

OPINION

**Associate Professor Gergana Ilieva Mihaylova-Borisova,
University of National and World Economy**

of dissertation of awarding the educational and scientific degree "Philosophiae
Doctor"

in the field of higher education 3. Social, economic, and legal sciences
Professional field 3.8. Economics, PhD Programme "Finance and insurance"

Author: *Volodymyr Busygin*

**Topic: *Development and Research of Applied Digital Economy Basis: Blockchain and
Optional Approach***

Research Supervisor: *Associate Professor Radostin Vazov, PhD*

1. General description of the submitted materials

By Order No. 118 of May 5, 2022 of the Rector of the Higher School of Insurance and Finance Prof. Boris Velchev, I have been appointed as a member of the scientific jury for the procedure for the defense of a dissertation thesis entitled " of Applied Digital Economy Basis: Blockchain and Optional Approach" for the acquisition of the educational and scientific degree "Doctor" in the field of higher education 3. Social, Economic and Legal Sciences, professional field 3.8. "Finance, Insurance and Assurance". The author of the thesis is Vladimir Bosygin - PhD student at the Department of Finance and Insurance of the Higher School of Insurance and Finance.

The materials submitted by PhD student Volodymyr Busygin include: dissertation for the award of the educational and scientific degree "Doctor", abstract of the dissertation in Bulgarian and English, CV, reference for fulfillment of the minimum national requirements for the award of the educational and scientific degree "Doctor" in professional field 3. 8. Economics, publications on the dissertation. The doctoral candidate has participated in numerous publications, which are co-authored, such as 3 monographs, 6 publications published and indexed in Scopus, 8 publications

in scientific journals, 6 reports in scientific and practical conferences. He has also submitted 6 publications that have been accepted for publication in Scopus but have not yet been published.

2. Brief biographical details of the applicant

The PhD student Volodymyr Busygin is enrolled in an independent form of study in the doctoral program "Finance, Insurance and Assurance" at the Department of Finance and Insurance of the Higher School of Insurance and Finance - Sofia, as of September 2020. He holds a Bachelor's degree in Finance and a Master's degree in Computer Science. He has also extensive practical experience as a co-founder and CEO of the Sports Innovations and Development Laboratory in Ukraine, counselor on foreign affairs at the farming enterprise "Sitik-Agro", chief manager of foreign affairs at the company M Plus CC, chief of foreign affairs of the company "Vasil" LTD - manufacturer of sports training machines.

3. Characteristics and evaluation of the thesis

The dissertation has a total length of 190 pages, of which the substantive part is 179 pages. It contains an introduction, an exposition with six chapters and a conclusion. The doctoral candidate has researched and used a wide range of economic literature related to the topic of the dissertation, namely 183 sources mainly in English and Russian. A variety of contemporary sources have been covered, including monographs, articles, periodicals and non-periodicals. The dissertation includes 8 tables and 60 figures.

The dissertation is on a topical theme related to the development of theoretical propositions and methodological positions, scientific and practical assumptions and recommendations for the management of digital transformation of applied economic systems based on the development of blockchain technology and the option approach.

The dissertation develops the principles of modern digital economy, which is based on blockchain technology and the option approach and aims to improve the structure and characteristics of multiprocessor computer systems for the purpose of solving the existing modern problems of digital economy. In this connection, 5 hypotheses are defended, of which are: the need to accelerate the process of digitalization and digital transformation of the economy for the purpose of achieving a competitive position in the emerging digital space; blockchain technology opens up new business opportunities and is used to optimize the financial activity of enterprises and banks; the emergence of new financial tools, such as options, without which companies and individual participants in financial markets will not be able to carry out their further activities; computer technologies are a driving factor for the development of the digital economy, etc. The PhD student also set himself 11 tasks in the course of the research.

The first chapter presents the basic principles and technological organization of the digital economy and the problems facing its practical implementation. Attention is paid to blockchain technology, its basic mechanisms and its use in logistics and banking. Special attention is also paid to the nature of options as one of the most flexible tools used in the digital economy. The second chapter is devoted to the innovative blockchain technology, which is the basis for the development of the digital economy. An analysis of software platforms for building blockchain is performed, proving that Ethereum's platform for building decentralized applications is the most secure for data storage due to the difficulty of breaking the secret key. The third chapter proposes a novel blockchain system that is based on a linear-scale consensus mechanism, allowing for the construction of a more flexible and decentralized architecture. In the next chapter, it is shown that a major factor influencing the development of information technology and the digital economy is information technology. Computing tools are particularly important in solving the problems of the digital economy. The fifth chapter is devoted to real options and the introduction of new types of options (license option, PR option, locality option, Digi-Smart option). The last chapter analyzes the existing option pricing methods by proposing and developing a modified parallel computer algorithm based on the Monte Carlo method.

In the conclusion, the PhD student summarizes the main conclusions he has reached in the course of his research.

4. Contributions and Significance of the Development for Science and Practice

The dissertation work of Volodimir Bosygin has a practical orientation, which is why it is possible to find significant scientific and applied moments in the dissertation work. The doctoral candidate gives his author's definition of the distinction of a new external environment of companies: the "digital environment", in which the competitive advantages of the transformation of the digital economy are manifested, as well as his concept of value management of companies taking into account digital factors, significant changes in technological processes, etc. Bosygin has also made significant contributions in developing a new method for creating a fully scalable, evidence-based and energy-efficient blockchain with a new consensus protocol that differs from known methods in robustness. It also develops a new model for security analysis of blockchain protocols based on the segmentation procedure, and allowing to estimate the failure probability of a node and consequently a blockchain chain. His proposed approach for evaluating options based on parallel Monte Carlo algorithms also has significant practical applications.

My conclusion about the contributions of the dissertation is that it reflects the doctoral student's extensive knowledge of practice combined with a very good knowledge of the theory in the topic under study.

5. Assessment of publications on the thesis

The PhD student Vladimir Bosigin has presented participation in numerous publications in co-authorship, including 3 monographs, 6 publications published and indexed in Scopus, 8 publications in scientific journals abroad, 6 reports in scientific and practical conferences. He has also submitted 6 publications that have been accepted for publication in Scopus but not yet published. All publications are co-authored, but the large number of publications indexed in Scopus is impressive. In the abstract, it is explicitly stated by the PhD student that the scientific achievements, conclusions and recommendations in the thesis were obtained by him personally and only ideas that are the result of the author's own research are presented in the thesis.

With the presented publications the PhD student fulfils the requirements set out in the Law on the Development of the Academic Staff of the Republic of Bulgaria and the Regulations for its Implementation regarding the number and type of scientific publications.

6. Assessment of compliance with minimum national requirements

The doctoral candidate has submitted a dissertation for the award of PhD, which meets the established rules for the development of this type of scientific work, as well as publications in scientific journals abroad. The report on the candidate's fulfilment of the minimum national requirements for the acquisition of the educational and scientific degree "PhD" in the professional field 3.8. Economics shows that the doctoral candidate has numerous publications that exceed the national minimum requirements under the Regulations for the Implementation of the Law on the Development of Academic Staff of the Republic of Bulgaria. The doctoral candidate has indicated in the reference: 6 co-authored articles, two of which are indexed in Scopus, 3 co-authored conference papers, one of which is indexed in Scopus.

7. Author abstract

The abstract is 40 pages long. It accurately and adequately reflects the content of the dissertation and meets the requirements. The abstract in Bulgarian language needs a stylistic revision.

8. Critical comments and recommendations

The dissertation represents a complete study with a number of merits and contributions. The quality of the development shows that the doctoral student has mastered the researched issues and is

able to use the methods and style of research. My only remark is with regard to the layout and the need for stylistic editing of the abstract in Bulgarian.

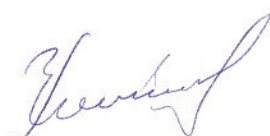
CONCLUSION

The dissertation contains scientific, scientific and applied results that represent an original contribution to science and meet the requirements of the Law for the Development of Academic Staff in the Republic of Bulgaria and the Regulations for the Implementation of the Law. The submitted materials and dissertation results fully comply with the specific requirements of the Regulations for Admission and Training of Doctoral Students at the Higher School of Insurance and Finance.

The dissertation work shows that the candidate Volodimir Bosygin possesses in-depth theoretical knowledge and professional skills in Professional field 3. 8. Economics, demonstrating qualities and skills for conducting scientific research.

Due to the foregoing, I confidently give my **positive assessment** of the research conducted, as represented by the above-reviewed dissertation, abstract, results and contributions, and propose to the Honourable Scientific Jury to award the degree of Doctor of Education and Science to Volodimir Bosygin in the Field of Higher Education 3. Social, economic and legal sciences; Professional field 3. 8. Economics.

May 30, 2022


Reviewer:
(Assoc. Prof. Gergana Mihaylova-Borisova, PhD)