statistical parainformation system* (reference system) for quick retrieval of relevant information from statistical and non-statistical

sources in case of emergency and producing pertinent chunks of knowledge for users

- 13) Building statistical *early warning system*. Defining and implementing procedures of active dissemination of chunks of relevant knowledge on possible extremal situations (events, phenomena, processes). Building the network of interviewers trained in data collecting in extreme situations and strengthening the capacities of statistics to active support of governments, economy and society in case of extraordinary situations
- 14) Strengthening the capacity (staff, organization, ICT) of official statistics to make it ready to react in the situations:
  - Preceding the extreme events, phenomena or processes,
  - Dynamic monitoring the extremal events, phenomena or processes,
  - Dynamic monitoring the consequences of extremal situations,
  - Active, continuous information support of stakeholders involved in actions connected with extremal phenomena and processes,
  - Providing relevant knowledge to stakeholders taking part in the data for reconstruction (e.g. organizing *post-war summary censuses*, data on financial situation of households, businesses and governments after hyperinflation etc.)

7.7. The attention should be paid to the following statistical database systems collecting data for *continuous dynamic monitoring* of:

- Demography (including migrations, refugees);
- Housing and related conditions of life;
- Social services for populations (health, education, safety and security);
- Infrastructures providing energy, transportation, water, environment pollution and protection);
- Infrastructure and investments protecting against disasters and catastrophes;
- Strategic branches of industry specific for particular countries;
- Strategic reserves of economy and state;
- Financial sector and public finances (central bank data);
- Safety and security services;
- GIS oriented complex monitoring for extreme situations.

7.8. Prerequisites of capacity building of official statistics for extreme situations

- Extension of statistical law – strengthening the role of national statistical offices as the coordinators and integrators of information for extreme situations.
- The role of official statistics in extreme situations is the integral element of the strategy of development of statistics (NSDS), embedded in statistical laws and in capacity building practice.
- Statistical support of governments in fragile states and extreme situations is the integral part of information infrastructure of government and country.

## 8. Conclusions

- 8.1. Fragile countries, small national economies, and the countries that are not the world leaders is inventing new methods and techniques for official statistics do not have – as a rule – their own research capacity and resources sufficient for developing their own methods, metadata, technologies and surveys of reacting in case of fragile and extremal situations that may happen or are happening in the country.
- 8.2. International statistical community, realizing the Amendment 10 of the Fundamental Principles of Official Statistics, is expected to consider the possibility of organizing international cooperation of researchers and practitioners to fill in the gaps existing in statistical methods and tools in extreme situations. Elaborating guidelines on the roles of official statistics in extreme situations, on legal, organizational prerequisites of realizing those roles and methodological guidelines on statistical activities could be useful product of such cooperation for many countries, in which extreme, specific situation already exist or may appear any time and place. The formula of joint research centre and network of excellence, successfully adopted in the EU in many domains of science and technology, and implementation of results of research, seems to be applicable in the statistics for fragile countries and extreme situations too.
- 8.3. Programs of post-graduate education of statisticians on the level of MOS (Master in Official Statistics) should include the problems, tools, methods and organization of statistical activities in fragile countries and in extremal situations.
- 8.4. The IAOS as the largest representation of national statistical offices and international organizations in the world seems to be the best forum for discussing new role of official statistics in globalized world, higher uncertainty and fragile, extreme, sensitive political, social and economic environment.

## REFERENCES

Proceedings of the ISIS 78 Seminar on integrated statistical information systems and related matters, Economic Commission for Europe and the Conference of European Statisticians, publ. United Nations Computing Research Center, Bratislava 1978. Published in UN Journal of Official Statistics, Geneva, 1979.