

REVIEW

**on the dissertation of Slaviyana Stoilova Danailova-Veleva
for obtaining a PhD degree in professional field 4.6 “Informatics and
Computer Science”, doctoral program 01.01.12 “Informatics”
Topic of dissertation: Intelligent methods for analysis of the processes in
Banking science**

1. Slaviyana Danailova-Veleva was born on 2 November 1969 in Radomir. In 1995 she completed a master degree program at the D. A. Tsenov Academy of Economics in Svishtov with specialty “Finance and Credit”, Banking science. From 1995 till 1997 she worked in TB OBB AD. In the period 1997-2015 she worked at Bulgarian National Bank.

In the documents presented by the candidate there was no CV. That is why I asked for a CV and the above information was found there. Additionally, there was no information in the documents as to when the doctoral candidate started the PhD program. I searched for this information on the web. It was there that I found some unpleasant, but by now, not proven facts about the candidate. Therefore, I have no reason to decline writing this review.

2. The dissertation work of Slaviyana Danailova-Veleva has a volume of 115 pages and consists of Introduction, three chapters, Conclusion and Directions for future research, a list of 5 publications on the topic of the dissertation work and a bibliography with 137 sources.

The dissertation work is devoted to the application of a new mathematical method – InterCriteria Analysis – aimed at the analysis of processes and search for proximity of criteria in some components of Banking science.

Without discussing the content of the dissertation in details, I will outline the most significant contributions and mistakes in it according to me.

The first chapter is an overview. It is devoted to the intelligent methods for analysis of complex systems. Among them, the intuitionistic fuzzy sets and the InterCriteria analysis are briefly described. As one of the authors of these theories, I would like to point out that up to this moment there is only one successfully defended PhD dissertation connected to the Banking science and based on the apparatus of the intuitionistic fuzzy sets by Prof. Dinko Dimitrov (now living in Germany) and there is only one successful dissertation in

the same area but based on the apparatus of the InterCriteria analysis - by Georgi Shahpazov.

Some of the most significant inaccuracies in this chapter are as follows: the indices of the rows and columns of the indexed matrix on page 31, formula (15), must be n and not q in number because $q = 1, 2, \dots, n$ is a variable and not a fixed quantity such as n ; Table 1 on page 34 contains the values of the degrees of similarity (as it was used in the period 2014-2016), but does not contain the values of the degrees of dissimilarity – something which has been used in the papers on InterCriteria Analysis during the last 5-6 years. Many of the references in this chapter are not exact. For example, references [18]-[20] have nothing in common with Generalized nets. In reality, they concern index matrices of various types. InterCriteria analysis is introduced in:

Atanassov K., D. Mavrov, V. Atanassova. InterCriteria Decision Making: A New Approach for Multicriteria Decision Making, Based on Index Matrices and Intuitionistic Fuzzy Sets. Issues in Intuitionistic Fuzzy Sets and Generalized Nets, Vol. 11, 1–8, 2014, and not in [24], but this paper is not cited, etc.

The second chapter is devoted to the analysis of processes in Banking science. I am not an expert in this area and therefore I will not comment and evaluate the results in it. It was interesting for me to go through it. I accept that the claim in point 1 of the Conclusion (page 95) is true, namely: “A critical analysis is made of the possibilities for application of the multicriteria decision making method InterCriteria analysis in the analysis of the processes in Banking science.”

In Chapter 3, the results of four InterCriteria analyses of processes discussed in Chapter 2 are described. Despite the inaccuracy of the index matrix description, used in the InterCriteria analysis pointed in Chapter 1, the index matrices used in each separate InterCriteria analysis in Chapter 3 are described correctly and in full detail. I will mention that in recent years this analysis gives the possibility to work not only with data in two-dimensional, but also with three- and even n -dimensional index matrices. For example, given data about various European countries in various years, additional results can be obtained. I recommend that such analysis be carried out and similarities be sought not only between countries but also between estimations of the countries in different years by various criteria.

At the end of Chapter 3, paragraph 3.5 “Intelligent techniques for analysis of knowledge and their application” is included as a patch. In my opinion, this text could be significantly extended to represent the content of a separate chapter.

The bibliography is poorly formatted. There are inaccuracies in some references. For example, in [7] city and publisher are missing. Some of the references are not related to the topic of the dissertation.

After the preliminary dissertation defence, I pointed out to the PhD candidate a number of inaccuracies which to a greater extent (but still far from all) have been corrected.

3. The author's summary of the dissertation (presented in both Bulgarian and English) reflects the content of the dissertation and meets the requirements of the Act for Development of the Academic Staff in the Republic of Bulgaria and the Regulations for the Conditions and the Order for Acquiring of Scientific Degrees and Holding Academic Positions at the Institute of Information and Communication Technologies of the Bulgarian Academy of Sciences.

4. From the submitted reference it is evident that Slaviyana Danailova-Veleva is author of 5 publications related to the dissertation work one of which is in a specialized series of Springer with SJR factor; 4 of the publications are reports at IEEE conferences: IEEE "Intelligent Systems" held in Bulgaria (1, from 2020) and Poland (2, from 2022) and IEEE-ICAI held in Bulgaria (1, from 2021). These publications are in editions related to the subject of the dissertation and meet the minimal requirements of the of the Act for Development of the Academic Staff in the Republic of Bulgaria and the Regulations for the Conditions and the Order for Acquiring of Scientific Degrees and Holding Academic Positions at the Institute of Information and Communication Technologies of the Bulgarian Academy of Sciences.

I have no information about citations of papers of Slaviyana Dnailova-Veleva but as I already mentioned above the 5 publications include new application of the InterCriteria analysis and probably they will be cited in future.

Having in mind all the above said, I give a positive evaluation of the dissertation and the additional materials to it and I recommend to the honorable members of the Scientific Jury to vote for awarding **Slaviyana Stoilova Danailova-Veleva** the education and scientific degree "**Doctor**" in professional field 4.6 "**Informatics and Computer Science**", doctoral program 01.01.12 "**Informatics**".

2 December 2022

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