REVIEW

on a competition for an academic position "Associate Professor"

announced by the University of Economics – Varna

1. General information

Prepared the review: Prof. Dr. Rosen Nikolaev, Lecturer in the Department of Statistics and Applied Mathematics at the University of Economics – Varna (UE–Varna), Professor of Professional Direction 3.8. Economics.

Reason for preparation of a review on the competition: the review was written on the basis of an order of the Rector of UE-Varna No 06-89/05.07.2023 for the composition of the Scientific Jury in a competition for the academic position "Associate Professor" and a decision of the Scientific Jury of 27.07.2023.

2. Competition data

The competition for the academic position "Associate Professor" in field of higher education 3. Social, economic and legal sciences, professional field 3.8. Economics, scientific specialty "Modeling of production and management processes" has been announced for the needs of the Department of Statistics and Applied Mathematics, Faculty of Informatics at UE-Varna and is announced in the State Gazette No. 46/26.05.2023.

3. Contest Candidate

The only candidate in the contest is Chief Assist. Prof. Deyan Georgiev Mihailov, PhD, lecturer in the Department of Statistics and Applied Mathematics at the UE-Varna since 2007.

4. Personal characteristics of the candidate

Chief Assist. Prof. Deyan Mihailov, PhD, graduated in 1984 from the National Military Artillery School "G. Dimitrov" - Shumen (acquired degree of engineer in computing equipment), in 1999 Military Academy "G. S. Rakovski" (acquired Master's degree in "Management Officer of Operational and Tactical

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Formations"), in 2018 Shumen University "Ep. Konstantin Preslavski" (acquired Master's degree in Economic Mathematics).

During the period 1984-2012 he served in various positions as an officer in military formations subordinate to the Ministry of Defense. In the academic year 2012-2013 he was a part-time assistant at UE-Varna. Since September 2013 he has been an assistant and since September 2014 he has been Chief Assistant at UE-Varna.

The candidate has defended a dissertation for acquiring educational and scientific degree "Doctor" on "Research of methods and means of distance learning in a distributed network environment" and holds a diploma No 10/16.12.2011, issued by the Military Academy "G. S. Rakovski" – Institute for Advanced Defense Studies. Chief Assist. Prof. Deyan Mihailov, PhD is registered with Doctor's degree in the register of the National Center for Information and Documentation (NACID) with scientific indicators of 50 points for defended dissertation and 45 points for publications (if necessary 30).

He speaks Russian and English.

5. Quantitative and meaningful characterisation of the scientific papers submitted since the last procedure

Chief Assist. Prof. Deyan Mihailov, PhD participated in the competition with 1 monographic work (independent) in a volume of 140 pages, 9 articles published in scientific journals and yearbooks (independent) with a total volume of 88 pages, fourteen scientific reports (13 independent and 1 in co-authorship) with a total volume of 102 pages, and 7 textbooks (all in co-authorship) with a total volume of 1972 pages. The monographic work was published in the Monographic Library "Prof. Tsani Kalyandzhiev (No. 74). Four of the articles have been published in publications indexed in world-renowned sciencemetric databases (SCOPUS and Web of Science). All other articles and reports are in publications included in the National Reference List of NACID. Four of the articles and one of the papers are in English. About a third of the volume of textbooks (692 pages) are written by the applicant.

With regard to quantitative scientific indicators, the applicant exceeds the minimum national requirements within the meaning of the Regulations for the

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Implementation of the Academic Staff Development Act and the requirements of the Regulations for the Development of the Academic Staff in UE-Varna.

The content of the presented scientific works mainly covers developments in the field of modeling processes and activities. This direction is present in the independent monograph of Chief Assist. Prof. Deyan Mihailov, PhD, in 7 of the articles and in 8 of the reports. In 2 articles and 6 reports are addressed issues in the field of teaching material.

The monographic work is devoted to the simulation modeling of the duration of production and management processes. It is in a total volume of 140 pages and consists of an introduction, three chapters, a conclusion and a literature used.

The main thesis of the author is that in order to study processes whose time to take place is a random quantity, it is necessary to construct the probability distribution function of this random quantity. The purpose of the study is clearly formulated, namely to study the influence of the structure of the process and the duration of individual activities on its total duration, with classical methods supplemented by an analysis of the distribution quantiles of the previously mentioned random quantity. To achieve this goal, the following tasks are set:

1.   Definition of general characteristics of processes.
2.   Research into the possibility of creating technologically simple models taking into account the general characteristics of processes.
3.   Conduct of experiments with process models.

In the first chapter the content of the concept of "process" is revealed. The views of a number of authors are presented, which have been appropriately interpreted in accordance with the objectives of the study. A process is seen as a complex structure of interrelated subprocesses, activities and tasks that can be decomposed with different depths according to the tasks of the analysis. It is shown that for the processes to take place it is necessary to have a system of elements and connections between them. Processes use different resources and produce utility that can be designed to meet the needs of users external or internal to the system. Each process leads to a change in the state of the system. The author considers as a separate type the processes that lead only to a change

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in the state of the system and classifies them as management processes. The other processes are called production.

Following an interesting classification of systems according to their complexity and determining, the author argues that the processes occurring in large systems are more or less probabilistic in nature, therefore probabilistic or simulation modeling methods should be applied when studying them.

As a specific resource necessary for the processes to take place, time is considered. It is shown that it is inherent in all types of processes – both production and management. The author accepts the thesis that time is an indispensable resource and in a dynamically changing environment it is crucial. In this way, the importance of studying the processes precisely in terms of time as a resource, i.e. their duration, is naturally shown.

In the second chapter the main directions for process modelling are presented. The objective need to apply simulation methods is pointed out and at the same time it is shown that they are relatively inaccurate. Some problems of a psychological nature that hinder the practical application of modeling in practice are discussed and some measures to overcome them are outlined. A distinction has been made between the concepts of "model" and "simulation", with the model being considered as a description of the respective process and the simulation as an implementation of the model. Some graphical models of processes are described and methods for their conversion are presented. Serious attention has been paid to the probabilistic approach to the analysis of the timing of processes. Under the assumption that the duration of each activity is a random quantity, it is shown by an example that using only the numerical characteristics (such as the mathematical expectation) to estimate the duration of the process is not enough. Significantly better insight is given by the quantiles of the distribution.

In the third chapter several statistical experiments are presented. A reasonable justification is presented for the use of the Monte Carlo method in comparison to discrete or discrete-event modelling. The possibilities for changing the execution time of the whole process when changing the duration of part of the activities, increasing the number of contractors or in parallel-sequential implementation of activities are studied. It is interesting to model the

sequential execution of a finite number of uniform processes, which can be considered as a mass service network with a fixed number of incoming requests.

The monographic work is an original scientific study. An appropriate mathematical apparatus was used in the creation of the models. Theoretical statements are proven or sources containing the evidence are indicated. Many examples are presented which appropriately support the theory. The results of simulation experiments are interesting from scientific and applied points of view.

In the majority of the papers, deterministic and probabilistic models of economic and technological processes are presented. The developments are in the field of optimization of construction and construction services, information assurance of decision-making, determination of the optimal composition of an organization, a model of the state of the working capacity of a system of uniform technical means, determination of the duration of simple technological activities and complex processes, econometric models. In their creation, appropriate theoretical models are used for each specific case – linear optimization problems, network schedules, Markov chains, data approximation, Monte Carlo method. The developments are interesting from a practical and methodological point of view.

Some of the articles and reports concern issues of teaching and training. The changes in the preparation in mathematics of the first-year students from UE-Varna over the years are traced. A scenario for teaching training material in the field of game theory using simulations is presented. An attempt is made to create a formal model of training. The accuracy of the assessment when applying closed-response tests is evaluated. As a methodological development can be considered the presentation of encryption and decryption methods using Excel.

Chief Assist. Prof. Deyan Mihailov, PhD meets the minimum national requirements by submitting publications for 305 points with 200 points required. He also satisfies the requirements for holding the academic position "Associate Professor" at UE-Varna, as the submitted publications are evaluated at 135 points for papers with 30 points required and 170 points for articles and studies with 80 points required.

The review and evaluation of his publication activity gives grounds for a high assessment of its scientific level, its usefulness for practice and corresponds to the requirements for occupying the academic position " Associate Professor".

6. Quantitative and qualitative assessment of teaching work

Chief Assist. Prof. Deyan Mihailov, PhD has led lectures and exercises in the Bachelor's and Master's Degree. He also taught a Ph.D. course. He has taught a large number of disciplines such as Applied Mathematics, Operations Research, Discrete Mathematics, Optimization Methods, Quantitative Methods, Economic Systems Modeling, Linear Algebra, Analytic Geometry and Mathematical Analysis, Probability Theory and Mathematical Statistics, Cryptography and Data Protection, etc. He has conducted courses in the field of the protection of classified information in UE-Varna.

Chief Assist. Prof. Deyan Mihailov, PhD is a co-author of two books (Mathematics with Application in Economics and Operations Research) and three textbooks (Mathematics with Application in Economics, Operations Research and Applied Mathematics) for students from the UE-Varna and two collections of sample tests for prospective students. In the chapters of textbooks and books developed by him, the training material is presented in detail and accessible. A large number of economic-mathematical models and examples are included.

I highly appreciate the quality of his teaching work.

7. Identification of contributions to research work. Evaluation of candidate citations. Assessment of the quality of developments from a linguistic and stylistic point of view

In the publications of Chief Assist. Prof. Deyan Mihailov, PhD, the following contributions can be highlighted:

1. The duration of processes with a complex structure has been studied. Simulation models have been created enabling the identification of activities that have a significant impact on the execution time of the whole process. A method is proposed to accelerate the occurrence of an event dependent on the completion of a set number of uniform, non-decomposable, parallel ongoing activities by attracting additional resources.

2. The methods of mathematical optimization for scheduling over time of production activities, optimizing the composition of organizational units, reducing costs when performing works from a network schedule are applied.

3. Probabilistic and simulation methods have been developed to assess the duration of work in a network schedule, to model the state of a system of uniform technical means, to assess the numerical characteristics of random quantities and the adequacy of simulation models, to study the effectiveness of target destruction.

4. The dependencies of the amount of construction output on labour input and capital costs (Cobb-Douglas function), of the volume of housing construction from the proximity to the sea were studied, the accuracy of an approximation with a fractional-linear model was studied.

5. A teaching scenario for learning material using a simulation experiment has been developed and its effectiveness evaluated.

There are 29 citations of the presented publications, 18 of which are in editions indexed in world-famous scientific data bases (SCOPUS and Web of Science), one citation is in a monographic work, and the rest are in editions included in the National Reference List. In quantitative terms, citations are estimated at 330 points at 50 required.

The publications are cited by scientists from Bulgaria (9 citations), Indonesia (1 citation), Russian Federation (16 citations), Saudi Arabia (1 citation), USA (2 citations), which shows that they are recognizable not only in Bulgaria but also abroad.

The publications of Chief Assist. Prof. Deyan Mihailov, PhD are well structured. The information is logically presented consistently. The language is understandable and the material is made available.

8. Critical remarks, questions and recommendations

I recommend the candidate to continue his research in the field of process and systems modelling.

It is noteworthy that almost all submitted publications are independent. I recommend to Chief Assist. Prof. Deyan Mihailov, PhD should be involved in collective developments as a priority in the future. I believe that working in a scientific team leads to significantly better scientific results.

9. **Conclusion.** As a summary of what was presented in the review and given that the fulfillment of the National Minimum Requirements for Academic Position "Associate Professor" and the requirements for occupying this position at UE-Varna has been found, I express an entirely positive attitude and suggest to the honorable members of the Scientific Jury to vote FOR the academic position "Associate Professor" by the candidate in the competition Chief Assist. Prof. Deyan Mihailov, PhD.
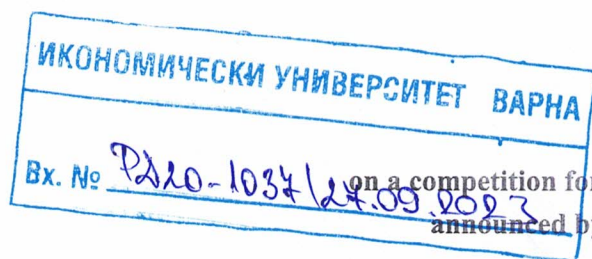
04.09.2023
Varna

Signature:

/Prof. Dr. Rosen Nikolaev/

REVIEW
on a competition for an academic position "Associate Professor"
announced by the University of Economics – Varna

1. General information

Prepared the review: Prof. Todorka Ignatova Kostadinova, PhD, Deputy Rector of The Medical University - Varna, Professor of Professional Directons 3.7. Administration and Management" in Faculty of Public Health, Department: "Economics and Management of Health Care"

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Reason for preparation of a review on the competition: the review was prepared based on the order of the Rector of IU-Varna No. 06-89/05.07.2023. for the composition of the Scientific Jury for the competition for the academic position "Associate Professor" and decision of the Scientific Jury dated 27.07.2023.

2. Competition data

The competition for the academic position "Associate Professor" in Higher Education 3. Social, economic and legal sciences, professional direction 3.8. Economics, scientific specialty "Modelling of production and management processes" has been announced for the needs of the Department of "Statistics and Applied Mathematics", Faculty of Informatics at the University of Economics -Varna and is announced in State Gazette no. 46/26.05.2023

3. Contest candidate

The only candidate in the competition is Chef Assistant Professor Deyan Georgiev Mihailov, PhD, lecturer in the Department of "Statistics and Applied Mathematics" at the University of Economics - Varna. He has been a member of the academic staff of the department since 2013.

4. Personal characteristics of the candidate

Ch. assistant professor, Dr. Deyan Mihailov, graduated from VNVAU "G. Dimitrov" - Shumen in 1984, where he obtained an engineer's degree, majoring in computer technology. In 1999, he acquired a master's degree in the specialty "Operational-Tactical Formation Management Officer" at the BA "G. S. Rakovski", and in 2018 he graduated from "Episkop Konstantin Preslavski" School of Higher Education with a Master's degree in "Economic Mathematics".

The dissertation work for the acquisition of the educational and scientific degree "Doctor" of Dr. Mihailov is on the topic "Research on the methods and means of distance learning in a distributed network environment". He holds diploma No. 10/16.12.2011, issued by the Military Academy "G. S. Rakovski" - Institute for Prospective Defense Research.

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During the period 1984-2012, he served in various positions as an officer within the Ministry of Defense. During the academic year 2012-2013, he was a part-time assistant at the University of Economics-Varna. Since September 2013, he has been an assistant at the same university and a Chef Assistant Professor since September 2014.

The fact check shows that Ch. Assist. Professor Deyan Mihailov, Ph.D., is registered with the Doctor's degree in the register of the National Center for Information and Documentation (NACID) with scientific indicators of 50 points for defended dissertation and 45 points for publications (out of the required 30).

He uses working foreign languages - Russian and English.

5. Quantitative and substantive characteristics of the presented scientific works after the last procedure.

Chef Assist. Professor Dr. Deyan Mihailov presented himself in the competition with 1 monographic work in a volume of 140 pages, 9 articles published in scientific journals and yearbooks with a total volume of 88 pages, fourteen scientific reports (13 independent and 1 co-authored) with a total volume of 102 pages and 7 textbooks and teaching aids (all co-authored) with a total volume of 1972 pages. The monographic work was published in the monographic library "Prof. Tsani Kalyandzhiev (ref. no. 74). Four of the articles were published in publications indexed in world-renowned scientometric databases (SCOPUS and Web of Science). All other articles and reports are in publications included in the National Reference List of NACID. Four articles and one report in English are presented. About a third of the volume of textbooks and teaching aids (692 pages) were written by Dr. Mihailov.

With regard to quantitative scientometric indicators, the candidate fulfills and exceeds the minimum national requirements in the sense of the Regulations for the Implementation of the Law on the Development of the Academic Staff and the requirements of the Regulations for the Development of the Academic Staff at the University of Economics-Varna.

The content of the presented scientific works covers mainly developments in the field of process and activity modeling. This direction is present in the independent monograph of Ch. assistant professor Dr. Deyan Mihailov, in 7 of the articles and in 8 of the reports. It is noteworthy that when developing the articles for publication, the author touches on issues from the field of teaching the educational material.

The monograph with which Dr. Mihailov presents himself in the competition for associate professor is in the field of simulation modeling of the duration of production and management processes. It has a total volume of 140 pages and consists of an introduction, three chapters, a conclusion and references.

The main thesis of the author is that in order to study processes whose running time is a random variable, it is necessary to construct the probability distribution function of this random variable. The purpose of the research is to investigate the influence of the structure of the process and the duration of the individual activities on its total duration, and classical methods are supplemented with an analysis of the quantiles of the distribution of the aforementioned random variable. To achieve this goal, Dr. Mihailov performs three main tasks:

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1. Determination of general characteristics of the processes.

2. Investigating the possibility of creating technologically simple models, taking into account the general characteristics of the processes.

3. Conducting experiments with process models.

In the first chapter, attention is paid to the unification of concepts, the content of the concept of "process" is revealed, and . the perspectives of different researchers. The process is considered as a complex structure of interrelated sub-processes, activities and tasks, which can be decomposed with different depth according to the tasks of the analysis. The importance of the systems approach is emphasized by commenting on the elements of the internal and external environment, including the forces of change leading to a change in the state of the system.

Chef Assist. Professor Mihailov asserts that the processes taking place in large systems have a more or less probabilistic nature, therefore the methods of probabilistic or simulation modeling should be applied in their study. He also pays attention to time, which he considers as a specific resource necessary for both production and management processes. The author accepts the thesis that time is an irreplaceable resource and in the conditions of a dynamically changing environment has a key importance.

In the second chapter of the monograph, the main directions for process modeling are discussed. A valuable point in this chapter is the examination of problems of a psychological nature that make it difficult to apply modeling in practice. Specific measures have been identified to overcome them. A distinction is made between the concepts of "model" and "simulation", whereby the model is considered as a description of the relevant process, and the simulation - as an implementation of the model. And in this part, special attention is paid to the probabilistic approach to the analysis of the time of the processes.

Several statistical experiments are included in the third chapter. The possibilities of changing the execution time of the entire process by changing the duration of part of the activities, by increasing the number of contractors or by parallel-sequential execution of activities were investigated. The author provides a rationale for using the Monte Carlo method compared to discrete or discrete-event modeling.

The monographic work is an original author's research. An appropriate mathematical apparatus was used in the creation of the models.

6. Quantitative and qualitative evaluation of the educational and teaching work

The reference for the teaching activity of Ch. assistant professor Dr. Deyan Mihailov shows the conduct of lectures and exercises in the "Bachelor's" and "Master's" OCs, including a doctoral level course. He teaches disciplines such as "Applied Mathematics", "Operations Research", "Discrete Mathematics", "Optimization Methods", "Modelling of Economic Systems", "Linear Algebra", "Analytic Geometry and Mathematical Analysis", "Probability Theory and Mathematical statistics', 'Cryptography and data protection'. He is the co-author of two textbooks: Applied Mathematics in Economics and Operations Research. He

participated in three manuals for the students of the University of Economics - Varna and two collections of sample tests for candidate students.

This gives me the reason to give a high assessment of the quality of the teaching activities of Ch. Assistant Professor Deyan Mihailov, Ph.D.

7. Identification of contributions to research work. Evaluation of candidate citations. Assessment of the quality of developments from a linguistic and stylistic point of view

In the publications of Chief Assist. Prof. Deyan Mihailov, PhD, the following contributions can be highlighted:

1. A method is proposed for accelerating the occurrence of an event dependent on the completion of a set number of parallel activities of the same type by attracting additional resources. Simulation models have been created.

2. Mathematical optimization methods are applied for time planning of production activities, optimization of the composition of organizational units, reduction of costs when performing works from a network schedule.

3. Probabilistic and simulation methods have been developed to estimate the duration of works in a network schedule, to model the state of a system of the same type of technical means, to evaluate the numerical characteristics of random variables and the adequacy of simulation models, to study the effectiveness of striking purpose.

4. The dependences of the amount of construction output on the labor input and capital costs (Cobb-Douglas function), on the volume of housing construction on the proximity to the sea, were investigated, and the accuracy of approximation with a fractional-linear model was investigated.

5. A scenario for teaching learning material using a simulation experiment was developed and its effectiveness was evaluated.

With regard to the visibility of the publishing activity of Chef Assist. Professor Mihailov, 29 citations of his publications are presented, 18 of which are in publications indexed in world-renowned scientometric databases (SCOPUS and Web of Science). There is also one citation in a monographic work, and the rest are in publications included in the National Reference List. Quantitatively, citations are valued at 330 points out of a required 50.

The publications are cited by scientists from Bulgaria - in 9 citations; Indonesia - in 1 citation; Russian Federation – in 16 citations; Saudi Arabia - in 1 citation; USA - in 2 citations. This shows that the scientific production of the Chief assistant professor Mihailov is recognizable in scientific circles in Bulgaria and internationally.

8. Critical notes, questions and recommendations

I have two recommendations for the Chief Assistant Professor Deyan Mihailov, PhD. The first one is to continue his research in the field of modeling processes and systems, including the aspects of digitalization, also in the field of health care, where there are

elements of national security. The second is to attract Bulgarian and foreign colleagues for team development and joint publications.

9. Conclusion.

As a summary of what was presented in the review and given that the **Minimum National Requirements for holding the academic position "Associate Professor" and the requirements for holding this position at the University of Economics-Varna have been met, I express a completely positive attitude and offer to the respected members of the Scientific jury to vote FOR taking the academic position "Associated Professor" by the candidate in the competition Chef. Assistant Professor Deyan Mihailov, Ph.D.**

09/22/2023   Prepared the review:
City of Varna

/Prof. Todorka Kostadinova, PhD/