REVIEW

by official opponent Nataliya Struk,

Doctor of Economic Sciences, Professor, Professor of the Department of Accounting and Auditing, Ivan Franko National University of Lviv on the dissertation by

Liu Chengyu "Accounting using blockchain technology",

submitted for the degree of Doctor of Philosophy

in the field of knowledge 07 "Management and Administration,"

specialty 071 "Accounting and Taxation"

Relevance of the dissertation topic and its connection with scientific programs, plans, and topics. The development of the digital economy is accompanied by a transformation in accounting approaches, driven by the active introduction of the latest information technologies, in particular blockchain technology. With the globalization of financial markets, the growth in the volume of electronic transactions and the expansion of the range of digital assets, there is an increasing need for reliable, timely, continuous and secure accounting information in the accounting system. Research into the possibilities of integrating blockchain technology into the field of accounting is becoming increasingly relevant, as it not only improves the efficiency of economic information management, but also ensures a qualitatively new level of transparency, reliability and automation of accounting processes.

Blockchain technology provides decentralized data storage and processing, enabling accounting without intermediaries, with minimal risk of data falsification or loss, and with high speed and accuracy in recording business transactions. Accordingly, there are prospects for transforming the traditional accounting paradigm regarding record keeping, primary document formation, internal control, and the preparation of financial and integrated reports. As a result, there is a need for a comprehensive scientific rethinking of the methodological and organizational foundations of accounting in the context of the use of blockchain technologies.

Given the existence of individual studies devoted to the analysis of the legal, technical and economic aspects of blockchain, we observe insufficient development of issues related to the justification of accounting principles, approaches to the classification

and valuation of digital assets, disclosure of information in financial and non-financial reporting, as well as the adaptation of national accounting standards to new digital realities. There is also no single conceptual model for accounting in distributed information systems.

Summarizing international experience, assessing the impact of blockchain solutions on the accounting system of enterprises, and adapting the latest technologies to the national legal and economic environment are important for the establishment of a modernized accounting system capable of responding to changes in the digital economy. That is why the chosen topic of the dissertation is relevant, timely and important for the development of science and the improvement of accounting practices in the context of digitalization.

The tasks that Liu Chengyu attempts to solve, in terms of scope, depth of coverage and persuasiveness of arguments, testify to a thorough analysis of the outlined issues and the importance of theoretical, methodological and applied development of conceptual approaches to accounting procedures in the context of blockchain technology use.

The connection between the dissertation and scientific programs and research topics is logical and well-founded. The dissertation was completed in accordance with the research plans of the Western Ukrainian National University. In particular, the contractual research topic “Digitalization of accounting to ensure the economic and cyber security of the enterprise” (state registration number 0125U001067), within which, through the application of blockchain technology, the author has improved the methodology of accounting for electronic transactions and the approach to cybernetic information protection.

The level of reliability and validity of scientific propositions, conclusions and results of the dissertation. The main scientific results of the author's research are sufficiently substantiated. Their reliability is beyond doubt. The applicant critically analyzed scientific sources on the problems of theory, methodology and organization of accounting procedures in the context of blockchain technology. Liu Chengyu studied a significant amount of scientific works by Ukrainian and foreign scientists, as well as legislative and regulatory acts. We trace the proper testing of the research results and their successful implementation.

The author of the dissertation clearly outlines and logically formulates the purpose and objectives of the research, substantiates the theoretical and methodological approaches to their implementation, and develops and tests appropriate proposals, which, taken together, reflect the scientific path to achieving the set goal. It should be noted that the objectives, provisions of scientific novelty and conclusions of the dissertation are logically interrelated. The research results were obtained by the author personally.

The dissertation by Liu Chengyu is an original scientific work, performed at the appropriate theoretical and applied level. It has a consistent structure and is a comprehensive and complete scientific work. The content of the work and the multifaceted coverage of accounting issues in the context of blockchain technology demonstrate the author's versatile and comprehensive scientific competence. The reliability of the research results presented in the work is confirmed by the use of statistical analysis methods, economic-mathematical and graphical methods, which, through the analysis of a significant amount of information, made it possible to comprehensively reveal the areas of application of blockchain technology in various segments of accounting and justify the need for new decisions to improve it.

The level of validity and reliability of the scientific provisions, conclusions and recommendations in the applicant's dissertation has been confirmed by testing at four international scientific and practical conferences, three publications in professional journals in Ukraine registered in international scientometric databases, and one publication in a scientific journal included in the SCOPUS and Web of Science scientometric databases.

Scientific novelty of the provisions, conclusions and results of the dissertation. In her dissertation, Liu Chengyu formulated and substantiated provisions, conclusions, and proposals that are characterized by scientific novelty and have practical applications. The scientific provisions formulated by the author independently reflect her personal contribution to the development of accounting theory.

The scientific novelty of the work is presented in a concrete, consistent and systematic manner. It is worth noting that the author:

– improved the methodology of electronic documentation and document flow based on the principles of block-chain data structuring technology, which involves the fragmentation

and recombination of accounting information at the internal and external levels of electronic communications implementation, which, unlike existing isolation practices, ensures the openness of document flow while preserving the commercial secrecy of the enterprise in accordance with the information needs of users, taking into account their classification in the enterprise management system (pp. 107-123);

– the procedure for integrating blockchain technology with cloud services has been improved to ensure the efficiency, security and transparency of accounting processes based on the capabilities of block-chain data structuring in the direction of their decentralization and cyber protection, which, unlike existing cloud accounting systems, is capable of: overcome the functional limitations of blockchain technology, offer effective management solutions for financial management, accumulate accounting information for tactical and strategic purposes, organize effective cyber security, and, as a result, minimize operating costs, increase the efficiency of information processes and ensure the scalability of implementation in the activities of variable enterprises (pp. 96-106);

– improved the information scheme for accounting for electronic transactions, which provides for digitized documentation, inventory, valuation, and reflection of cryptocurrencies in accounting accounts and reporting with their recognition as cash, cash equivalents, financial instruments, and intangible assets in the context of evolutionary development in the digital economy, which ensures the generation of primary documents exclusively in electronic format, automatic formation of accounting records, permanent control over electronic transactions, and remote management of the enterprise's operations (pp. 80-95);

– an approach has been developed to generalize the impact of innovative information technologies (Big Data, blockchain, artificial intelligence, mobile Internet, cloud computing, Internet of Things) on accounting in the digital economy in the direction of ensuring integration, automation, data-driven decision-making, innovation, scalability, user orientation, transparency, security, and sustainability in the processing of accounting information, which justifies the gradual evolution of the accounting system from the stage of informatization to the stage of intellectualization (pp. 148-151).

The main content of the dissertation is structured into sections and subsections. The conclusions are well-reasoned and have important theoretical and practical significance. In

assessing the validity of the scientific propositions, conclusions and recommendations as a whole, we note the author's adequate level of theoretical and methodological treatment of the research topic.

Theoretical and practical value of the provisions, results and conclusions of the dissertation. The scientific results obtained have practical value, consisting in the development and improvement of the methodological and applied basis for the formation of an accounting system in the context of using blockchain technology. In particular, the following proposals are interesting:

- positioning of three types of blockchain technology (public chains, alliance chains and private chains), endowed with specific architectural characteristics, as transformers of accounting methodology and organization for decentralization (distributed ledger), reliable interaction, smart contracts, a coordinated access mechanism, a new measurement model, and a timestamp that creates security for accounting data, reduces fraud, and increases the efficiency of accounting operations (pp. 45-63);
- an information scheme for open document flow based on blockchain technology (p. 95);
- a scheme for storing data in a private chain network of an enterprise (p. 105);
- a developed scheme for an innovative information system for foreign economic electronic transactions involving cryptocurrencies and its impact on accounting functions (p. 141).

A positive aspect is that the dissertation's sample of data on the implementation of blockchain technology in the accounting sphere covers a period of 10 years (from 2013 to 2023). The results of regression analysis, obtained on the basis of annual observations of 1,598 companies, prove the significant and positive impact of blockchain technology on the organization of accounting (pp. 164–174).

The main results of the dissertation are fully presented in scientific publications. The theoretical provisions, conclusions and recommendations set out in Liu Chengyu's dissertation are scientifically sound, well-argued and reliable. Based on the results of the research, eight scientific works have been published: four abstracts of international scientific and practical conferences, three publications in professional journals of Ukraine registered in international scientometric databases, and one in a

scientific publication included in the SCOPUS and Web of Science scientometric databases.

The publications fully reflect the provisions of the dissertation. The content of the applicant's scientific works on the topic of the dissertation and the profile of the printed publications comply with the current requirements of the Ministry of Education and Science of Ukraine for the presentation of scientific work results for obtaining a Doctor of Philosophy degree in the field of knowledge 07 “Management and Administration” in the specialty 071 “Accounting and Taxation”.

Absence (presence) of academic misconduct. Familiarization with the dissertation and scientific works of Liu Chengyu gives grounds to assert that the author has adhered to the principles and norms of academic integrity. The use of provisions, works and statements of other authors contains appropriate correct references to the original sources for textual and illustrative borrowings. There is no academic plagiarism. No violations of academic integrity have been found in the dissertation and publications.

Points for discussion and comments on the content of the dissertation. In general, while evaluating the dissertation positively, it is advisable to pay attention to the following discussion points and comments:

1) Despite the fact that the topic of the dissertation comprehensively addresses the disclosure of accounting procedures in the context of blockchain technology, the focus is mainly on the application of such technology in financial accounting. In the second chapter, the author rightly states that “Enterprises should make fulluse of the platform to collect more information about customer behavior, purchase habits, transaction records, search preferences, etc.”; “Establishing an advanced and efficient financial management mechanism isundoubtedly the key for an enterprise to achieve sustainable development and increase revenue, which will greatly increase the market share of the enterprise and create greater value for investors” (p. 113). Therefore, the scientific work would be greatly enriched by revealing the elements of blockchain technology in management accounting and during the formation of integrated reporting.

2) The title of Table 1.2 “Historical Development of IT and Its Impact on Accounting”, should have been presented as “Stages of Historical Development of IT and Its Impact on Accounting”.

3) Section 3 is titled “Improving Accounting Using Blockchain Technology and Analyzing Its Effectiveness”, but the titles of the subsections do not contain phrases such as “improving accounting” and “analyzing effectiveness.”

4) Subsection 3.1 “Accounting for electronic money and cryptocurrencies” presents a somewhat fragmented and inconsistent classification of cryptocurrencies. In particular, classifications according to IFRS (IAS 2, IAS 7, IAS 32, IAS 38) are considered, but the author does not take a clear position on the most appropriate classification. Tax aspects of accounting for electronic money and cryptocurrencies are also not taken into account.

5) In subsection 3.2 “Accounting for settlements with counterparties” most of the text is devoted to technological aspects (blockchain, smart contracts, big data), but the specifics of accounting procedures for settlements with counterparties are not sufficiently disclosed. In particular, there is no analysis of how the introduction of blockchain technologies transforms accounting procedures in accordance with IFRS or NAP(S)B. Instead, a significant amount of information is provided on international payment systems (SWIFT, Western Union); the architecture of the new blockchain model is described in detail; the Rubik case study mainly describes IT solutions rather than justifying the accounting approach. It would have been useful to clearly highlight the practical aspects of implementing blockchain technologies in accounting for settlements with counterparties.

At the same time, the comments made do not diminish the scientific and practical value of the main provisions of the dissertation, the conclusions drawn, or the recommendations provided, but only emphasize the relevance, complexity, and comprehensiveness of the chosen research topic.

Overall assessment of the dissertation and conclusions. Liu Chengyu’s dissertation “Accounting using blockchain technology” is a comprehensive, original, and independent scientific study. Given the relevance of the topic, scientific novelty, significance of the results obtained, and professional focus, the dissertation meets the requirements for its formatting, approved by Order of the Ministry of Education and Science of Ukraine No. 40 dated 12 January 2017 (as amended on 31 May 2019 No. 759), as well as the Procedure for awarding the degree of Doctor of Philosophy and cancelling the decision of a one-time specialized academic council

of a higher education institution or scientific institution on awarding the degree of Doctor of Philosophy, approved by Resolution of the Cabinet of Ministers of Ukraine No. 44 of 12 January 2022 (as amended on 21 March 2022 No. 341 and dated 19 May 2023 No. 502), and its author, Liu Chengyu, deserves to be awarded the degree of Doctor of Philosophy in the field of knowledge 07 "Management and Administration" in the specialty 071 "Accounting and Taxation".

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