# R E V I E W
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Concerning: dissertation for the award of an educational and scientific degree **PhD** on professional field 3.8 – Economics, scientific specialty Statistics and Demography

Author of dissertation: **Tsvetozaria Dimitrova Gateva**
Dissertation topic: "**Improvement of the organizational structure of NSI – problems and prospects**"

***Basis*** for presenting the review: member of the scientific jury assigned for the dissertation defense by Order № 1320/17.12.2024 of the Rector of D. A. Tsenov Academy of Economics - Svishtov

## I. Overview of the dissertation:

The dissertation submitted for review is dedicated to a current and significant topic, namely the state and problems of the organizational structure of the highest authority of official statistics in Bulgaria - the National Statistical Institute, and prospects for its updating and improvement in accordance with the changes occurring in recent years regarding the process of collecting, producing and disseminating publicly useful statistical information.

The dissertation is presented in a sufficient volume of 234 standard pages. The content is structured in an introduction, 3 chapters, conclusion, list of references, 20 appendices and a declaration of originality. The presentation is illustrated with a sufficient number of appropriate tables and figures – 42 tables and 26 figures are included in the main text. The list of references contains a sufficient number of literary sources – 135 in total, 24 of which are in English. The appendices include tables, figures in the form of organograms and copies of official documents.

## II. Assessment of the form and content of the dissertation.

The relevance and social significance of the scientific problem developed in the dissertation is determined, on the one hand, by the constantly growing need of society for increasingly rich in volume and content and increasingly accessible socio-economic and demographic information, and on the other hand - by the rapid development in recent years of information and communication technologies and their increasingly widespread use in all aspects of public life, including in the production and dissemination of statistical information. The organizational structure of the institution, which has a leading role in providing social, economic and demographic statistical information necessary for society, is of essential importance, as it guarantees the successful implementation of its activities.

The purpose of this study is justified by the need of regular monitor, analysis and update of NSI organizational structure in accordance with the changes occurring in the process of collecting, producing and disseminating statistical information. It is clearly defined, namely to conduct analysis and assessment of the NSI organizational structure changes, including staffing of activities, establishing patterns and revealing structural changes in the staffing structure. The PhD candidate formulates 5 main tasks to fulfill the set research goal, and all were completed within the framework of the development. The research thesis is based on and in accordance with the set goal of the study, with a main emphasis on the challenges facing the NSI in terms of implementing ICT achievements, improving the quality of statistical information and user satisfaction, reducing the workload of respondents and suplyng the

activities of the NSI with highly educated, competent and responsible specialists with the necessary professional experience and knowledge.

The object and subject of dissertation are correctly defined. The coverage and limitations of the study are presented in a reasoned manner, which correspond to the period of rapid penetration of new information and communication technologies into all activities of society and are related both to the expansion of the information base and to changes in the methodology of collection, production and dissemination of statistical information. Deductive and inductive approach and various methods are applied within the framework of the study, leading to the implementation of the set research tasks, including methods of analysis and synthesis, statistical methods for time series analysis and for analysis of structural changes.

The first chapter of the dissertation presents a critical review of the literature on the research problem, including the essence, elements and principles of the organizational structure of management in institutions. The types of organizational structures are examined, clearly highlighting the specifics of each type, its strengths and weaknesses, advantages and disadvantages, as well as the organizations in which it is appropriate to apply each of them. The process of organizational structure creation is followed in details and the circumstances that require its changes and updates are identified. The thorough literature examination on the research problem provides PhD student possibility to identify the most important requirements to the organizational structure as well as the most important characteristics by which its adequacy and the management effectiveness might be estimated.

The historical development of Bulgarian state statistics is traced from its establishment in 1880 to the present. PhD student distinguishes 4 periods in the development of the organizational structure based on important changes in it, that closely correspond to the specifics of the political and economic conjuncture in the country. The main characteristics of each identified period are presented in the context of organization, management and subordination of the statistical institution. As a result of study a number of NSI archival materials, official documents and publications, the significant changes in the names, subordination and organizational structure of state statistics have been systematized in chronological order. The chronology is presented in tabular form, which allows easy tracking of the changes that have occurred over time.

The role and place of the NSI in the National Statistical System are presented in detail, clearly highlighting its leading position as the supreme authority of official statistics. Attention is also paid to the main regulatory documents regulating the activities of the statistical institute. In addition, the place of the NSI in the European Statistical System, whose executive body is Eurostat, is also examined.

The second chapter of the dissertation is dedicated to the organizational structure of the NSI in the period 2004-2023 and the approaches and activities aimed at its updating, optimization and improvement. At the beginning, the main outcomes of the implementation of 4 projects during this period are analyzed, which justify different approaches for change and improving the current organizational structure of the NSI. Based on the current organizational regulations and other official documents in the period under review, the PhD student presents a detailed model of the NSI organizational structure, clarifying the combination of the hierarchical model of administrative management with the functional structure of organization activity. The significant changes in organizational structure of the institution and important achievements during the period under review by year are identified and tracked chronologically. It is established, that the changes of NSI organizational structure are accompanied by number of employee optimization, expressed in its gradual and significant reduction. As a result of analysis, the PhD student deduces 4 main characteristics of the organizational structure, namely efficiency, reliability, effectiveness and adaptability.

Creation, development and current structure of the territorial units of NSI (TSBs) is examined and it is presented in summary tables for the periods before 2015 (when significant reorganization is done) and from 2015 to 2023. Functions and tasks in the process of

collecting and producing statistical information of the newly formed TSBs since 2015 up to now are summarized. Based on the analysis conducted by the PhD student about the significant changes occurred in the TSBs structure in 2015, it is established that their new structure is sustainable, corresponds to modern conditions and to the vision and main goal for development of the National Statistical System and contributes to the production of higher quality information with smaller financial and labor resources.

In the research conducted by Tsvetozaria Gateva, it is clarified that the regulatory provisions concerning the educational degree and professional experience for holding individual positions are strictly complied within the NSI system, and all changes in the service or employment relationship of employees are carried out in accordance with legal requirements. The conclusion is formulated that the high requirements for the NSI's activities impose the implementation of a systematic policy for increasing administrative capacity, introducing ICT achievements, implementing information security measures and financially ensuring the activities.

In the last chapter of the dissertation, the PhD student presents an analysis of the staffing of NSI. At the beginning, an overview of statistical methods for analyzing dynamics and structural changes is presented. I think that the presentation is quite detailed regarding some of the statistical methods and indicators, such as elementary indicators of dynamics, as well as methods for identifying the presence of a trend in time series. At the same time, it would be good to include methods related to proving the qualities of the developed trend models, such as presenting the stochastic accuracy of the parameter estimates in the model, checking their statistical significance as well as models goodness-of-fit. I would like to mention interpretation of the growth rate given in percent, that shows not how many percent the phenomenon changes itself as it claimed in the work (the relative /percentage/ growth rate shows this) but how many times its volume changes compared to the basic one. Due to possible confusion between both characteristics, it is not recommendable to present growth rate in percentages. In addition, averages of all the elementary measures of time series movements are calculated only using the individual characteristics at moving base. Regarding the characteristic "absolute value per 1 % growth" pointed by the PhD student, probably she means absolute change of the volume per 1% growth.

The empirical analysis conducted is initially focused on the dynamics of the staffing levels in the NSI according to the staffing schedule, in total, in the Central Office and in the Territorial Statistical Bureaus (TSBs) for the period 2003-2023, as the PhD student links the changes in the staffing levels with the changes in the organizational structure of the institution.

The main part of empirical analysis is focused on the dynamics of the actual employed in the NSI, analyzing it in several aspects: all employed in total; in groups by level of education - secondary education, higher education (in total and by groups of professional bachelors, bachelors and masters) and doctors; and by age groups. The analysis is conducted using the elementary measures of time series movement for the period 2009-2023 and a set of trend models are applied to analyze trends. The trend models for employed in the NSI, in total and for education and age groups specified, are presented and the best model for each time series analyzed is chosen based on the coefficient of determination. Along with the main criteria for selecting the best trend model, the PhD student also points out the empirical characteristic of Fisher's test, which she has called "Fisher's criterion." The role of this characteristic, however, is quite different. The empirical characteristic of Fisher's test is a part of the hypothesis testing procedure for checking model goodness-of-fit and it serve for providing statistical evidence for this not for criterion in comparing models. It would be better, if the application of Fisher's test for goodness-of-fit had been included in the analysis. In addition, it is appropriate standard errors of the model parameters, their interval estimates, as well as the results of the tests for their statistical significance to be included in the trend model analysis (if not in the main body, at least in an appendix) At the end of this part of

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analysis, the dynamics of " observations on the NSP by NSI" is presented using absolute growths, growth rates and percentage growth rates during the period under review as well as the employees burden in the Central Office and in the TSBs by year, expressed as number of employees per observation.

Another focus of the research presented in the dissertation is analysis of the structure changes of NSI staffing in terms of their education level and age group. Structure changes are examined using the integral coefficient of structural differences calculated on a 2009 basis and on a chain-linked basis. For period 2015-2023 analysis is detailed for those employed in the Central office and those employed in TSBs.

In the final part of the dissertation, the author presents in a summarized form the outcomes research on the organizational structure of the NSI from its establishment to the present, with a main focus on the period 2003-2023. The main specifics and key changes in the organizational, functional and personnel structure of the institution identified within the conducting analysis are deduced. This allows Tsvetozaria Gateva, based on the research conducted, to formulate opportunities for improving the organizational structure of the NSI in the context of increasing digitalization of the processes related to its activities, including expanding the use of online systems in collecting statistical data, expanding the scope and access to data from administrative sources and other databases for the purposes of statistical research, extracting information from big databases, etc. As a key prerequisite for realizing these opportunities, the author recommends continuous development and enhancement of the NSI's human resources capacity by upgrading knowledge, skills and competencies related to the new conditions for collecting, producing and disseminating statistical information.

Tables, graphs and schemes presented in the dissertation sufficiently clear and fully illustrate exposition. There is repetition of data in some of the tables, which is most likely caused by the author's aim for greater comprehensiveness, but I would recommend to avoid it.

In linguistic and stylistic terms, the work is well presented. The individual parts of the work are well balanced.

Statistical methodology and toolkit are generally presented and applied correctly. As I have already noted, in my opinion the presentation of some of the routine statistical methods could be less detailed. At the same time, the statistical methodology used in time series analysis would be better to be more complete by including assessment of the stochastic accuracy of parameter estimates, hypothesis testing for model goodness-of-fit and for statistical significance of the models' parameters In order not to make the main body of dissertation to large, the analysis outcomes might be exposed in appendices.

The dissertation does not contain any evidence of violation of scientific ethics - incorrect citation of literary sources, publication of the same manuscript in different places, plagiarism, the "copy-paste" problem.

The abstract contains the necessary elements and information that correspond to the content of the dissertation.

The PhD student is submitted a Declaration of Originality of the dissertation work.

## III. Scientific and applied scientific contributions of the dissertation.

I can summarize the more important scientific and applied scientific results contained in Tsvetozariya Gateva's dissertation as follows:

- Based on in-depth study, the determining importance of the organizational structure of institutions, including the NSI, for their effective functioning has been justified

- A periodization of the development of national statistics, concerning NSI as its supreme authority, from its establishment to the present is proposed. The distinction of 4 stages of development is based on a thorough chronological review of the development of Bulgarian state statistics. Characteristic for each of the distinct periods is presented in the context of subordination, organizational and functional structure of the institution.

- Trends of the NSI's human resources development in the period 2003-2023 are analyzed, in total and in two main breakdowns - level of education and age, and existing regularities related to changes in the organizational structure of the institution are identified.
- Regularities in dynamics of the NSI's human resources structure are established concerning staff education level and age

Two articles are published in the Annual Almanac "Scientific Research of Doctoral Students" of SA-Svishtov and 3 reports are presented at conferences, two of which are international, on the dissertation topic.

## IV. Critical notes, questions and recommendations on the dissertation

The dissertation as a whole does not contain error theses, statements and assessments that would degrade its quality. I would like to make the following notes and recommendations:
- I would like to mention that the NSI is the supreme, but not the only, authority of official statistics in the country that produces statistical information, as it is stated on page 40 of the dissertation. Actually, this becomes clear in the presentation in section 1.3 of Chapter 1.
- Fig.1 on page 30 is not readable.
- There is no numbering of the formulas, which makes it difficult to reference them
- Formula presented on p.123 (up) is average absolute growth.
- There is no model (function or equation) of parabola; parabola is graphic view and it could present different mathematical functions - polinoms, exponential, growth or other functions. As it viewed from presentation, the author uses this term for the quadratic function but it is not correct.
- OLS method is not method for modeling – it is a method for estimation of model parameters
- There is the same data in some of tables – for example data in table 20 and table 36 is absolutely the same.

I would like to ask PhD student following questions:
1. Since the application of trend models methodology requires data to be structured in periodic time series, it would be good to specify in the study what is the type of the analyzed time series of the employed. It concerns the fact that the employed are observed with momentary populations and respectively momentary time series are generated. Can the dissertationist specify what type of time series of the employed in the NSI are analyzed in the dissertation.
2. Can the PhD student briefly clarify the essence of the "approximation methods" and "integration method" for estimating the parameters of trend equations pointed in the dissertation?
3. What does the author mean by "number of observations on the NSP" - is this the number of studies or something else?

## V. Summary conclusion and opinion

The approach and statistical methodology used by PhD student in the study are a good basis for achieving quality of the dissertation and useful results in scientific and applied terms. Tsvetozaria Gateva's dissertation contains sufficient scientific and applied scientific results. The content of the dissertation undoubtedly proves that the she possesses the abilities for independent scientific research.

The qualities of the dissertation give me good reason to believe that it meets the requirements of the Law of the Academic Staff Development in the Republic of Bulgaria and the Regulations for its implementation at the "D.A.Tsenov" Academic College - Svishtov. Therefore, I propose to the scientific jury to award Tsvetozariya Dimitrova Gateva the scientific degree PhD on professional field 3.8 - Economics, scientific specialty "Statistics and Demography."

Date: 21.02.2025

Reviewer: ………………

(prof. S. Chipeva, PhD)