REVIEW

by Dr. Eng. Borislav Hristov Milenkov,

Associate Professor, University of Food Technology – Plovdiv

of a dissertation for the award ofeducational and scientificdoctorate degree

in: field of higher education: 5 – Technical Sciences;
professional field: 5.3 "Communication and computer technology";

Doctoral program: "Automation of areas of the intangible sphere (medicine, education, science, administrative activities, etc.)"

Author: Anna Ilieva Bekyarova-Tokmakova

Topic: "Technology-based solutions for process management in telecommunications"

Scientific supervisor: Prof. Dr. Nevena Stoyanova Mileva – Paisii Hilendarski University

1. General description of the materials presented

By order No. PD 22-92 of 17. 01. 2025 of the Rector of Plovdiv University "Paisiy Hilendarski" (PU), I am appointed as a member of the scientific jury for ensuring a procedure for the defense of a dissertation on the topic"Technology-based solutions for process management in telecommunications",for the acquisition of the educational and scientific degree "Doctor" in the field of higher education: 5 "Technical Sciences", professional field: 5.3 "Communication and Computer Engineering",doctoral program:"Automation of areas of the intangible sphere (medicine, education, science, administrative activities, etc.)". The author of the dissertation is Anna Ilieva Bekyarova-Tokmakova - a full-time doctoral student at the Department of EKIT with a scientific supervisorProf. Dr. Nevena Stoyanova Milevafrom"Paisiy Hilendarski" University.

The set of materials on paper presented by Anna Ilieva Bekyarova-Tokmakova 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:

- a request to the Rector of the University of Plovdiv to disclose the procedure for defending a dissertation;
- CV in European format;
- minutes from the department council, related to reporting the readiness to open the procedure and preliminary discussion of the dissertation work;
- dissertation;
- abstract in Bulgarian and English;

– a list of scientific publications on the topic of the dissertation;
– copies of scientific publications;
– list of noted citations;
– declaration of originality and authenticity of the attached documents;
– a statement of compliance with the minimum requirements.

The doctoral student has submitted 3 (three) publications related to the topic of the dissertation.

2. Brief biographical data about the doctoral student

The doctoral student currently holds the academic position of "assistant" in the Department of EKIT at PU "P. Hilendarski". Previously, she held the position of "regional manager" in one of the telecommunications operators. In addition to the daily duties related to employee management, her responsibility was negotiations with "key clients".

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

The dissertation submitted for review presents an in-depth study of technological solutions for optimizing business process management in the telecommunications sector and their application.

The relevance of the work is related to technological solutions for process management in telecommunications. First of all, this is the rapid development of the sector and the many new services that are provided to customers. Increased needs and requirements create the need for innovative approaches and effective management of the processes that occur when conducting negotiations and avoiding "Chern" - customer churn and switching to another operator

4. Knowing the problem

Judging from the presented autobiography of the doctoral student and the positions she held before entering the University of Plovdiv, I come to the conclusion that she has been familiar with the problem for many years (fourteen). To examine and analyze a problem highlighted in her dissertation, Mag. Anna Bekyarova-Tokmakova used 132 literary sources. She uses mainly literary sources from recent years. This suggests a good knowledge of the problem by the doctoral student and her ability to cope with the tasks set. The work contains a detailed analysis of the relevant specialized literature and the technologically-based solutions for process management in telecommunications proposed in them. The reference to these sources and the achieved results speak of a good knowledge of the problem and its creative solution.

5. Research methodology

The dissertation is structured in an introduction and three chapters. After stating the purpose of the dissertation and what its tasks are to be fulfilled, a list of abbreviations used follows. This is a very

good approach - it provides preliminary information about them, especially considering that some of them are characteristic of telecommunications companies.

In the first chapter, the doctoral student makes a comprehensive review and systematization of existing technology-based solutions for process management in telecommunications. She thoroughly justifies the construction of a system with technology-based solutions for process management in the telecommunications industry. She focuses on processes related to marketing and customer service, emphasizing the use of artificial intelligence and business customers, for which there is a lack of in-depth research in the reviewed scientific literature. She emphasizes the selection of processes due to their key importance for customer satisfaction and the competitiveness of companies. She presents the purpose of the dissertation and the tasks to be solved to achieve the formulated goal.

Chapter Two describes in detail the development of a technology-based system for managing the Business Customer Retention process and the contribution to the redesign of the process is formulated from it. The focus in this chapter of the dissertation is on the business customer market and a detailed analysis of the business customer retention process is presented. Interviews were conducted with 16 key individuals involved in the process, including operational managers, account managers and employees from the analytics department. Based on the information collected from the interviews and observations, a model of the Business Customer Retention process was developed, which provides a structured presentation of the main stages and strategies in the business customer retention process. Using the SWOT tool, the Business Customer Retention process was analyzed, where the key strengths and weaknesses were identified and categorized. A business customer churn forecasting system is presented, which will be implemented as a technological solution in the Business Customer Retention process in telecommunications companies.

The last chapter is devoted to the experiments conducted by the proposed new technology-based system for managing the “Retention” process, as well as an analysis of the obtained results. Within the framework of the experiments, an assessment of the effectiveness of various predictive models was given in order to establish which machine learning technique provides the best results in predicting customer churn. The results obtained from the experiments confirmed the research hypothesis that it is possible to develop a system that uses a real database, used daily by managers in a telecommunications operator, to reliably predict subscriber churn. The system demonstrates high values in key parameters, including accuracy, sensitivity, precision and F1-score.

As "Appendix 1" is presented the questionnaire (Interview Questionnaire) conducted with the personnel of the telecommunications campaigns engaged in offering new contracts to corporate clients.

6. Characteristics and evaluation of the dissertation work

When reviewing the dissertation and publications submitted to me for review, doctoral student Anna Ilieva Bekyarova-Tokmakova, I can say with conviction that the results achieved from the research and development were obtained entirely with her participation. The doctoral student demonstrates her knowledge and skills for in-depth research and solving scientific problems of a scientifically applied and applied nature. I believe that the developed ideas and the obtained results have become known to the scientific community through publications and reports presented at conferences.

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

In her dissertation, the doctoral student has proposed five "scientific and scientifically applied" contributions, as well as four applied ones. The reviewer, for his part, has no objections to the two groups of contributions formulated by the doctoral student. The most important of them (in my opinion) is the one placed under No. 5 "Redesign of the Business Customer Retention Process: A new design of the process has been developed in order to optimize interaction with customers and increase the effectiveness of retention strategies". Namely, through it the goal of the dissertation is precisely fulfilled - "development of a technology-based system for forecasting and managing the customer retention process in telecommunications companies".

In applied contributions, the emphasis is on: a justified and selected appropriate system architecture that provides flexibility and efficiency in data processing and customer churn forecasts; a detailed design of the system, which includes a description of the main components and functionalities necessary for its effective functioning, and a developed working prototype of the system that demonstrates the applicability of the proposed solutions and concepts in a practical environment.

8. Assessment of dissertation publications

Three (3) articles are attached to the dissertation. Two of the articles are in English and the third in Bulgarian.

The articles in English are from participation in scientific conferences. In them, the doctoral student is the first author in co-authorship with her scientific supervisor and are referenced in Scopus (both) and WoS (the first). As of February 18, according to information from Google Scholar, there are two citations of the article "Classification of Business Processes in Telecommunications". The third article is in Bulgarian and is independent for the doctoral student. It can be expected that the results of the dissertation work can be used for training personnel from telecommunications companies.

9. Personal participation of the doctoral student

Taking into account the role of the supervisor in formulating the general goal of the dissertation and the tasks arising from it, it must be recognized that the doctoral student has the main role in the overall development. During the training process, she has improved her skills in formulating tasks, choosing a methodology and conducting experimental research.

10. Autor's abstract

I believe that the presented abstract has been prepared in accordance with the requirements of the regulations for the implementation of the ZRASRB of the P. Hilendarski University and reflects the main results achieved in the dissertation. I believe that the structure and content of the abstract corresponds to the title and reflects the content and contributions of the dissertation work.

11. Critical remarks and recommendations

After a thorough review of the scientific production provided to me by Anna Ilieva Bekyarova-Tokmakova, I have no critical remarks towards the doctoral student regarding the presented documents and scientific works. My main recommendations are in the direction of - reporting on the work of the various telecommunications operators and their characteristics.

These recommendations do not relate to the substance of the contributions, therefore they do not reflect on my personal positive impression of the scientific output and other merits of the doctoral student.

12. Personal impressions

I do not know the doctoral student personally and have no direct impressions of her work over the years. Having read the dissertation, I can say that she possesses the necessary knowledge and skills to recognize (identify) the problem and find methods and means to solve it.

13. Recommendations for future use of the dissertation contributions and results

In section 5.3 of the dissertation (p. 164), the doctoral student has proposed directions for future development of the obtained results and their application. I hope that telecommunications companies will show interest. I also think that this Chern forecasting model could be applied not only to corporate clients, but also to individuals (private clients).

CONCLUSION

The dissertation work***contains scientific-applied and applied results that represent an original contribution to science***and meet all requirementsof the Act on the Development of the

Academic Staff in the Republic of Bulgaria (ADSRB), the Regulations for the Implementation of the ADSRB and the relevant Regulations of the PAISIY HILENDARSKY PU.

The dissertation work shows that the doctoral student Anna Ilieva Bekyarova-Tokmakova possesses in-depth theoretical knowledge and professional skills in the scientific specialty.**"Communication and computer technology"**,by demonstrating qualities and skills for independently conducting scientific research.

Due to the above, I confidently give my positive assessment of the conducted research, presented by the above-reviewed dissertation, abstract, achieved results and contributions, and I propose to the esteemed scientific jury to award***the educational and scientific degree "doctor"***of Anna Ilieva Bekyarova-Tokmakova in the field of higher education: 5. "Technical Sciences", professional direction 5.3 "Communication and Computer Engineering", doctoral program "Automation of areas of the intangible sphere (medicine, education, science, administrative activities, etc.)"

24 February 2025 years

Reviewer: .....

(signature)

Assoc. Prof. Dr. Eng. Borislav Milenkov