



OPINION

by **Professor Eng. Rosen St.Iliev PhD,**

from the Defence Institute "Prof. Tsvetan Lazarov",

as a member of the scientific jury of Toncho Ivanov Boyukov's dissertation work
on the topic

"Generalized nets as a tool for modeling railway transport in Bulgaria"

for the acquisition of an educational and scientific degree "doctor"
in the scientific specialty "Computer systems and technologies",
field of higher education 5. *Technical sciences*, professional direction
5.3. Communication and computer technology,
with scientific supervisors: Acad. Krasimir Atanassov DSc DSc and
Professor Sotir Sotirov PhD

1. Relevance and significance of the developed scientific problem

The dissertation examines a current problem related to the modeling of the railway network in Bulgaria using generalized nets and monitoring of railway transport processes. From the objective formulated in the dissertation, it is clear that the research focuses on the construction of a detailed model of the entire railway network of Bulgaria, with a description of standard components of the railway system and the possibility of using the model for the simulation of various situations that may arise between trains in real time.

The dissertation is structured in an introduction, six chapters, a conclusion, a bibliography, a list of publications related to the dissertation, a list of abbreviations used and has a total volume of 127 pages, with 21 figures and one table included. The indicated bibliography is from the field of dissertation research and includes 44 titles of which 33 are in Cyrillic and 11 in Latin. The thesis publication list includes four co-supervisor publications, one of which was presented at the 2022 IEEE 11th International Conference on Intelligent Systems.

The content of the dissertation fully corresponds to the topic of the dissertation. It represents a useful study and application of the Theory of Generalized Nets of academician Krasimir Atanassov for the development of generalized net models of the railway transport structure of Bulgaria.

2. Evaluation of the scientific results and contributions of the dissertation work

The dissertation work of Eng. Toncho Boyukov was developed in the necessary volume and completeness, and from its content it is understood that the author is very well acquainted with the problem area of railway transport in Bulgaria, as well as with the possibilities of the tools used for its modeling - the apparatus of aggregate nets.

The formulated results in the dissertation are a logical consequence of the conducted research, including the necessary generalized net models and

mathematical apparatus for their description. Of interest is the proposal to introduce definitions for four new extensions of the "Two-way Generalized Net". Each of these extensions is proven to be a conservative extension of the standard generalized net, and four variants are presented that demonstrate the algorithms for the operation of the net.

I accept the contributions defined by the author as an extension and enrichment of existing knowledge and application of scientific achievements to solve important practical tasks related to modeling of complex processes such as railway transport in Bulgaria by using generalized nets. I believe that the dissertation work and the results obtained in it are the personal work of Eng.

I have not noticed any plagiarism in the author's work. The style of presentation and the logical sequence of his statement give me confidence about the personal involvement of Eng. Toncho Boyukov in the preparation of his dissertation work.

The abstract corresponds to the dissertation work and adequately reflects the results achieved by the author.

3. Critical notes

I have no significant critical comments on the dissertation work and the abstract. Although the contributions made, which I believe to be essential, are more clearly described in the abstract than in the dissertation, this in no way diminishes the quality of the dissertation work presented.

I recommend the author to continue his further research work on the ideas that arose during the writing of the dissertation and to direct his future scientific interests to the study of other types of transport in Bulgaria, as well as to their modeling using generalized nets – for the integration of which he presents his view in the sixth chapter of his dissertation.

4. Personal impressions

I do not know Eng. Boyukov personally, but from the attached reference it is clear that he has a graduate master's degree in engineering in the scientific direction of transport, shipping and aviation, and for several years he has been an assistant at the University "Prof. Dr. Asen Zlatarov" in Burgas. His dissertation shows a very good knowledge of the Theory of Generalized Nets and the possibilities of its application for modeling complex processes, such as the railway transport in Bulgaria.

I have no joint posts with the candidate.

5. Conclusion

The developed dissertation work of Eng. Toncho Boyukov is a completed scientific study on a current and important problem related to railway transport in Bulgaria and in terms of content, volume and structure it fully meets the requirements stipulated in the Law on the Development of the Academic Staff of the Republic of Bulgaria (LDASRB) and the Regulations for the Law on the Development of the Academic Staff of the Republic of Bulgaria (RLDASRB), for awarding the educational and scientific degree "doctor".

6. Evaluation of the dissertation work

From the content of the dissertation, the abstract, the fulfillment of the procedural requirements for compliance with the LDASRB and RLDASRB, as well as my personal impressions, give me the reason to give a POSITIVE ASSESSMENT of the dissertation work "Generalized nets as a tool for modeling railway transport in Bulgaria" and I offer to the author – Toncho Ivanov Boyukov, to be awarded the educational and scientific degree "Doctor", in field of higher education 5 "Technical sciences", professional direction 5.3 "Communication and computer technology".

28.07.2023

Jury member: ...

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(Prof. Dr. Rosen Iliev)