STATEMENT

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Concerning: dissertation for the award of an educational and scientific degree **PhD** in professional field 3.8 – Economics, scientific specialty Statistics and Demography

Author of dissertation: **Plamena Yordanova Koleva**
Dissertation topic: "**Statistical Survey of Tourism in Bulgaria**"

Basis for presenting the review: member of the scientific jury assigned for the dissertation defense by Order № 126/11.02.2025 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 status, dynamics and structure changes of the incoming tourism in Bulgaria. Tourism, including incoming tourism, is of key importance for the development of Bulgaria's economy, especially after the democratic changes, the borders opening and the significant increase in travel opportunities outside and to our country. The imposed temporary travel restrictions related to the COVID-19 pandemic period have had a significant negative effect on tourism worldwide, and this has not spared Bulgaria. After the end of this period, however, the tourism sector revived again and took its key place in the economy, including in our country.

The purpose of this study is clearly defined, namely to examine the status, dynamics and structural changes of incoming tourism in Bulgaria for the period 2008 - 2024. It is justified by the need to study key patterns related to the state, dynamics and structural changes in the tourism sector in the country, in particular in the incoming tourism, by proposing appropriate statistical indicators for measuring incoming tourist flows, as well as statistical and econometric methods and models for analyzing trend, seasonality and structural changes in its development and for developing forecasts. To fulfill the set research goal, the doctoral candidate formulated 5 main tasks, which were fully implemented 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 application of appropriate statistical and econometric methodology to establish objective pattern of development of incoming tourism in the country and to develop short-term forecasts. Deductive and inductive approach and various methods leading to the implementation of the research tasks, including methods of analysis and synthesis, statistical methods for analyzing dynamics and structural changes have been applied within the framework of the study.

The object and subject of the dissertation are correctly defined. The scope and limitations of the study are presented in an argumentative manner. They are related, on the one hand, to the importance of incoming tourism in Bulgaria for the volume of GDP, and, on the other hand, to problems of the statistical study of tourism in the country and the available information provided by the official statistics.

The dissertation is presented in a sufficient volume of 204 standard pages. The content is structured in an introduction, 3 chapters, conclusion, list of references, 22 appendices and a declaration of originality. The presentation is illustrated with a sufficient number of appropriate tables and figures – 13 tables and 32 figures are included in the main text. The list of references contains a sufficient number of literary sources – 154 in total, 64 of which are in foreign languages. The appendices include tables with initial data, outcomes of developed models and forecasts of studied phenomena.

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

European and global experience in the statistical studies of tourism is examined in the first chapter. Key methodological decisions and documents related to the statistical studies of tourism, in particular incoming tourism, worldwide and in Europe, are presented in chronological order. Special attention is paid to the main concepts and definitions related to the statistical study of tourism. A diagram of the forms and categories of tourist visits is presented. Based on the review of empirical research on tourism in the country conducted by the doctoral candidate, it was found that despite the impressive number of such studies, a statistical-econometric approach and methodology have been applied to the analysis in a small part of them.

Second chapter is dedicated to the methodological aspects of the study. The sources of empirical data used in the study are presented, in accordance with the specifics of the information provided. A set of statistical indicators that were used to analyze the dynamics and structural changes in incoming tourism in the country has been formulated. Statistical methods for analyzing trend and seasonal components in time series are presented sequentially and the strengths and weaknesses of their application are highlighted. With regard to the "classical method" for seasonality analysis presented (known in statistical methodology as ratio-to-moving average method), I think that the indicated drawback, expressed in the impossibility of obtaining smoothed values of the first and last few values of the time series, is not of significant importance for sufficiently long time series, but at the same time allows smoothed values to be obtained without establishing the trend type within the analysis procedure. Methodological aspects of the statistical analysis of structures and, more specifically, methods for measuring the intensity of their change are presented. I would like to mention that formulas 2.20 and 2.22 are the same, although they are presented as different measures. At the end of the 2nd chapter, the doctoral student formulates several conclusions concerning the methodology for successfully conducting a statistical study of tourism in the country.

Third chapter of the dissertation presents results of the conducted empirical analysis of tourism in Bulgaria, with a main emphasis on incoming tourism. Comparative analysis of international tourism in the country with that of Greece, Turkey, Romania and Hungary was conducted based on data from official statistics, tracking its development in the period 2000-2020, the changes that occurred as a result of the global economic crisis (2008) and the Covid-19 pandemic (2019-2020) as well as the periods of recovery. Trend models have been developed to analyze the main tendency of 17 of the defined indicators for incoming tourism in the country, including polynomials of the 1st, 2nd and 3rd degree, reciprocal and linear logarithmic models. I would like to mention, that some concepts related to modeling are used incorrectly in the text, such as: (1) OLS method is not a trend modeling method, but model parameters estimation method; (2) parabola and hyperbola are not functions or models, but are graphical representations; (3) autocorrelation is a phenomenon related to the time series, not the model; the commented autocorrelation of the models is actually autocorrelation of the residuals of the model and it is known as "serial correlation". Some of estimated trend models include the dichotomous variable D_{2020}, by which the effect of border closures during the Covid-19 pandemic should be presented. At the same time, however, along with the inclusion of this variable, the type of the models referring to the same time series was also changed. I think that the inclusion of the dummy variable should not be accompanied by a change in the model specification, but only identify the effect of the Covid-19 crisis. Changes in the models in this case make them incomparable and the pure effect of the pandemic cannot be identified. In this sense, the differences in the predictions made by the two scenarios actually are caused by the use of different trend models for the respective phenomenon, but not only from the inclusion of the D_{2020} variable.

The X-13 ARIMA and TRAMO/SEAT methods were applied within the empirical part of the study to analyze seasonality in incoming tourism in Bulgaria for the period 2008-2024.

Forecasts of the studied indicators were made with a horizon of 3 years based on the estimated models and the outcomes obtained by applying the two approaches were compared. The changes occurred in the structure of the incoming tourist flows to Bulgaria in total and by defined groups of countries in terms of the visit purposes have been traced using the integral coefficient of differences. The analysis for the groups of countries covers different length of time periods. At the end of the third chapter, the results of the empirical statistical analysis are summarized in 22 conclusions.

In conclusion part of the dissertation, the doctoral candidate presents in a summarized form the results of her research on incoming tourism to Bulgaria for the period 2008-2024, which are formulated in 8 items. This allows the doctoral candidate, based on the established status and dynamics of the tourism sector, as well as its legislative regulation, to recommend the need for changes in state governance to more active stimulation and promotion of Bulgarian tourism.

The tables and graphs included in the dissertation sufficiently clearly and fully illustrate the presentation. 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. But I would recommend the doctoral candidate strive for a more precise use of terms and concepts of statistical and econometric methodology.

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 doctoral candidate is submitted a Declaration of Originality of the dissertation work.

III. Scientific and applied scientific contributions of the dissertation.

I accept the contributions formulated by the doctoral student Plamena Koleva in the dissertation work. I assess the presented reference as correct and realistically reflecting the achieved results. I can summarize the more important scientific and scientific-applied results contained in the dissertation work in the following way:

- Based on an in-depth study of empirical research in tourism, insufficient application of statistical and econometric approaches and methodology has been established and the need for such approaches has been highlighted for adequate and effective study of the regularities related to tourism in the country.
- The importance of a harmonized methodology for providing reliable and sufficient statistical information in the tourism sector, both on a European and global scale, is highlighted.
- Regularities in the dynamics of incoming tourism to Bulgaria in total, by specific groups of countries and according to the purpose of visit have been established, taking into account the effect of seasonal factors.
- Structural changes of the incoming tourism to the country have been studied.
- Forecasts with a 3-year horizon have been developed for the indicators defined in the study based on the estimated trend models.

My overall assessment is that the research outcomes presented in the dissertation can be characterized as an enrichment of existing knowledge and application of scientific achievements.

Two articles are published in the Annual Almanac "Scientific Research of Doctoral Students" of SA-Svishtov and 2 publications are presented at international conferences 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:

- Parabola and hyperbola are not mathematical functions that are used in the trend equation. They are graphical representations of different functions.
- The F-test is not a criterion for comparing trend equations. It is a statistical test that gives statistical proof whether the model is adequate or not.
- On page 68, in item 5 of the procedure for analyzing a time series with seasonality, it is written that after smoothing the new series obtained from the model consists of (T+E) or (T.E). However, the random component (residuals) is not presented in the smoothed values obtained from the model.

I would like to ask PhD student following questions:

1. Might be claimed based on the empirical analysis, that seasonal factors significantly increase the level of incoming tourism to the country in the summer, while in the winter months it has the greatest decline (statement on p.52)? As far as I know, winter tourism in Bulgaria, including incoming one, has been quite popular in recent years and increase more and more.
2. What does the dissertation candidate mean by the statement that the residuals of the trend model can be used to analyze relationships between the original time series and other time series?
3. Why the type of trend models is changed with inclusion of the variable D_{2020}? Also, the closure of the borders due to the Covid-19 pandemic lasted more than 1 year (2020, 2021). In this sense, how many non-zero values of this variable were used? And can we estimate the effect of the Covid-19 pandemic in the forecast periods if different trend models were applied for the same phenomenon?

V. Summary conclusion and opinion

The approach and statistical methodology used by PhD candidate in the study are a good basis for achieving quality of the dissertation and useful results in scientific and applied terms. Plamena Koleva'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 Plamena Yordanova Koleva the scientific degree PhD on professional field 3.8 - Economics, scientific specialty "Statistics and Demography."

Date: Reviewer: ....
                                                            (prof. S. Chipeva, PhD)