

## REVIEW

on the Thesis for the acquisition of the educational and scientific degree PhD  
under the Scientific Field: 4. Natural Sciences, Mathematics and Informatics,  
in the Professional Area: 4.6 Computer Science and Computer Science,  
the Scientific Specialty: 01.01.12 Informatics,  
on the topic: **“Intelligent methods for analyzing banking processes”**

Author: **Slaviiana Stoilova Danailova-Veleva**

Reviewer: **Academician Vassil Stoyanov Sgurev**

I was appointed as a member of the scientific jury for the defense of the educational and scientific PhD degree of the aforementioned PhD thesis by order No. №245 from 14.09.2022 of the Director of the Institute of Information and Communication Technologies (IICT) at the Bulgarian Academy of Sciences (BAS), Prof. Galia Angelova, based on the Law for the Development of the academic staff (LDAS) in the Republic of Bulgaria. At its meeting on September 16, 2022, the scientific jury elected me as a reviewer of the PhD thesis.

As a member of the scientific jury, the PhD thesis, the author's abstract, the PhD student's publications and the accompanying administrative documentation were submitted to me in paper and electronic form.

The review of the above mentioned documents shows that they fully comply with the requirements of the LDAS in the Republic of Bulgaria, the Rules for its implementation, the Rules for the conditions and the order of acquiring academic degrees and occupying academic positions in IICT at BAS.

In order to form the final evaluation of the PhD thesis, the requirements of the Development of Academic Staff Act in the Republic of Bulgaria are implemented the specific requirements in the Act's Institutional Regulation shall be taken into consideration, where the respective norms are:

1. Pursuant to Art. 6 (3) of the Development of Academic Staff Act in the Republic of Bulgaria, PhD thesis should contain scientific or scientific-applied results, which represent an original contribution in science. The PhD thesis must indicate that the candidate has in-depth theoretical knowledge of the relevant specialty and ability for independent research.

2. According to Art. 27 (2) of the specific requirements in the Act's Institutional Regulation, PhD thesis should be presented in a form and volume corresponding to the specific requirements of the primary unit. The PhD thesis should contain: a cover page; content; introduction; exhibition; conclusion - a summary of the results obtained with a declaration of originality; bibliography.

The PhD thesis is written in English and has a volume of 115 pages. It is structured in: an introduction, three chapters, conclusion, guidelines for future research, publications on the dissertation, a statement of originality of results, and a bibliography of 137 sources.

The meaningful content of the thesis is structured thematically and generally in the following way:

- a) Overview of intelligent methods for analyzing complex processes;
- b) Analysis of banking processes;
- c) Experimental results.

In item a) a review of the intelligent methods is made, in item b) an overview of the current state-of-the-art for the problems of the PhD thesis is presented, and in item c) some experimental results are given. The dissertation contains a list of 137

sources used. Of these, 117 are in English, 11 in Bulgarian and 9 are Internet resources.

The list of publications in the PhD thesis includes five publications. Of these, one is book chapters, in the series Lecture Notes in Networks and Systems на Springer International Publishing and four are papers in a scientific forum referenced in Scopus - 10-th International Conference on Intelligent Systems - IS'20, International Symposium on Bioinformatics and Biomedicine - BioInfoMed'20, International Conference Automatics and Informatics - ICAI'21, 11-th International Conference on Intelligent Systems - IS'22 и International Workshop on Intuitionistic Fuzzy Sets and Generalized Nets - IWIFSGN'22.

All publications are co-authored, and in four of them, the PhD pretender is at first place.

All requirements of the Art. 3 of the Rules on the Specific Conditions for Acquisition of Academic Degrees and Occupation of Academic Positions at IICT-BAS, in relation to the minimum number of points for indicators of professional field 4.6. Informatics and computer science, for acquisition the PhD degree are observed. For the group of indicators A, the PhD student has the required number of 50 points, and for the group of indicators D the required number of points is 30, and the PhD student has 56 points.

The aim of the PhD thesis is to study intelligent methods for analyzing banking processes. Six scientific tasks have been formulated to achieve this aim. I believe that the set aim, the formulated tasks and the achieved results reflect the relevance and significance of the presented PhD thesis.

The PhD abstract has a volume of 41 pages. It faithfully reflects the essence and content of the PhD thesis, including the purpose, subject, object and tasks of the dissertation research and the ways of their realization.

Generally speaking, the main scientific, scientific-application and application results, presented in the dissertation can be formulated as follows:

1. A critical analysis of the possibility of applying the multicriteria decision-making method - InterCriteria Analysis, in the analysis of processes in banking was conducted.

2. Intelligent techniques have been applied to analyze the mechanism of work of financial institutions in the EU, according to which the banking system functions.

3. An analysis of the activities of the participants in the financial system of the EU member states was carried out.

4. An analysis of the financial indicators of eight selected EU members for 2020 was carried out.

5. A comparative analysis of the financial indicators of the banks in the selected EU members counties was carried out.

6. An original knowledge-based architecture with application in the field of intelligent plant breeding has been developed.

The following notes and recommendations can be made on the dissertation:

1. Estimates of the asymptotic behavior of the computational complexity of the proposed methods and tasks using Landau parameters are not been given and probably such have not been made. However this is too important to evaluate the performance of the algorithms themselves, and to compare them with each other, as well as to compare them with previously known methods.

2. At certain places it is not clear what exactly the PhD student has done and what are the known results so far. It is not clear what part of the proposed methods and algorithms are verified by numerical modeling.

3. In many of the author's claims – to each chapter, and in the overall conclusion, the emphasis is on the research methods and means used, not the final substantive results obtained.

During the preliminary discussions I had the opportunity to make other notes and recommendations, many of which have been taken into account by the PhD student in the final completion of the dissertation.

## CONCLUSION

Taking into account the mentioned contributions in the PhD thesis being reviewed, as well as the fact that all the requirements of the relevant normative documents for the educational and scientific degree PhD have been observed, I dare to confidently recommend to the Scientific Jury to vote **Slaviiana Stoilova Danailova-Veleva** to be conferred on with PhD degree under the Scientific Field: 4. Natural Sciences, Mathematics and Informatics, in the Professional Area: 4.6 Computer Science and Computer Science and the Scientific Specialty: 01.01.12 Informatics.

October 23, 2022  
Sofia

Reviewe

НА ОСНОВАНИЕ

331A