REVIEW

From Prof. Dr. Silvia Trifonova Trifonova-Pramatarova,

University of National and World Economy (UNWE), Sofia

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

in Area of Study 3. Social Sciences, Economics and Law, Field of Study 3.8. Economics, Ph.D. Program "Finance, Insurance and Social Security", Higher School of Insurance and Finance (VUZF University), Sofia

Author: Ph.D. student Volodymyr Busygin

Title: „**Development and Research of Applied Digital Economy Basis: Blockchain and Optional Approach"**

1. General description of the presented materials

By Order № 118/05.05.2022 of the Rector of the Higher School of Insurance and Finance (VUZF University) Prof. DSc. Boris Velchev I have been appointed a member of the scientific jury for providing a procedure for defense of a dissertation on the topic "**Development and Research of Applied Digital Economy Basis: Blockchain and Optional Approach**" for obtaining an educational and scientific degree "Doctor" in the Area of study 3. Social Sciences, Economics and Law, field of study 3.8. Economics, Ph.D. program "Finance, Insurance and Social Security".

The author of the dissertation is Ph.D. student Volodymyr Busygin. The materials submitted by the Center for Scientific Research and Doctoral Studies at the VUZF University include all the necessary documents for the procedure, namely: CV in English, dissertation in English, abstract in Bulgarian and in English, list and summaries of the publications on the topic of dissertation in Bulgarian and English, the publications of the doctoral student on the topic of the dissertation, reference for fulfillment of the minimum national requirements for obtaining educational and scientific degree "Doctor" in the field of study 3.8. Economics.

2. Brief biographical data about the candidate

The doctoral student Volodymyr Busygin presented a very short autobiography, from which it is not clear when and in which university he graduated with a bachelor's degree in Finance and a master's degree in Computer Science and in Agribusiness.

It is noteworthy that in addition to VUZF, Volodymyr Busygin is a doctoral student in Ukraine - Oles Honchar Dnipro National University.

Volodymyr Busygin's professional experience began in October 2002 as Head of the Foreign Affairs Department of "VASIL" LTD, Ukraine, where he worked until April 2005. From July 2006 to November 2009 he worked as General Manager of Foreign Affairs at "M Plus CC Company",

Johannesburg, South Africa. From November 2009 to February 5, 2013, he was a counselor on foreign affairs at the farming enterprise “SITIK-AGRO”, Ukraine. Since March 2013, he has been the founder and CEO of “Sports Innovations and Development Laboratory”, Ukraine. The candidate masters various software products such as Microsoft Office (Word, Excel, Access, PowerPoint), Corel Draw, Adobe Premiere Pro, WordPress sites creation.

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

The relevance of the dissertation research is indisputable given that digitalization is the most modern direction in the development of any economy, including and Ukraine.

The author has correctly focused on the study of the applied digital economy and in particular the structural and institutional aspects of modern economic theory for building a digital economy, as well as the scientific and methodological basis of practical tools for digital transformation of socio-economic systems. He emphasizes the role, application, internal logic and problems of blockchain technology, on the basis of which it is possible to make practical recommendations for managing the digital transformation of the economy.

The author has set as the main goal of the dissertation to explore the theoretical and methodological foundations and scientific and practical recommendations for managing the digital transformation of applied economic systems based on the development of blockchain technology and elective approach, improving the structure and increasing the productivity of multiprocessor systems and introducing of numerical and analytical algorithms and methods to increase the speed, accuracy and reliability of experimental data processing. This goal is decomposed into 11 tasks.

4. Knowledge of the problem

The author is very well acquainted with the problem of scientific research. The object of the study are the selected information processes in the applied problems of the digital economy, based on blockchain technology and the optional approach and in modular multiprocessor computing systems. The subject of the study is the concept of digital transformation management in applied economic systems based on the development of blockchain technology and optional approach; the methodology for designing new modular multiprocessor computing systems based on reorganizing the structure of the network interface to solve the problems of the digital economy; methods and algorithms for distributed modelling of applied problems of the digital economy.

5. Research methodology

Various research methods have been used for the development of the dissertation work – theoretical and methodological analysis, systematic analysis, functional and structural approach, economic and mathematical modelling, the methods of linear algebra, the theory of differential equations and other methods of mathematical analysis, integrated approaches based on the one hand on the principles of economic theory, blockchain theory and options, and on the other hand on the

conceptual principles of economic-mathematical modelling of processes in the digital economy, etc. Other applied research methods are also mentioned in the dissertation's methodology.

6. Characteristics and evaluation of the dissertation

Structurally, the dissertation consists of the following parts: introduction, six chapters, conclusion and bibliography. Before the introduction are presented list of abbreviations, list of tables and list of figures. The dissertation is accompanied by an abstract, which briefly presents the structure and content of the dissertation and author's theses and research results. The dissertation is written in Russian, and the abstract is in Bulgarian and English. The total volume of the dissertation is 190 pages. The paper presents 60 figures and 8 tables.

The bibliography includes 183 literature sources – books, articles, reports, periodicals and non-periodicals, statistical sources, Internet sources.

The first chapter of the dissertation is devoted to the theoretical and fundamental foundations of the digital economy. In this regard, some practical and organizational aspects and problems of blockchain technology in the modern world and especially in the banking sector are presented. Blockchain technology is one of the main directions for the development of the digital economy. Particular attention is paid to the optional pricing model and analysis.

The second chapter is devoted to the analysis of the role and application of innovative blockchain technology as the basis of the digital economy. An analysis of the development of the theory, design, programming, modelling, testing and application of blockchain technology, as well as the problems associated with each of these stages.

The third chapter proposes and explores a new blockchain system that operates on a linearly scalable consensus mechanism with a selection method that confirms the piece by voting shares and has scalable random generation using VRF (Verifiable Random Function) and VDF (Verifiable Latency Function) delay function). The proposed approach allows the development of a blockchain with the following advantages: full scalability, security, energy efficiency and rapid consensus.

The fourth chapter is devoted to the role of computer technology in solving the main problems of the digital economy, as the study of many processes often requires data on such phenomena, which in real conditions are very complex and expensive, and in some cases impossible. The author shows that it is possible to design both homogeneous and heterogeneous multiprocessor systems under the necessary conditions, and in this part of the paper are described all the main characteristics of these systems – design, network interface, functional aspects and more. It is established that the creation of parallel multiprocessor computing systems (clusters) is one of the strategic directions for the development of the digital economy.

The fifth chapter focuses on the study of real options. New possibilities for applying the method of real options for the digital component of corporate governance and the digital economy are

presented. It has been found that the real option in the digital economy in one of three variants (digital asset option, digital income option or digital income option based on digital asset) allows to more accurately reflect the income generation processes in the digital economy and allow to form sensible value-based solutions in corporate governance, including in the digital economy.

The sixth chapter is devoted to the analysis of new methods for option pricing. After analyzing the various analytical methods for option pricing, emphasis was placed on the Black-Scholes-Merton model as an improved version of the Black-Scholes model. The numerical-analytical method for solving partial differential equations on the basis of modern parallel computational technologies for determining the price of the option has been further developed, which allows to increase the accuracy and achieve high efficiency of calculations by reducing time compared to the traditional approach. for processing.

The conclusion presents the main findings from the study. In general, it can be summarized that the author has managed to achieve the set goal and tasks of the dissertation.

7. Contributions and significance of dissertation for science and practice

The author's contributions are listed in the conclusion in the abstract. The contributions can be divided into two groups – scientific contributions of theoretical nature and scientific-applied contributions of practical nature. The author has presented a total of 12 scientific and scientific-applied contributions of his dissertation. However, some of them are more of the results of research. In this context, they are rightly mentioned in the conclusion of the dissertation and of the abstract. They are also presented on pages 8-11 in the abstract. However, the doctoral student should highlight more clearly the scientific and practical contributions of the dissertation.

8. Evaluation of publications on the dissertation

The candidate has presented 29 scientific publications on the topic of the dissertation. They are completely co-authored and closely related to dissertation issues.

The doctoral student is the author of: 6 articles (co-authored) published in journals indexed in the world database SCOPUS, 6 articles co-authored published in journals indexed in SCOPUS (accepted and printed), 8 publications (co-authored) in scientific journals, 3 monographs (co-authored), 6 papers to scientific and practical conferences.

These publications are listed in the Reference with scientific publications on the topic of the dissertation, where summaries of publications in Bulgarian and English are presented, and are also listed in the abstract.

It makes a positive impression that the doctoral student has joint publications with his supervisor – Assoc. Prof. Dr. Radostin Vazov.

However, it does not make a good impression that the doctoral student does not have a single independent scientific publication.

9. Personal participation of the candidate

There is evidence that the dissertation is the work of the candidate himself.

10. Abstract

The abstract corresponds to the content of the dissertation. The abstract is prepared in Bulgarian and English, and the dissertation – only in English. The abstract does not include a separate Reference of scientific and scientific-applied contributions, but they are presented in conclusion.

11. Critical remarks and recommendations

I have the following notes and recommendations about the dissertation:

The author has not formulated a research thesis or hypothesis / hypotheses of the dissertation to direct him to the specific field of research and to be proven or rejected in the course of the research. Therefore, in my opinion, the dissertation covers a particularly wide range of problems related to the subject matter.

My main difficulties in preparing the review are related to the translation into Bulgarian of the presented materials on dissertation. For example, in the whole abstract it is written a diploma work instead of a dissertation, which is quite annoying and unpleasant. Even when the candidate's last name is written on the title page of the abstract in Bulgarian, there is a Ukrainian letter. The more significant problem is in the material itself, which is not translated well enough and makes it difficult to read. In practice, a much better idea of the research is obtained from the English versions of the work itself and the abstract. However, these difficulties do not diminish the qualities of the dissertation of the candidate for the educational and scientific degree „Doctor".

Notes of a technical nature to the dissertation, the presence of repetitions, discrepancies in the number of tables, etc. can also be made, but they do not diminish the merits of the dissertation.

12. Personal impressions

I do not know the Ph.D. student and I have no personal impressions of her.

CONCLUSION

The dissertation on the topic "**Development and Research of Applied Digital Economy Basis: Blockchain and Optional Approach**", developed by Ph.D. student Volodymyr Busygin is an interesting and in-depth study of this issue, which shows that the basic approaches of the digital economy, based on the development of blockchain and the optional approach, can be implemented and adapted in the form of specific methods in each organization. The presented materials comply with the requirements of the Law for the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB) and the Regulations for implementation of ZRASRB, and the Regulations for admission and training of doctoral students at VUZF University.

Based on this, I give my **positive assessment** of the research presented by the above-reviewed dissertation and abstract, and **I propose to the esteemed scientific jury to award the educational and**

scientific degree of *"Doctor"* to Volodymyr Busygin in the area of study 3. Social Sciences, Economics and Law, field of study 3.8. Economics, Ph.D. program "Finance, Insurance and Social Security", Higher School of Insurance and Finance (VUZF University), Sofia.

05.06.2022
Sofia

Reviewer: .....
(Prof. Dr. Silvia Trifonova-Pramatarova)