

TOWARDS AN INTEGRATED ANALYTICAL APPROACH

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Abstract

In the face of diversity of socio-economic phenomena, as well as growing public demand for more complex analytical compilations, there is a greater need for response of official statistics services to the necessity of accurate characterisation of changing reality. With the aim to address this challenge, the Central Statistical Office of Poland has taken activities to build professional analytical team with the task to meet users' demand for explanation of socio-economic phenomena, based on statistical information, and to adjust content and presentation forms to diverse users' needs. It is a long-lasting process, oriented to the appropriate selection of human capital, organization of trainings, cooperation development and stimulation of members' motivation to share their knowledge. The effective performance of analytical works requires preparation of human resources with knowledge and skills enabling statistical data analysis, consideration on the causes of observed dependencies and formulation of relevant conclusions. A necessary condition for the efficient functioning of the analytical team also includes providing access to integrated dataset and specialized tools supporting data analysis. The paper presents Polish experience in creation and implementation of the analytical works concept within the system of official statistics. Issues presented in this paper will serve to emphasize the meaning of data analysis as a complex component of statistical production process.

Keywords: data analysis, official statistics, analytical team, statistical production process

Introduction

The latest advances in data capture, processing and storage technologies as well as the dissemination of digital tools, have resulted in recent years in the production of huge data volumes stored in databases, data warehouses and various kinds of data repositories. According to the newest report of the analytical company International Data Corporation, in the subsequent years the growth of information is expected to be much higher – till 2020 total data amount might increase even 67-fold.¹

With the expansion of digital world, progressive development of information society and knowledge-based economy, the question concerns the aim of storing immense volumes of data. A recent research has shown that only a small amount of data gathered is subject to the comprehensive statistical analyses and the results serve for socio-economic practice. That being said, it is necessary to conduct complex analyses of data stored and to use the results to support the decision-making process. However, in order to make this process more effective, it is fundamental to develop skills and qualifications helpful in appropriate data selection and analysis, and then in accurate interpretation of the results.

In the face of rapid progress of the digital data processing and constantly changing information needs of the society, many institutions, including the Central Statistical Office of Poland, take up the challenge to use the processed data effectively and rationally in order to explain complex socio-economic phenomena based on various sources (statistical and non-statistical) and to carry out analyses fulfilling expectations of various information recipients. The aim of this paper is to present the experience of Polish official statistics related to the implementation of organizational improvements in analytical activities.

Analyses as a part of the statistical production process

Data analysis, on the subject scope, means the sequence of mutually linked logical operations leading from gaining raw data to final results, distinguished within statistical production process and providing a basis for substantive conclusions accurately explaining socio-economic reality. The process of data analysis, understood as the series of integrated actions, includes the compilation of analytical results and indicators with the use of specialised methods and tools, the factual interpretation of socio-economic phenomena paying attention to the questions and hypotheses, as well as the preparation of analytical studies and final statistical products poised to be published.

¹ DC Digital Universe, *Big Data, Bigger Digital Shadows, and Biggest Growth in the Far East*, <http://www.emc.com/collateral/analyst-reports/idc-digital-universe-united-states.pdf>.

It is worth emphasising that data analysis as the integral part of research process cannot be conducted separately from the whole statistical production process. The improvement of analytical works in the CSO takes place simultaneously with the implementation of the new approach towards the statistical production process, constituting one of the components of the Polish Integrated Statistical Business Process Model based on the Generic Statistical Business Process Model (GSBPM). Both projects concern the whole organization, i.e. the Central Statistical Office of Poland, as well as regional offices.

Diagnosis of the present state of analytical works

The concept preparation to refine analytical works organization within the official statistics was preceded by the recognition of the current state. The analytical works in the Central Statistical Office are conducted currently within particular units or organizational sections specializing in specific domains. The authors of statistical research conduct their studies with the help of tools available, then create statistical datasets, subsequently analyse and interpret the results to finally provide recipients with tabular-analytic compilations, mainly of thematic character. Such course of the analytical works causes that the analyses are generally thematically oriented. In most cases, they concern one domain and other, strictly connected issues, are included only to a minor extent. Further weakness of the presented organization of analytical works is the limitation of specialised knowledge to the small group of specialists. Those are the experts with the professional methodological knowledge who are engaged in the research process from the beginning to its end. It should be noted, however, that the supervision of the whole research process constitutes a positive aspect of the existing approach to the analytical works. It contributes to the strengthening of the integral cohesion and the current control of the obtained results. The process of data analysis is conducted by people or a group of them, who are also engaged in other tasks apart from analytical works. Consequently, they cannot devote their time and attention solely to the process of preparing complex statistical analyses.

Besides thematically oriented analytical and research activities, official statistics initiates and conducts work aiming at the preparation of cross-sectional information, multi-domain analyses and publications that characterise social and economic situation of the country and also involve international comparisons. The CSO activities are also oriented towards undertaking methodological works and statistical research to serve complex analyses of the processes and macroeconomic phenomena. Such approach to the analytical works will be developed and improved, not neglecting further development of specialised thematic analyses.

The effective realisation of analytical activities requires methodological change tracking, current authentication of various regulations and frequent update of information systems. The complexity of socio-economic phenomena forces society to gather and integrate knowledge derived from different research areas in order to ensure complete diagnosis of a given phenomenon, description of its determinants as well as possible consequences. The process of knowledge integration is strictly connected with the demand for wider scope of complex analyses. Users' expectations regarding accessibility of advanced analytical compilations are constantly changing, which can result from even more intense cause-effect dependencies of observed phenomena and processes.

Summing up the diagnosis of the present state of analytical works conducted within official statistics in Poland, it is worth highlighting, that despite difficulties, analyses are compiled under reliability and objectivity principles, meeting the highest possible standards in terms of quality. With no account of analytical works organization, its place in the official statistics structures and a wide range of future activities to be undertaken by the CSO, these fundamental principles will be of utmost importance at any stage of the implementation process of the new concept.

Recognition of needs, vision of target state and expected results

In the contemporary information society and the knowledge-based economy, the efficiency in extracting useful information from statistical data and creating practical knowledge thereof, forms the basis for effective social, economic and political activities. The ability to conduct complex analyses and to compile data with the use of advanced computer-based methods facilitates the decision-making processes.

In the face of diversity of socio-economic phenomena, growing public demand for more complex analytical compilations, as well as awareness of providing society, government bodies, public administration and entities of national economy with reliable information on economic, demographic and social situation, there is a greater need for response of official statistics services to the necessity of accurate characterisation of changing reality. With the aim to address this challenge, the Central Statistical Office of Poland has taken activities to build professional analytical team with the task to anticipate users' demand for explanation of socio-economic phenomena, based on statistical and non-statistical sources, and to adjust content and presentation forms to diverse users' needs. The creation of professional analytical team is a long-lasting process, oriented at the appropriate selection of human capital, organization of education and trainings, cooperation development and stimulation

of members' motivation to share their knowledge. The effective performance of analytical works requires preparation of human resources with knowledge and skills. Highly motivated staff with professional qualifications should enable statistical data analysis, consideration on the causes of observed dependencies and formulation of relevant conclusions. A necessary condition for the efficient functioning of the analytical team also includes providing access to an integrated dataset and specialized tools supporting data analysis.

Works aiming at implementing the new concept of analytical teams were initiated with the identification of strengths and weaknesses connected with the successful functioning of the new approach. Potential difficulties include the necessity to intensify efforts and engagement of a considerable number of employees, especially those with professional methodological knowledge on statistical research. Entering new team structures will also require acceptance of new roles, intensification of cooperation, particularly between employees from different organizational units with a distinct work culture, which can magnify overall reluctance and fear of changes. Among further difficulties connected with the implementation of the new concept, a gap between requirements towards employees and their remuneration proved a considerable challenge. High-level qualifications should be adequately rewarded, which is difficult to achieve with limited budget.

Despite potential difficulties while implementing the new concept of analytical teams, in the long run considerable improvements and benefits from creating specialized analytical unit are to be expected, for both individual employees and the official statistics as a whole. The realisation of the new analytical approach will enhance professional career prospects and will provide opportunities for perfection of competencies and analytical skills, thereby the analytical potential of official statistics and other public administration entities will be reinforced. Furthermore, popularisation of specialised methodological knowledge will ensure its continuity and sustainability of specialists. It is also expected that the implementation of the new analytical approach will ensure the facilitation of complex statistical compilation process, as well as the enrichment of statistical products by adjusting their content and form to various recipients and improving functionalities and attractiveness.

Identification of analytical potential (key competencies of analytical division members)

The process of building the analytical team, ready to handle growing public demand for more complex analytical compilations, requires foremost the appropriate selection of human resources. One of the initial stages of the aforementioned process has included identification

and integration of official statistics employees to analytical resource, i.e. a group of people with competencies and experience desired for conducting analytical works.

The intention to create analytical resource within official statistics was an ideal opportunity to identify analytical potential of the institution as well as to recognize employees' knowledge, skills, experience and interests towards analyses. According to the original assumptions, employees forming the analytical resource will support analytical works conducted in particular departments or regional offices, and will also become involved in the performance of task assigned to newly created domain analytical teams. For the needs of creating analytical resource within official statistics a competency profile template was developed. It is a report sheet with information on employees, essential to recognize analytical potential and to specify possible professional career paths. With this tool, it was possible to select employees to form analytical resource and to determine among others, their seniority in official statistics, professional experience (skills required for preparing analyses), knowledge of or experience in certain fields or/and multi-domain issues. The analytical resource is being formed of employees who conduct analyses, prepare analytical papers and statistical compilations in the performance of their duties, as well as employees with strong will to further development of analytical abilities, but assigned other tasks.

On the basis of information gained with the use of competency profile templates, people from the analytical resource will be successively selected to support current analytical works conducted in particular departments of the CSO and in regional offices. Subsequently, members of the analytical resource will be appointed to carry out works assigned to domain analytical teams.

It needs to be emphasized that the process of employees' selection to provide support in current analytical works, as well as to the domain analytical teams is not a single undertaking, but a long-term action. The appropriate selection of human resources within official statistics is the key to the successful building of the professional analytical teams, and thereby to the knowledge popularisation, development and improvement of internal and external communication.

Creation of specialised team on analytical works within official statistics

Constantly changing needs, expectations and information behaviour of the society have generated the necessity to create within official statistics a professional team dedicated to analytical works. And to meet the recipients' demand for more complex analytic compilations, it requires creating the team who can competently combine theoretical

economic knowledge and socio-economic practice with the use of advanced tools supporting data analysis.

The process of building analytical unit within official statistics will progress by appointing domain analytical teams, focused on certain thematic areas (e.g. labour market, education, industry or foreign trade) or complex multi-aspect issues (national accounts, sustainable development or green economy). The target scope of thematic areas, as well as the number of domain analytical teams will be flexibly specified and adjusted to the current needs. The domain analytical teams will be created successively among the employees of the CSO and regional offices, based on the information acquired from the competency profile templates.

The main aim of creating domain analytical teams is to integrate a group of people, oriented towards the expansion of specialized knowledge, including also detailed methodological information on the conducted statistical research. Particular domain analytical teams will be formed by analysts, specializing in certain issues and being able to face more and more demanding analytical challenges. Such way to enhance the analytical potential of official statistics, under the assumption of mutual sharing of knowledge and experience, will minimize the consequences of losing valuable knowledge resources in the case of “key” expert leaving the institution.

According to the initial assumptions of the domain analytical teams’ organisation within official statistics, their primary responsibilities will include:

- conducting analyses with the use of advanced methods and tools,
- enhancement and pursuit of perfection in compiling information and statistical publications,
- declaration of training needs and application for analytical tools,
- sharing knowledge and experience related firstly to analytical activities.

The creation and appropriate preparation of the domain analytical teams for the realisation of analytical works is the first stage of building professional analytical unit within official statistics, which will constitute the part of currently created concept of Integrated Statistical Business Process Model. In the aforementioned model, there are planned three various groups within data analysis unit, i.e. econometric analysis group, analysis and statistical inference group and information presentation group. Progressive acquisition and wide spreading of knowledge and skills will allow analytical teams’ members for the indication of the target group to work in. Further development of analytical teams should be oriented towards

professional competency enhancement, mutual cooperation and exchange of experience between particular teams, and finally towards undertaking interdisciplinary tasks. It will enable gradual transition from separate analytical teams to the specialised structures of the analytical unit.

The concept of analytical teams' education system

The effective addressing of analytical challenges posed towards official statistics requires adequate preparation and development of human resources. It needs to be emphasized that analytical works will not be conducted professionally without education activities, oriented at competencies development and enhancement of skills essential for data analysis.

For the project realisation needs, a concept of analytical teams' education system is being developed to be incorporated into the complex statistical education system, after the consultation and final acceptance of the CSO management. The role of the analytical teams' education system is to permanently strengthen the analytical potential of official statistics by popularisation of statistical and economic knowledge as well as analytical skills among members of the analytical resource in order to enrich and diversify information services offered by official statistics.

The implementation of the analytical teams' education system includes development of diversified training offer, both in a traditional form and e-learning, dedicated to members of the analytical resource. It is assumed to use the possibilities offered by traditional media, as well as the so-called 'new media', to systemize socio-economic knowledge, to intensify cooperation with research centres and to encourage employees to life-long learning, creating innovation as well as bringing own contribution to the development of the analytical team.

To meet educational needs and expectations of the analytical team, specialized training programmes will be launched, oriented towards the development of the following "hard" skills: knowledge on economic theory, econometrics, statistics, mathematics, statistical research methodology and ability to use advanced analytical tools (among others, SAS, SPSS, Statistica) and programmes for visual presentation of information. Moreover, the training offer will also support the development of "soft" skills, such as analytical and systems thinking, complex perception of socio-economic processes, information interpretation, reasoning, combining information derived from various sources, problem solving, creative thinking and written communication.

Education and development of human resources towards the enhancement of analytical skills contribute to the building of information society and knowledge-based economy by the

system of official statistics. The transfer of knowledge and skills between members of the analytical resource is the key element of creation and further development of specialised analytical unit. Daily practice constitutes the basis for the presented concept of the analytical teams' education system. It is expected that regular work supported by trainings will bring the best results.

For the successful preparation of official statistics services to conduct advanced analytical works, apart from their participation in trainings, conferences and workshops, "Share your knowledge and experience" programme is under preparation to be realised by the team of internal trainers, as well as mentoring. The primary goal of the internal trainers programme is to transfer teaching competencies to the analytical resource, which enables to continue training projects for analytical resource members with the help of own staff, comprising of talented, experienced and engaged employees possessing professional teaching skills. Moreover, the programme aims to be the form of appreciation and enrichment of work. Both the programme of internal trainers and mentoring are modern solutions functioning within the organization development and constitute successful alternatives to external trainings. The aim of mentoring is to share knowledge and experience by the analytical team members who are willing to take care of employees with shorter seniority and less experience, but possessing desirable competencies and eager to develop skills essential for conducting analytical works.

Conclusions

The growing globalisation, the emergence of new phenomena and processes, as well as the need for conscious decision-making concerning society or economic entities contribute to the rising importance of information. To meet users' expectations, such information should be adequately analysed and submitted in, or near, real time. Readiness to ensure statistical support of the official statistics services, in accordance to the expectations, requires flexibility and appropriate adjustment of the statistical production process organization, including data analysis.

The experience of the Central Statistical Office related to the enhancement of analytical potential within official statistics aimed at showing that the successful modernisation of the analytical activities organization depends, among others, upon the following conditions:

- creating appropriate organizational infrastructure,
- shaping proper attitude and behaviour of the official statistics services, as well as improving essential skills and qualifications,

- widening access to interdisciplinary information resources and complex statistical metadata system,
- creating opportunities for the use of advanced analytical tools, their current updates and adjustment to the changing needs,
- intensification of cooperation with the research and scientific environment aiming at knowledge and experience exchange, as well as drawing on national and international performance related to analytical activities.

Taking into account constantly changing users' information needs, as well as rapid development of advanced technologies, Polish official statistics faces a challenge to meet expectations towards the realisation of complex analytical works.