REVIEW

by Dr. Vladimir Vassilev Monov,

Professor at the Institute of Information and Communication Technologies - BAS

of a dissertation for the award of the educational and scientific degree **"Doctor"**

in: field of higher education: *4. "Natural Sciences Mathematics and Informatics"*

professional field: *4.6. "Informatics and Computer Sciences"*

doctoral program: *"Informatics"*

Author: Laska Delkova Kostadinova-Tsankova
Topic: "Modeling of an intelligent supply chain in smart agriculture systems"
Scientific supervisor: Assoc. Prof. Dr. Emil Doychev, Plovdiv University "Paisii Hilendarski"

1. General description of the submitted materials

By order No. РД-22-692 of 30.03.2026 of the Rector of Plovdiv University "Paisii Hilendarski" (PU), I have been appointed as a member of the scientific jury for conducting a procedure for the defense of a dissertation on the topic "Modeling of an intelligent supply chain in smart agriculture systems" for the acquisition of the educational and scientific degree "doctor" in the field of higher education 4. "Natural sciences, mathematics and informatics", professional direction 4.6. "Informatics and computer sciences", doctoral program "Informatics". The author of the dissertation is Laska Delkova Kostadinova-Tsankova - a doctoral student in part-time study at the Department of "Computer Systems" with scientific supervisor Assoc. Prof. Dr. Emil Doychev from PU "Paisii Hilendarski".

The set of materials presented by Laska Kostadinova-Tsankova is in accordance with Art. 36 (1) of the Regulations for the Development of the Academic Staff of the University of Plovdiv and includes the following documents:

– application to the Rector of the University of Plovdiv for the opening of the procedure for the defense of a dissertation;
– curriculum vitae in European format;
– protocol of preliminary discussion of the dissertation in the department and the opinion of the scientific supervisor on the readiness to open the procedure;
– dissertation;
– abstract in Bulgarian and English;
– list of scientific publications on the topic of the dissertation;
– copies of the scientific publications;

– declaration of originality and authenticity of the attached documents;
– reference of compliance with the minimum national requirements.

The attached documents comply with the regulatory requirements set forth by the Law on the Development of Academic Staff in the Republic of Bulgaria and the Regulations for its implementation for the acquisition of the educational and scientific degree "doctor".

2. Brief biographical data of the doctoral student

The attached CV shows that in the period 1994-2020 Laska Kostadinova-Tsankova has acquired master's degrees in several specialties, respectively: Master of Finance and Accounting, Master of Macroeconomics with specialization in Organization and Technology of Accounting and Master of Computer Technologies with professional qualification as an Informatics Economist. Since 2022, she has been a doctoral student in part-time study in the doctoral program "Informatics" at the "Paisii Hilendarski" University. Laska Kostadinova-Tsankova has work experience and professional experience in the field of insurance, accounting and consulting, holding the position of manager of an accounting and consulting firm in the city of Plovdiv. In the period 2021-2022, she conducts scientific research in the field of information systems at the "Center for Excellence in Informatics and ICT" at the University of Plovdiv. L. Kostadinova-Tsankova's main scientific research interests are in the field of information technology and computer systems with a specific focus on the development and application of integrated supply chain management systems.

3. Relevance of the topic and appropriateness of the goals and objectives

The dissertation is dedicated to the study, modeling and development of a complex supply chain management system, which aims to improve logistics processes and risk management in deliveries to organizations and public institutions. The presence of risk factors in the functioning of supply chains necessitates the conduct of systematic scientific research and the development of innovative solutions for the overall management of the process. This includes both the use of traditional methods and the application of modern approaches such as machine learning and artificial intelligence. In this context, as well as in the conditions of a dynamic and competitive business environment, the dissertation research is undoubtedly distinguished by its topical and significant nature. The dissertation presents an author's thesis on the construction of an integrated supply chain management model in the public sector, outlining in detail the subject and object of the research. On this basis, the goal and objectives of the dissertation are well-argued and formulated with the potential for contributions of scientific and scientifically applied attitude.

4. Understanding the problem

The introduction and literature review made in Chapter 1 of the dissertation are presented on 84 pages. Basic concepts, modern supply chain models, logistics management, risks, vulnerabilities and disruptions in the supply chain are examined and analyzed in detail. Data on the supply chains of world-renowned companies in the food and manufacturing sectors are presented, as well as concepts of intelligent supply chains such as "direct to consumer" (DTC) and "on-demand supply" (On-Demand Supply). The main steps in the logistics of a food warehouse supply chain that connects food producers with kindergartens are studied. The conclusions to Chapter 1 outline the main challenges and key directions in the development of supply chains. The analytical review made in the problem area of the dissertation shows a thorough knowledge of the subject and current problems, as well as potential opportunities for finding new solutions with scientific and applied contribution.

5. Research Methodology

The developed methodology for conducting the research is based on a systematic and step-by-step approach with specifically planned steps for the development of an innovative supply chain management system based on an event model and knowledge, the integration of the system into the ZEMELA smart agriculture software platform, testing and demonstration of its functionalities. The implemented methodological approach fully meets the set goal and objectives of the dissertation research.

6. Characteristics and evaluation of the dissertation work

The dissertation is 212 pages long and consists of an Introduction, 5 chapters and a Conclusion. It contains 64 figures and 19 tables. The list of literary sources includes 234 titles, including sources from Bulgarian and foreign authors and Internet sites. The list of publications on the dissertation topic contains 2 titles. Additionally, a complete list of the doctoral student's publications, containing 10 titles, is presented. According to the requirements, a Declaration of originality of the results obtained is attached to the dissertation.

Chapter 1 presents basic definitions and concepts, an analytical review of the types of supply chains, their logistics and risk factors is made. The conclusions to the chapter outline challenges, directions for development and justify the need to conduct the dissertation research.

Chapter 2 describes the combined approach used, including quantitative and qualitative methods for building a supply chain. The logistics system, management levels, main flows and processes in the supply chain, as well as indicators for assessing effectiveness are examined.

In Chapter 3, an event model for supply chain management is developed, including specific types of events in the supply process. The program implementation of the event interpreter (event machine) in the Prolog language is presented, as well as the possibilities for integrating the model into the software platform for smart agriculture ZEMELA.

In Chapter 4, the software tool Flex Expert System for developing expert systems, its interconnection with the Prolog language and the software package for logic programming LPA is described.

In Chapter 5, a prototype of a supply chain management system is developed. The architecture of the system and its main elements are built: a knowledge base, an event machine and a user interface. The operability of the prototype is demonstrated with examples for generating schedules for delivering food products to kindergartens.

The dissertation work is characterized by a thorough knowledge of the theoretical and practical problems and challenges in the development of integrated supply chain management systems, proficiency in modern software tools for the construction of these systems and the possibilities for their practical application. The relationship between the tasks set, their development in the structure of the dissertation, the contributions obtained and the publications made is underlined. The presented author's solutions and results are tested and analyzed and meet the set goals and objectives.

In the final part of the dissertation, the results of the dissertation are summarized and directions for future research are outlined.

7. Contributions and significance of the development for science and practice

I accept and positively evaluate the main results of the dissertation research, which are formulated in the dissertation and the abstract. They are of a scientific and scientifically applied nature and can be summarized as follows.

- A model and architecture of an intelligent supply chain management system is proposed. An event model and an interpreter of events in the supply chain have been developed.
- An approach has been developed for integrating the event model into the ZEMELA software platform with capabilities for intelligent data collection and analysis, as well as assessing the effectiveness of logistics processes in the supply chain.
- A prototype of a supply chain management system has been developed, its applicability has been demonstrated with test scenarios for generating a schedule for food product deliveries in a kindergarten.

Specific results and contributions and their relationship to the set goal and objectives are presented in tabular form in the table on page 186 of the dissertation. The texts with numbers 3,4,5,6 and 7 in the column “Scientific contribution/result” of the table describe substantial and undisputed author’s contributions to the dissertation research. It should be noted, however, that the texts with numbers 1,2,8 and 9 in the same column of the table describe activities carried out without specific

results and should not be considered as contributions to the dissertation. A similar remark applies to the table on page 187, the content of which is essentially the same as that of the previous table.

In general, the significance and contributions of the dissertation work relate to the development of new and improvement of existing methods and approaches in the field of analysis, modeling and construction of integrated supply chain management systems. The results obtained have useful practical applications in the public procurement sector and supply for public institutions, as well as potential for future development to improve and expand the capabilities of the developed prototype of a supply chain management system.

8. Assessment of publications on the dissertation work

Two publications on the dissertation topic are presented, which are co-authored, in English and were published in 2025. They are printed in the proceedings of an international scientific conference, which are referenced and indexed in the Scopus database. In one of the publications, the doctoral student is the first co-author. The publications meet the requirements for acquiring the educational and scientific degree "doctor". A complete list of the doctoral student's publications, containing 10 titles, is additionally presented with the dissertation work. This ensures the necessary publicity of the doctoral student's scientific research activities and the results of the dissertation research.

9. Personal participation of the doctoral student

I do not know Laska Kostadinova-Tsankova personally and have no direct impressions of her work. My acquaintance with the dissertation, the abstract and the publications made gives me reason to believe that the dissertation work and its contributions are her personal work, obtained under the direct supervision of her scientific supervisor. I am not aware of any evidence of plagiarism.

10. Abstract

The abstract is 32 pages long and meets the requirements for its formatting. Its content corresponds to the content of the dissertation and presents the main results of the dissertation work. An abstract of the dissertation in English is also presented in a volume of 30 pages.

11. Critical remarks and recommendations

I have no critical remarks on the substance of the dissertation and the presented results. Of an editorial and technical nature, I have the following remark.

Chapter 4 presents a detailed description of the Flex Expert System software package, intended for the development of expert systems and its interconnections with specialized software for logic programming. In essence, the content of the chapter has no direct connection with the dissertation topic and could be significantly shortened by indicating only the specific application of this software for the development of the prototype of a supply chain management system.

This remark does not reduce the value of the obtained results and the contributions in the dissertation work.

My recommendation to the doctoral student is to continue the research activity in accordance with the guidelines for future work outlined in the dissertation, as well as to improve and expand the possibilities for practical application of the developed prototype.

CONCLUSION

I positively assess the scientific research work carried out and the results obtained in the dissertation. The dissertation contains original scientific and applied scientific results that meet the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for the Implementation of the Law and the relevant Regulations of the Plovdiv University “Paisii Hilendarsky”. The dissertation shows that the doctoral student possesses in-depth theoretical knowledge and professional skills in the scientific specialty "Informatics", demonstrating qualities and skills for conducting scientific research.

I strongly propose to the esteemed Scientific Jury to award the educational and scientific degree "doctor" to magister. Laska Delkova Kostadinova-Tsankova in the field of higher education: 4. "Natural Sciences, Mathematics and Informatics", professional direction 4.6. "Informatics and Computer Sciences", doctoral program "Informatics".

04/22/2026 Reviewer: …….

/Prof. Dr. Vladimir Monov/