Институт по информационни и
комуникационни технологии-БАН
Вх. № 266 / 20.03.2024 г.

OPINION

Assoc. Prof. Tatiana Radeva Radeva-Stoilova, PhD

Institute of Information and Communication Technologies

Bulgarian Academy of Sciences

on a dissertation for the acquisition of an educational and scientific PhD degree

under the Scientific Field: 5. Technical sciences

Professional Area: 5.2. Electrical engineering, electronics and automation

the Scientific PhD Specialty: "Application of the principles and methods of cybernetics in various fields of science"

Author of the dissertation: Ekaterina Spasova Tsopanova

Dissertation topic: **INFLUENCE OF THE SUBJECTIVE FACTOR IN DECISION MAKING SYSTEMS**

1. **Relevance of the problem developed in the dissertation work in scientific and applied scientific terms**

Degree and levels of relevance of the problem and specific tasks developed in the dissertation. The presented dissertation aims to investigate the combination of psychological and mathematical models, which will create greater effectiveness of the combined decision making methods compared to their separate use. The topic of people's motivation occupies an increasingly significant place in today's complex and changing economic environment. In connection with which I find the problem to be significant and relevant in a scientific and applied scientific sense.

2. **Degree of knowledge of the state of the problem and creative interpretation of the literary material**

The dissertation is 154 pages long, including an introduction, 4 chapters for solving the formulated main tasks, a conclusion, a list of the main contributions, a list of publications on the dissertation and used literature. A total of 151 literary sources are cited, 84 of which are in Latin. In the literature review, a very significant part of the available works on research, analysis of motivation is covered, a numerical example of a discrete decision making system with motivation accounting is implemented. An impression is made by the author's ability to freely navigate the problem and classify literary sources, identifying leading directions of development in the field of the dissertation topic.

3. **Correspondence of the chosen research methodology and the set goal and tasks of the dissertation with the contributions achieved**

The selected methodology of discrete decision making systems based on network flows enables relatively accurate and adequate modeling. The research mainly relies on the implementation of a numerical model for a discrete decision making system with consideration of motivation, to achieve the goal of the dissertation work. The research done and the results obtained are in accordance with the structured tasks and the set goals. The

types of motivation and the main motivational models are formulated; Decision support systems; Discrete decision making systems with consideration of motivation; An implemented numerical example of a discrete decision making system with motivation accounting.

4. Scientific and scientific-applied contributions of the dissertation work

The contributions presented by the author to the dissertation correspond to the research done and the approbation of the results.

Scientific contributions

1. It has been determined that discrete decision making systems based on network flows provide the opportunity for a relatively accurate and adequate modeling of discrete decision making systems when considering motivation.
2. It has been noted that the most suitable are generalized network flows with coefficients for increasing or decreasing flows on individual arcs. Through them, models for decision making can be created, incorporating elements from motivation theory, graphs, and flows over them. These arc coefficients reflect the influence of motivation on decision making – positively (if $KIJ > 1$) or negatively (if $0 < KIJ < 1$).
3. A formal description of discrete decision making systems with consideration of motivation has been developed. Concepts related to sets, graphs, and network flows have been explored.

Scientific and applied contributions

4. A comprehensive, multi-layered overview, providing a multidisciplinary and systematic description of concepts from the theory of decision making, as well as decision support systems, has been conducted.
5. A numerical example of a discrete decision making system with consideration of motivation has been implemented.
6. A classification of motivational theories has been proposed based on a comprehensive review, taking into account their influence on decision making systems or the support of these decisions. Preference has been given to motivations that are related to the work of operators in real-time control systems.
7. It has been observed that in most cases, motivation aligns well with discrete decision making systems.
8. An extensive analysis of motivation and its role in decision making systems has been conducted. The overall analysis contributes to a broader understanding of the multifaceted nature and complexity of motivation and its role in understanding the decision making process.
9. A comparative analysis of different types of motivation and motivational theories and models has been carried out, emphasizing their characteristics, driving forces, and impact on individuals' behavior.
10. The functionality of the proposed discrete generalized network flow with coefficients for amplification and reduction of their influence has been suggested and demonstrated for use in decision making systems with motivation, based on a numerical example.
11. The capabilities of the proposed generalized network flow have been outlined for modeling psychological processes with a broader scope than motivation.

5. Evaluation of publications on the dissertation work

Main achievements and results of the dissertation work were published in 2023, in 2 scientific articles. In my judgment, the publications made cover the main results shown in the dissertation work and create sufficient visibility for the research made and the output data obtained from it. The prepared abstract reflects key moments of the dissertation work, the requirements for structuring and layout are met. The number of publications and the author's contribution in them is above the minimum requirements set by the Regulations for Doctoral Education and Dissertation Defense for the Acquisition of the Educational and Scientific PhD Degree at the IICT-BAS.

6. Opinions, recommendations and notes

The dissertation work is up-to-date scientific-applied research, meeting the requirements of LDASRB (Law on the Development of the Academic Staff in the Republic of Bulgaria) and Regulations for Doctoral Education and Dissertation Defense for the Acquisition of the Educational and Scientific PhD Degree at the IICT-BAS.

A recommendation to the author is to continue researching and improving methodologies that lead to a wider applicability of motivation and role in decision making systems. The promotion of the results of these activities should be actively continued.

7. Conclusion with a clear positive or negative assessment of the dissertation work

The considered dissertation work represents a completed work, the results achieved by the author are important, to a certain extent fundamental in the field, and contain a significant contribution to the problem of the influence of the subjective factor in decision making systems. Based on the above, I give a positive assessment of the presented dissertation work on the topic "INFLUENCE OF THE SUBJECTIVE FACTOR IN DECISION MAKING SYSTEMS" with author Ekaterina Spasova Tsopanova and I recommend to the Honorable Jury to award the educational and scientific PhD degree to Ekaterina Spasova Tsopanova in the Scientific Field 5. Technical sciences, Professional area 5.2. Electrical engineering, electronics and automation, the Scientific PhD specialty "Application of the principles and methods of cybernetics in various fields of science".

11.03.2024 JURY MEM

На основание
331Д