REVIEW

For a competition for the academic position "Associate Professor", announced in SG No.77/ 27.09.2022
Professional domain 5.3. "Communication and computer technology"
For the needs of the "Distributed Information and Control Systems" section, IICT-BAS
With candidate Chief assistant PhD **Elisaveta Dimitrova Trichkova - Kashamova**

From DSc Krasimira Stoilova – Institute of Information and Communication Technologies – Bulgarian Academy of Sciences (IICT – BAS)

By order No. 338 of 25.11.2022 of the Director of IICT-BAS, issued on the basis of a decision of the SC of IICT, protocol No. 12 of 17.11.2022, I have been appointed as a member of the scientific jury in a competition for filling the academic position " Associate Professor " in professional field 5.3 "Communication and computer technology" for the needs of the section "Distributed information and control systems" of IICT-BAS. Only one candidate has submitted documents for the announced competition - Ch. As. PhD Elisaveta Dimitrova Trichkova-Kashamova.

1. Biographical data and general description of the presented materials

Ch. Assistant prof. PhD. E. Trichkova-Kashamova is an engineer, bachelor from 2003 at TU-Sofia, Faculty of Electrical Engineering and master from 2005 at UCTM-Sofia, Faculty of System Chemical Engineering. She has been working since 2004 at ICCS-BAS, which since 2010 has been united with two other institutes under the name IICT-BAS.

E. Trichkova-Kashamova obtained the degree "PhD" from 2014 at IICT - BAS.

All documents required for participation in the competition for "Associate professor" are presented:

1. Autobiography on the European model.
2. Copy of diploma for the educational and scientific degree "doctor".
3. Certificate of internship in the specialty.
4. List of scientific publications for participation in the competition, which do not repeat those presented for the acquisition of the educational and scientific degree "PhD".
5. List of citations.
6. Summaries of scientific publications for participation in the competition - in Bulgarian and English.
7. Copies of scientific publications for participation in the competition.
8. Reference of fulfillment of the minimum requirements of IICT.
9. Reference to original scientific and applied scientific contributions.
10. Declaration that no plagiarism in scientific works has been proven according to the law.
11. Electronic media with information, according to the requirement of IICT-BAS.
12. List of publications included in the dissertation.

An official note dated 9.11.2022 was presented regarding the total length of work - 18 years and 6 months, of which as Ch. assistant has been working for 7 years.

2. General characteristics of the scientific and scientific-applied activity

For the competition, 25 scientific publications were submitted, which were not used in the procedure for the educational and scientific degree "PhD". Of the publications, 12 are self-published [5, 6, 9, 10, 13, 14, 16, 19, 20, 21, 24, 25] with the first 4 visible in SCOPUS and 6 first authored [1, 4, 17, 18, 22, 23]. There are three publications with SJR/Scopus: 0.19, Q4 [3]; 0.11 [10]; 0.20 [11].

The scientific interests of E. Trichkova-Kashamova are in a wide range in the field of system engineering, modeling and optimization, modern information technologies. Her published scientific results relate to optimal synthesis of networks (communication, information, transport), optimal allocation of resources, intelligent solutions in distributed information systems, design, development and optimization of information systems, modeling of work flows, modeling and management of the web services, database modeling, Workflow technologies, design and development of Web applications, software integration, Web programming.

From the attached publications, 3 main areas can be summarized in which the candidate has significant scientific and scientific-applied achievements: modeling and management of information and communication flows; intelligent management solutions in animal husbandry; automation of business processes.

3. Scientific and scientific-applied achievements according to the materials

I evaluate the contributions of the publications submitted for the contest as follows.

Scientific contributions

- **Optimizing the network structure in computer, communication, transport and information networks**

An optimal network topology synthesis was made [9, 15]. Optimization of the network structure leads to optimization of information flows in computer and communication networks and as a result a set quality of client applications is achieved. A formal model for flow management in networks has been created, including evaluation of quality, continuity and fault tolerance of service in order to technologically and structurally improve networks. An algorithm was created to determine the time delays between the nodes of added alternative communication channels. The calculated time delays were used in the definition and solution of a task for the optimal synthesis of a network topology. The synthesized model is essential because it can be used in various application areas - management of communication flows in real time, management of transport systems in urban networks, optimization of information search. Research results on modeling and optimization in shortest path networks are published in [9]. An algorithm for fast movement of emergency vehicles in conditions of intense road traffic has been synthesized [2].

A conceptual model of network management applicable to most modern network management protocols including Simple Network Management Protocol (SNMP) has been developed [22]. SNMP-related security and device access security are also included in the model. The model can also be applied as an information service for optimal network management.

I consider the research in this area and the obtained results as a significant scientific contribution of the candidate, which has found application not only in computer and communication networks, but also in transport and information systems and in particular in information services.

Scientific - applied contributions

- **Intelligent management solutions in animal husbandry**

An analysis and comparison of software management platforms has been done for more efficient organization of farm processes [4]. A comparison is made between these platforms in terms of financial management, embedded accounting, inventory management, crop and livestock management, labor and supplier management, monitoring, as well as on the user side (ease of use, flexibility, accessibility, integration, satisfaction etc.)

Two interrelated frameworks are used as a tool to support decision-making in livestock management: benchmarking and key performance indicators (KPI). An analysis of various key performance indicators in animal husbandry has been made [1]. As a result of this analysis, indicators were selected for tracking the farm animal population. Research results are beneficial to the farm manager for its successful development.

Modern information and communication technologies for the application of intelligent solutions in animal husbandry are analyzed [7]. With their help, the overall management of the farm, considered from various aspects, is improved.

A mathematical model was created for the management of stocks of nutritional supplements for feeding pigs and its implementation through an Internet-based application [8]. In this way, a module is created for local and global informational advice to farmers in decision-making in food additive warehouse management.

Modern technologies applied in cow farms are analyzed, including robotic and automated milking systems (AMS) [3, 8]. Guidelines are given for increasing the capacity of the AMS. Different types of configurations of milking parlors and the most frequently used elements of barns and milking boxes were analyzed. Recommendations are made for the management of a dairy farm, for appropriate configurations of milking parlors depending on the conditions and purpose of the farm.

I positively evaluate the results obtained from research on intelligent solutions in animal husbandry and consider them to be beneficial for modern and efficient animal husbandry.

- **Automation of information activities and services**

The use of information technology in workflow management systems (Workflow), enterprise resource planning (ERP) systems, and customer relationship management (CRM) systems is explored[12, 18, 19, 20, 21]. The application of these technologies to assist a virtual cluster of small ISPs in market research (marketing) and customer service provision is discussed. Workflow management systems include three main components, which are analyzed in the publications: process modeling tools; process execution system; means of monitoring.

To support the decision-making process for finding quality and promising software products, an evaluation model is proposed based on the established international standard ISO/IEC 9126 for the quality of software products.

A solution is proposed for web services in a web information system such as the web service "Citation Index" [24]. The solution is based on the Enhydra JaWE (Java Workflow Editor) graphical editor for open source Java workflows.

Modeling and exploring of web service is considered, integrated in the web service "Citation index", router management of Cisco and the main concepts of security of web services have been also commented [23].

A specific program solution of an information service was created on a three-level client-server model of a web information system [25]. The capabilities of applied information solutions such as PHP and MySQL have been examined in the established information service "Index for Citations".

I highly appreciate the results in this area, as they have led to the integration of research and development into modern web information systems and services.

- **Approach to quantitative assessment of information systems**

A formal approach for quantitative assessment of the quality and efficiency of information systems has been created, which is based on a mathematical method for determining the weighting coefficients of expert opinions when making multi-criteria decisions [6, 13]. The mathematical formalization of the synthesized approach is based on portfolio theory. A general assessment scheme is used based on an established world standard with minimal subjective expert influence, based on objective product requirements. The originality of the approach consists in the appropriate inclusion of the summarized evaluation results in an optimization task that determines which of the features of the software product can be improved in order to increase the efficiency of its work.

The approach has been applied to the evaluation of software products in the educational sector [5, 10, 11, 14, 16, 17] and has the potential for application in various fields such as work process management, optimal distribution of information resources in animal husbandry, etc.

The claims for the scientific and applied scientific contributions formulated by the candidate are substantiated and correspond to the achieved results.

I positively assess the contributions achieved by the candidate.

4. Fulfillment of the minimum requirements and other activities

Ch. Assistant PhD E. Trichkova-Kashamova fulfills and exceeds in almost all indicators the minimum national requirements for the academic position "associate professor". The minimum requirements/**performance** ratio for the individual indicators is as follows: indicator A - 50/**50**; B - 100/**370**; Г – 220/**263**; D – 60/**180**; E – 20/**110**.

According to indicator D, I reduce 22 points due to the presence of self-citation (D12 / 4.1 and 4.2 – 20 points; D14 /4.1 – 2 points). Thus, for the candidate under indicator D, the amount becomes 158 points, which again significantly exceeds the minimum of 60 points.

A list of all - 55 publications is attached, which is a very good certificate for the results achieved by the candidate.

Ch. Assistant PhD E. Trichkova-Kashamova in the Reference for the fulfillment of the minimum requirements declared participation in 5 national and 3 international projects, but did not declare participation in other funded scientific research projects in the previous institute, so actually according to indicator E the amount is very bigger.

Recently, she participated in the training of students under the project "Student Internships - Phase 2" BG05M2OP001-2.013-0001 of the Ministry of Education and Science.

She also teaches at the New Bulgarian University.

The achieved results and activities characterize her as a researcher capable of successfully completing scientific challenges.

5. Reflection of the candidate's scientific publications in the scientific community (known citations)

In the scientific database Scopus, the candidate has an h-index of 2, which is a relatively good visibility score for her position in the global scientific community. 26 citations of 14 publications were noted according to the attached citation list. Of these, I exclude three [10, 11, 13], which are self-citations. Citations indicate that the applicant's scientific results have become widely known among the international scientific community.

6. Significance of contributions in science and practice

I accept the contributions formulated by the candidate, which are of essential importance for science and practice. Research, analysis, optimization solutions, modeled and developed communication and information systems, synthesized intelligent solutions in animal husbandry enrich and are relevant for the various practical applications of her results.

Ch. Assistant PhD E. Trichkova-Kashamova established herself as a scientist with significant results in the fields

- Optimal synthesis of network technologies.
- Optimization solutions in various subject areas.
- Intelligent solutions for animal husbandry.
- Automation of information activities and services.

7. Personal impressions and opinion of the reviewer

I have known E. Trichkova-Kashamova since the beginning of her work at the BAS. She grew in her creative activity thanks to hard work and perseverance in response to creative challenges, as well as consistency and responsibility in the implementation of scientific projects, where she has an essential role in their successful completion. The candidate has serious scientific publications on the issues of the competition, distributed at our and international forums and published in prestigious publications. It follows from the presented production, published results and achievements that Ch. assistant PhD. E. Trichkova-Kashamova is established as a very well-prepared scientist on the issues of the competition. She has the skills to work in a team and creates a creative environment for transferring the accumulated experience and knowledge.

An important fact is also the authority and respect she has built among her colleagues, which significantly complements my opinion of a deserving candidate for the academic position of "Associate professor".

8. Critical notes and recommendations

I have no significant critical remarks about the contest materials. They are presented very clearly and make it easy to evaluate them.

From the attached list of noticed citations, not all links are active. I think that the applicant should have given separate links to the sources of the citations, and not from the SONIX system output to word. This does not detract from the research results and does not affect the very good overall impression of the candidate's output.

My recommendation is to increase the share of published materials in publications with IF/SJR, which is a guarantee for a wider dissemination of its future results.

CONCLUSION. All the requirements of the Law on the Development of the Academic Staff, the Rules for its Implementation and the Rules for the Specific Conditions for Acquiring Scientific Degrees and for Holding Academic Positions at IICT have been fulfilled. Based on the presented materials, the scientific and scientific-applied contributions, as well as the complex assessment of the other indicators of the competition, **I give a positive assessment** and I **strongly recommend to the Honorable Jury** to propose to the Scientific Council of IICT-BAS **to choose** the Ch. assistant PhD E. Trichkova-Kashamova for the academic position "**Associate Professor**" in field 5.3 "Communication and computer technology" for the needs of the section "Distributed information and control systems" of IICT-BAS.

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