REVIEW

For procedure for academic position "**associated professor**"

domain of High education: 5. "**Technical Sciences**",

professional field of study: **5.2 „Electrical engineering, electronics and automatics "**

scientific specialty: **„Application of the principles and methods of cybernetics in different fields of science"**

for the needs of the department **"Information Processes and Decision-Making Systems"**,

The competition is published in "State newspaper" N81/11 November for the needs of Institute of Information and Communication Technologies-Bulgarian Academy of Sciences (IICT_BAS)

with candidate: **chief assistant Ph.D. Iliyan Ivanov Petrov** from the Institute of Information and Communication Technologies-Bulgarian Academy of Sciences

Member of the jury: prof. D.Sc.,Ph.D. Eng. **Todor Atanasov Stoilov** , Institute of Information and Communication Technologies – Bulgarian Academy of Sciences, Sofia, Acad.G.Bontchev str., BL.2

I. Common biographical data of the candidate

Main data about the education and for his scientific degree and academic position of the candidate are summarized in Table1

Table 1.

Name	born	High education	Scientific degree Ph.D.	Chief assistant
Iliyan Ivanov Petrov	19.01. 1959 Sofia	1993-1998 – masters specialty "Law", University of National and World Economy – Sofia	2011 – 2015 State University of Oil and Gas, Moscow, Russia	Since 01.05.2019 chief assistant in IICT_BAS

Iliyan Petrov completed his higher education in 1985 at the Moscow State Institute of International Relations, Moscow as a Master, with the specialty in "International Economic Relations". For the period 1991-1992 he has a specialization

in "Finance and Banking" at the University of Lorraine, Nancy, France. In 1998, he graduated with a second master's degree with specialty "Law" at the University of National and World Economy – Sofia. For the period 2011-2015 he is a PhD student at the State University of Oil and Gas, Moscow, Russia. He defended the scientific degree "PhD" (candidate of economic sciences) in the specialty "International Economy" in 2015. The topic of his dissertation thesis is "Evolution of world and European energy market structures and prospects for the development of gas transport networks in South-Eastern Europe with the participation of Bulgaria and Russia".

Since 2019 he is on position of chief assistant in the Institute of Information and Communication Technologies-Bulgarian Academy of Sciences.

II. Common presentation of the candidate's materials for the competition

The presented research papers for the competition for the academic position "associated professor" are prepared according to the legislative requirements in Bulgaria: The Law for academic promotion, The Rules for the application of this law and the specific requirement of IICT-BAS. The internal rules for this position in the IICT-BAS particularly are more restrictive. That's why the referee makes assessments about the candidate achievements towards the internal requirements of IICT-BAS.

The candidate submits separate lists of scientific publications for the implementation of the group of indicators B, G, D and E.

For the indicator group B the candidate submits 11 publications, which meets the requirements of this indicator. The list of publication for indicator group G contains 9 publications. Hence the total number of publications for this procedure is estimated to 20.

In the document "REFERENCE for the fulfillment of the minimum requirements", the applicant has calculated the points for the fulfillment of the indicators B and D, which proves the fulfillment of the minimum requirements.

The candidate has also declared participation in scientific and scientific-applied contracts according to indicators E, which are mandatory for the competition, according to the requirements of IICT-BAS. These additional data show the qualification and skills of the candidate, which is a positive certificate for him and increases his personal assessment in point terms.

Indicators group A: a diploma for awarding the educational and scientific degree "doctor" on the topic "Evolution of world and European energy market structures and prospects for the development of gas transport networks in South-Eastern Europe with the participation of Bulgaria and Russia".
The candidate satisfies the requirement of this indicator.

Indicators group B: the requirement is to collect 100 points through a habilitation thesis, monograph or scientific publications (not less than 10) in publications referenced and indexed in world-known databases. The candidate satisfies the requirement of this indicator by submitting 11 scientific publications. One of them is in a journal with quantile Q2. The remaining 10 publications were

presented at international conferences and printed in the relevant proceedings. Proceedings of these conferences are published as articles in journals that have SCOPUS ranks with an ISSN number. Such conferences are: Communications in Computer and Information Science, Journal of Physics: Conference Series, AIP: Conference Series, ACM. All scientific publications have a digital identification DOI. The presented publications are authorized only by the candidate, which also estimated the significant overrate the requirements of indicator B.

The reviewer considers that the applicant significantly exceeds the legal requirements for this indicator.

Indicators group G: it insists achieving 220 points. The candidate presents a list of 9 publications, respectively 6 in the G7 category and 3 for the G8 category. These publications are included in the conference proceedings. The latter have a digital identification number ISBN. The conferences were held in India, Egypt, Iran, Bulgaria and they are under the patronage of IEEE. Submitted publications in the G7 category that carry high point levels have a digital DOI identification number. Publications in the G8 category are at conferences organized in our country: University of National and World Economy – Sofia, Management of Energy Industrial and Environmental Systems, Big Data, Knowledge and Control Systems Engineering.

The presented data for indicator D contains full bibliographic data. The candidate has calculated their results, with the submitted publications exceeding the legally required levels.

The reviewer accepts that the publications submitted for participation in the competition fulfill the requirements of indicator D.

Indicators group D: This indicator requires achieving 60 points. This indicator group concerns citations in scientific publications, monographs, collective preprints, patents, which are referenced and indexed in world recognized data bases with scientific information and citations in non-referenced editions.

The candidate submits a list of 20 citations. They are presented in fulfillment of indicators D12 and D14. In category D12, which has high point levels, 15 citations were declared. They are also identified by virtual links presented. Data for 5 citations are presented in category D14. The calculated point levels exceed the requirements of the regulatory documents.

The reviewer assumes that the submitted data for citation in the contest fulfills the requirements of indicator D.

Indicators group E: participation in projects, attracted resources from projects. This group of indicators has minimum requirements of IICT-BAS of 20 points. The applicant has declared data for indicator E18 for participation in two projects. The projects are funded by the National Research Fund of Bulgaria.

The reviewer considers that with the declared data, the candidate fulfills the minimum requirements of IICT-BAS for the position of "associate professor".

The reviewer's conclusion is that the candidate fulfills and exceeds the required levels with his declared scientific production and scientific-applied activity in all indicators. The reviewer did not calculate the declared levels for the individual groups of indicators, but only checked the fulfillment of the necessary minimum requirements.

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III. Assessment of the pedagogical activities of the candidate

The candidate is working as a chief assistant in an Institute of the Bulgarian Academy of Sciences. The main activity in such an academic institution is research and scientific-applied activity. Pedagogical activity is not mandatory in the academic institute. Therefore, the reviewer considers that the candidate should not declare this type of activity for the current competition.

Nevertheless, of this lack of requirements, the candidate has experience in the field of professional education and finance as a leading lecturer of the "Corporate Finance" and "Credit Analysis" modules within the Master's programs of the International Banking Institute (IBI) of the Bulgarian National Bank (BNB).

IV. Main scientific and applied scientific contributions

The candidate submits lists of a total of 20 scientific publications for this competition. The candidate also presents his abstract and a list of the publications included in the defense of the educational scientific degree "doctor". But the majority of the publications presented in the competition were published after 2019, when the educational-scientific degree "doctor" was awarded. The reviewer accepts that the submitted publications in this competition have not been used by previous procedures. Electronic versions of all publications are presented in the attached competition documents.

The candidate's main scientific and scientific-applied contributions, which are presented in the competition publications, relate to the scientific field of multi-criteria analysis and decision-making. A feature of the candidate's research is that the analysis criteria are formalized in terms of information entropy. The formal relations of this kind of criteria are essentially non-linear. Therefore, modifications and formalizations of this type of criteria are also presented in the candidate's publications. Minimum and maximum entropy levels for given systems are numerically evaluated. These numerical estimates are defined in the publications as indices by which parameters of complex systems are defined as "concentration" and "hierarchy" and they can be numerically evaluated.

The multi-criteria analysis and decision-making approach using this specific way with information entropy as criteria has been applied in energy systems to assess the energy balances at global and national levels. This allows economic assessments to be made for gas production on the shelf of the Black Sea region; to assess the efficiency of potentially built gas transmission infrastructure projects.

The stochastic nature of the spread of the COVID disease is assessed by applying criteria based on a formal representation of information entropy.

The topics of scientific publications can be conditionally classified as:
- Development of formal methods and modification of existing formal relations that represent information entropy as criteria for making multicriterial decisions. These formalizations allow to reduce the subjective weight in the selection of the weights of the criteria by which a system is evaluated.

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- Application of the derived formalizations for the evaluation of the efficiency of energy projects, potential activities in the production and transmission of natural gas, evaluation of the appropriate technological equipment of computer systems.

In his publication activity, the candidate demonstrates an ability to formalize and quantify systems and processes that are not trivially observable, contain a large amount of unknown arguments and a complex interrelation of the parameters of the object or system. An advantage of his researches is that they give a concrete solution or recommendation that is conceivable and comprehensible.

The reviewer considers that a scientific result is contained in the applicant's research in the part of modifying existing criteria, formalizing information entropy as a criterion in multi-criteria analysis and decision-making. As a scientific-applied contribution, he considers the project-implemented evaluations of energy projects, evaluation of the effectiveness of computer system configurations, the forecasts of the development of COVID infections. Thus, through the specific formalizations of information entropy as criteria in decision-making tasks, numerical evaluations of parameters and quality of objects and systems are achieved.

These scientific and applied results are presented in scientific publications, most of which are indexed in SCOPUS.

The reviewer considers that scientific and scientific-applied contributions are contained in the publications submitted by the candidate for this competition.

The reviewer considers that the candidate's publications present appropriate examples of scientific and scientific-applied engineering solutions.

V. Significance of the contributions for the science and practice

The candidate's publications show the desire to implement developed system solutions by applying formal methods from information theory. Accordingly, information entropy class criteria have been developed and modified. They have been applied in the analysis of complex systems, in multi-criteria decision-making with the aim of reducing the subjective influence in making the various assessments; the suitability of computer architectures was quantitatively evaluated; the potential and development of projects related to energy resources and their transportation; the potential spread of disease contagion for a specific case of disease was estimated.

These scientific and scientific-practical decisions are also indirect evidence of the usefulness and significance of the candidate's scientific and scientific-applied contributions.

VI. Critical remarks and recommendations

The reviewer has no substantive critical comments. He notes here his notes and judgments, which do not affect the competition but may be taken into account by the candidate in the future.

In the substantive part of the candidate's research, analysis of systems and problems is mainly done. The reviewer recommends that a comparison of achieved solutions with existing or similar solutions should also be applied. Thus, the positive results of the research are shown and proven easily and clearly. Thus, the element of analysis will also be logically bound to synthesis, which is an objective goal in scientific research. This will also help the candidate's publication activity to be evaluated by a wider circle of researchers and not limited to a potential collegiate audience.

This reviewer's opinion does not relate to the content and significance of the candidate's results. They reflect the specific personal opinion of the reviewer.

The submitted documents for the competition are well organized. They are easily processed and do not create difficulties in assessing the obtained scientific and scientific-applied results of the candidate.

Conclusion

The candidate in this competition chief assistant **Ph.D. Iliyan Ivanov Petrov** is presented with enough set of research works. In the candidate's works there are original research and practical contributions.

I find that the legislative requirements of The Law for academic promotion and The Rules for the application of this law and the internal rules IICT-BAS are satisfied. All upper said and after my acquaintance with the presented documents and their contributions with research and practical results give me ground to suggest **chief assistant Ph.D. Iliyan Ivanov Petrov** to take the academic position "**associated professor**" in IICT-BAS , department "**Information Processes and Decision-Making Systems**", for the professional field of study: **5.2 „Electrical engineering, electronics and automatics "**, scientific specialty: „**Application of the principles and methods of cybernetics in different fields of science** ".

На основание

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