SCIENTIFIC REVIEW

by Prof. D.Sc. Rositsa <u>Rangelova</u> Pavlova, Economic Research Institute at the Bulgarian Academy of Sciences,

of a dissertation work for the gain rights of the educational and scientific degree "doctor" in Professional field 3.8. Economics, PhD program: Analytical research on data /Data Science/ at the Department of "Statistics and Econometrics", Faculty of Economics of Sofia University (SU) "St. Kliment Ohridski" on the basis of the provision of art. 4, para. 5, 6 and 7 of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), decision of the Faculty Council Protocol No. 08/21.05.2024 and Order No. RD 38-283/03.06.2024 of the Rector of SU "St. Kliment Ohridski"

Doctoral student: Mihaela Angelinova Angelova

Dissertation topic: Satisfaction and active living of people aged 50 and over in Europe: evidence-based factors, causes and policies. Empirical research within the SHARE project before and after the outbreak of COVID-19

Research supervisor: Associate Professor Dr. Boryana Tsvetanova Pelova

1. Brief biographical data for the doctoral student

Mihaela Angelinova Angelova received a bachelor's degree in urban planning at the University of Architecture, Construction and Geodesy (UACG) in Sofia (2006-2010). After that, she studied two master's programs: master's in urbanism at UACG where he studied integrated planning, EU policies and programs, macro and microeconomics, strategic management (2010-2012) and master's in economics - big data modeling in business and Finance (Business Analytics), Faculty of Economics, SU "St. Kliment Ohridski" (2018-2020). It performs excellently everywhere.

Various areas of professional realization and growth are indicated in her extensive and detailed resume. I will mention some of them, more related to the topic of the dissertation. Continuing education, including: Summer School of Complex Systems Modeling, 2022 and Summer School of Research Methods, 2020 at SU "St. Kliment Ohridski", Faculty of Economics. In the years of her doctoral studies, Mihaela Angelova gained academic experience in this faculty as: guest lecturer in MP "Artificial Intelligence for Business and Finance", "Probability and Statistics for Advanced" module and part-time teacher in "Fundamentals of Statistics" in English.

Mihaela Angelova's experience in solving real business cases in 2019-2020 (8 in number) are in a variety of areas - bank loans, cluster analysis, pricing, etc. For her active work, mainly as a student, she mentions 7 awards in the period 2010-2023. The professional experience she describes in the period 2011-2023 shows her active learning and realization. Michaela Angelova's preparation for the topic of her doctoral dissertation is mainly contributed by her participation in the project "Research on Health, Aging and Retirement in Europe (SHARE project)", successively in 2021, 2022 and 2023.

These biographical data show the acquired multifaceted professional training of Mihaela Angelova and her gradual orientation towards the topic of the dissertation work.

2. Assessment of compliance with minimum national requirements

It is proper to consider only that activity which is related to the defense of the dissertation work. According to the report attached by Mihaela Angelova on the fulfillment of the minimum national requirements for obtaining the educational and scientific degree "doctor" in the professional direction 3.8. Economics, she has a total of 135 points: development of a dissertation work for the award of the scientific degree "Doctor" - 50 points and the requested three scientific publications in connection with the dissertation work, one of which is an article in a scientific publication, referenced and indexed in world-renowned databases and carries 30 points, the other is a study and carries 45 points and the third is an article in a non-refereed peer-reviewed journal and carries 10 points. I accept that the doctoral student meets the minimum national requirements for admission to the defense of his doctoral dissertation.

The doctorate was conducted in regular form, as a positive assessment is the fact that it was developed and completed within the specified period of three years (date of enrollment - 25.02.2021 and date of exclusion - 28.03.2024).

3. General characteristics of the dissertation work

The dissertation thesis has a total volume of 303 pages - long for such a dissertation format (although in a narrower sense it is about 250 pages) and includes, in addition to the text, 20 tables, 75 figures and 7 appendices. It consists of an introduction, three chapters and a conclusion. The cited literature includes 238 sources of Bulgarian and foreign authors in English only. Appropriate publications in Bulgarian could be indicated. A good idea is includong a list of abbreviations used and a glossary of terms. A small note: you don't need to have a header on every page, and it would reduce the amount of work at least a bit.

The **introduction** presents a very well thought out study by clearly and comprehensively giving the necessary components in it. The **object** is defined as the respondents - people aged 50 and over in Europe, included in the two waves of the SHARE project survey (wave 7, conducted before and wave 8, conducted after the pandemic). However, the object, in my view, is the satisfaction and active life of people in Europe aged 50 and over before and after the outbreak of COVID-19. As **subject** of the study are correctly indicated the changes in the factors of life satisfaction, active life before and after the pandemic, as well as the quality of life and well-being of people aged 50 and over in Europe after the outbreak of the pandemic.

The **main objective** of the dissertation work is correctly defined (I quote): "Investigating the factors of satisfaction and active life of people aged 50 and over in Europe before and after the outbreak of the global pandemic of COVID-19 and creating proposals for social policies , targeting each factor'. An additional goal was also set - "to identify the different aging profiles among people aged 50 and over in Europe during the pandemic and to analyze inequalities in well-being between different groups". To fulfill the set goals, **tasks** have been formulated in three main groups. The *first group* of tasks is related to a critical literature review of existing studies and consists of 4 subtasks. The *second group* of tasks is related to the creation of a standardized approach to identify changes in the factors of satisfaction and active life of people aged 50 and over in Europe and consists of 5 consecutive sub-tasks. The *third group* of tasks consists in the creation of an algorithm for extracting knowledge from data in order to form better management policies oriented towards reducing inequalities and increasing the well-being of the different aging profiles in Europe and consists of 3 sub-tasks. Each of the formulated tasks is argued how to be realised following the methodological framework presented in Chapter 2 and the defined steps detailed in the empirical study presented in Chapter 3.

The **research thesis** of the dissertation is: "A comprehensive understanding of the complex of factors that influence the satisfaction and active life of people aged 50 and over in Europe in

different European countries is a prerequisite for the preparation of knowledge-based socio-economic policies". The development of the thesis is realияed by proving *four formulated hypotheses*. The content of the separate hypotheses, which generally speaking refer to: first hypothesis – the structure of the factors that determine the dynamics and satisfaction of the active life of people aged 50 and over is complex; second hypothesis – there are significant transnational differences on the issues under consideration; third hypothesis – the determinants of satisfaction and active life change after the pandemic. A fourth hypothesis was added, according to which a better understanding of aging profiles and well-being inequalities is a starting point for formulating adequate and concrete social policies. Positive is the clarity with which the verification of which hypothesis is presented in which chapter is indicated (perhaps the first time I have encountered such a practice), as well as the reference to questions discussed earlier, and their reminder is logical and useful.

The strength and essence of the dissertation work is in the **methodology used**, as a result of which an "overall integrated author's methodology for empirical verification of the formulated hypotheses as an algorithm for better management policies" was developed. Various statistical tests and analytic techniques were applied to reduce the dimensionality of the data for Wave 7 (conducted before the pandemic), Wave 8 and Wave 8 – Corona virus (conducted during the pandemic) variables to combine highly correlated characteristics into latent factors. Another important part is the application of explanatory feature selection techniques, including demographic, socioeconomic, health and behavioral aspects and living environment qualities, used to subsequently analyze the determinants of active living and life satisfaction before and during the pandemic. as well as creating an up-to-date picture and subsequent analysis of the well-being inequalities of different aging profiles. For the purpose of the study, the answers of respondents from 24 European countries included in the three waves of data of the SHARE project were used, and a comparative analysis of the most significant determinants of active life and life satisfaction is carried out.

The **structure** of the dissertation consistently develops the logic of the research. The **first chapter**, as a rule, introduces into the research, in this case giving definitions of life satisfaction and its measurement, factors on this satisfaction and whether it changes over time. The main focus of this chapter is a literature review of research papers with three focuses: on life satisfaction of people aged 50 and over in Europe, on the active life of people in this age group and on inequalities in their well-being. Relevant articles are cited (with the caveat that some of them refer to younger groups than the one covered in the dissertation, which is not the same, but perhaps for comparison). For a more comprehensive literature review, attention is drawn to a published article by Mihaela Angelova, repeating this (unnecessarily) three times. I do not consider the first three tables (numbered 1, 2 and 3), indicating distributions of the reviewed scientific articles from the last 10 years, to be indicative and necessary - it is too formal an indicator. I also do not find it appropriate for the doctoral student himself to qualify his research as unique - let readers and reviewers say so. It is positive that the results of the review are summarized, which is also its purpose. In this case (I quote) "the literature reveals diverse approaches to segmenting the elderly and exploring different aging profiles."

The **second chapter** presents the research methodology, which is the main component of the study. For the purposes of the empirical study, the database from the SHARE project was used. This chapter first introduces it as (I quote) "a unique multidisciplinary, cross-national project involving panel microdata on the health, socioeconomic status, and social and family networks of persons aged ≥50 years". Positive in the work is the indication of methodological limitations in the research based on the SHARE project, two main ones being indicated: (a) the nature of the

indicators used as factors for satisfaction and well-being through self-perception, that is, subjective; (b) the analysis is not done by country, so it cannot show how inequalities are changing along these lines, and the results are inevitably somewhat blurred by averaging. Mihaela Angelova proposes as one solution to the first problem the application of a mixed-methods design, also using data from respondents' relatives. Regarding the second question, there is a described analysis of formed clusters (figs. 64, 65 and 66), which show the manifestation of the individual states very clearly. What would a PhD student say about whether or not country analysis is done?

Methodological frameworks are then described to investigate: life satisfaction factors before and after the global outbreak of the COVID-19 pandemic and inequalities in well-being between different aging profiles in Europe after the global outbreak of the COVID-19 pandemic. For the description of the methodological frameworks, sequential implementation steps are introduced, such as the framework for the study of life satisfaction factors before and after the global outbreak of the COVID-19 pandemic includes: data processing and analysis, factor analysis, selection of target and predictor characterization in a baseline model on wave 7 data, testing the baseline model on wave 8 data, testing a post-covid classification model with additional factors and, as a result, identifying changes and formulating social policy proposals regarding every single factor. The factor and cluster analysis, the influence of the individual factors included in them, as well as the selection of the predictive characteristics and the modeling methods, were considered in a comparative plan.

Chapter three contains a description and analysis of the results of the empirical research carried out sequentially for each of the three areas: life satisfaction factors, active living and inequalities in the well-being of people aged 50 and over in Europe after the outbreak of COVID-19, following the steps of the methodological framework presented in the second chapter. Finally, a systematic summary and discussion of the research results is made.

The references that the doctoral student makes to his scientific publications are useful for summarizing and discussing the main results of the research conducted in the three thematic areas. The dissertation is precisely designed. The style is clear, making it easy to grasp the complex econometric matter as well as the results in empirical applications.

4**. Evaluation of the scientific and practical results and contributions of the presented dissertation work**

1. I highly appreciate the choice of such an up-to-date, promising and complex topic as the one chosen for the dissertation work, as well as the very serious methodical and applied work in it. His goal has been achieved.

2. The topic is developed in detail and with knowledge, as Mihaela Angelova convincingly demonstrates. The dissertation demonstrates a new approach and a new culture of research on the active aging of the population, in which the econometric (technical) direction prevails. His correct, in my opinion, illustration on a certain contingent of elderly people leads to important conclusions that are logical and useful. However, in general, these are logical and known conclusions from other demographic studies and implemented policies. The big plus here is in their scientific validity.

3. As a result of the research, the doctoral student reaches important conclusions, which she reflects in the text or in the conclusion. The results can be used both in other research and projects, and in the formulation of appropriate policies and services aimed at different profiles of the elderly, especially in times of crisis.

I accept the contributions determined by the doctoral student in substance, which I can divide into two groups - methodical and scientific-applied. The contributions lead to new results in the researched areas and to clear practical applications of the proposed methodology.

Among the *methodological contributions* are the following: a standardized approach (author's methodology) was created to identify changes in factors for satisfaction and active life of people aged 50 and over in Europe; a complex structure of factors that influence the life satisfaction and active life of people in this age structure in a normal situation and the changes in their behavior during the pandemic have been identified.

The *scientific-applied contributions* are related to the application of the created author's methodology for the researched questions. This methodology can be used in order to create better management policies regarding the studied demographic group. The study adds to the literature on welfare inequalities during the global pandemic. She concludes that the global pandemic is creating new inequalities, particularly among older people, whose consequences need further study.

I agree with the doctoral student's statement that the research in the dissertation work can serve as educational material for students and doctoral students in Bulgaria and around the world in connection with the preparation of diploma theses of bachelors, masters and doctoral students, as well as in lectures and seminars, and and for everyone interested in the issues under consideration.

Mihaela Angelova reports participation in 4 **scientific conferences** during the period 2021-2023, three of which are international. The topics of the conferences are promising from the point of view of the applied econometric apparatus (generally speaking). However, it is not indicated whether the doctoral student participates in them with a report and, if so, the topics of the report.

Evaluation of publications related to the dissertation thesis

Mihaela Angelova declares *3 scientific publications* in connection with her dissertation work. They are in English and published in various editions. Affect the most basic areas of research in the dissertation work based on the data from the three waves of the SHARE project. These publications fulfill their purpose - to disseminate and popularize the doctoral student's ideas embedded in his research. In *one of the articles*, the factors affecting active life are identified of people aged 50 and over in Europe and indicate risk factors for inactivity both before and during the COVID-19 pandemic (published in Revista Inclusiones, 2021). There has been a significant change in the behavior of older people in Europe due to this pandemic, indicating a need to support the generation in critical situations. *Another article* published in Economic Studies (2024) uses logistic regression models to analyze changes in the determinants of life satisfaction of older people in Europe before and after the outbreak of COVID-19. The results indicate guidelines for social policies that would improve the life satisfaction of older people in ordinary scenarios and in hard times. In *the third article*, which is to be published in a collection of reports, are identify the different aging profiles among people aged 50 and over in Europe during the global pandemic and outline the inequalities in well-being between different groups. For this purpose, a sample of 30,625 older people included in wave 8 data of the SHARE project - Survey of Health, Aging and Retirement in Europe was used. Using cluster analysis to form homogeneous groups of elderly people in Europe, three profiles are outlined.

Mihaela Angelova indicates *8 citations to her publications* in scientific articles.

The abstract of the Dissertation thesis is 54 pages long. It was developed according to the requirements for a dissertation work. It is well structured and reflects the main content, conclusions, scientific contributions, list of the author's publications and references. However, it does not need a list of the literature sources used, even in abbreviated form. Also, there is definitely no need for some text to be bolded and underlined at the same time.

5. Critical Notes and Questions

1. It is claimed that the doctor student have developed "a comprehensive integrated author methodology for empirical verification of formulated hypotheses as an algorithm for better management policies'. What is meant by comprehensive and integrated? And one more thing - how did the idea for the essence of such a methodology appear - from the idea in partial studies of other authors, tracing the logic of the researched processes or something else? This is not explained.

2. The age structure 50 + is too wide and heterogeneous. Those are at least two generations of people with different physical and mental health, work opportunities, quality of life and satisfaction (trust me!). Not to mention the observed demographic processes of a higher average birth age for mothers, the increasing average life expectancy and the related increase in the retirement age in Europe. In my opinion, it is more logical and indicative (and at the same time facilitating the study) to start with 60 or even 65+ (that is, the age of retirement). The difference between the age group of 50-60 years and the rest is too big. At the same time, strangely, this first age structure has a much smaller number of respondents. My question is: why is such a wide age group preferred? A narrower age group is more homogeneous and would yield much more relevant results and guidance for social policy.

3. The word longitudinal (longitudinal) research should find appropriate version in Bulgarian. It is possible that the author follows the terminology used in the SHARE project, but in publications in Bulgarian it sounds strange. Even some native English speakers have linguistic reservations about the word longitudinal, economists and sociologists use epithets such as long-term, historical, etc. Moreover, the epithet itself implies a long-term series of data, but here several years before and after the pandemic preriod are applied. The same goes for other epithets used: predictive traits, low extraversion, risk predictors, etc.

Recommendations

I would recommend Michaela Angelova to continue her research in this area. She has a lot invested in it and knows the characteristics and limitations of the complex econometric apparatus it uses. With this knowledge, she could enrich the process of researching the severe demographic changes of depopulation and aging of the population in Europe and especially in Bulgaria.

CONCLUSION

According to the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (Article 5, Paragraph 3), I believe that the presented dissertation work on the topic "Satisfaction and active life of people in Europe aged 50 and over: factors, reasons and policies, data-driven'. Empirical research within the SHARE project before and after the outbreak of COVID-19 is successfully fulfilled. The presented materials and the quality of the dissertation fully meet the specific requirements of the Regulations for the admission and training of doctoral students at SU "St. Kliment Ohridski".

Bearing in mind the above, I give a positive assessment of the research carried out in the dissertation work and confidently propose to the respected scientific jury to award the educational and scientific degree "Doctor" to Mihaela Angelinova Angelova by Professional direction 3.8. Economics, Doctoral program: Analytical research on data /Data Science/ at the Department of "Statistics and Econometrics", Faculty of Economics of SU "St. Kliment Ohridski".

25 July 2024   Reviewer:

                                                         (Prof. Rossitsa Rangelova Pavlova, D.Sc.)