

ВІДГУК ОФІЦІЙНОГО ОПОНЕНТА

д.е.н., доцента, завідувача відділу економічного регулювання природокористування Державної установи «Інститут ринку і економіко-екологічних досліджень НАН України» Петрушенка Миколи Миколайовича на дисертаційну роботу аспіранта кафедри менеджменту імені Л. І. Михайлової Цюй Дунсюй (Qu Dongxu) на тему «Формування системи управління освітніми та науковими активами університету в умовах переходу до моделі циркулярної економіки Китаю» (англ. “Formation of management system of university’s educational and scientific assets in the context of transition to the model of circular economy in China”), поданої на здобуття ступеня доктора філософії з галузі знань 07 «Управління та адміністрування» за спеціальністю 073 «Менеджмент»

1. The relevance of research

Universities are increasingly rethinking their role in the 21st century and looking to be both more responsive to societal needs and to become agents of change towards solving global challenges. Universities drive technological and societal progress through research, discovery and knowledge creation. They also provide people with professional and personal skills and capabilities. They have access to large concentrations of young and curious people who are passionate, creative and have a desire for a better world.

The dissertation is devoted to the study of the formation of the system of management of educational and scientific assets of the university in the conditions of the transition to the circular economy model of China. Especially in some developing countries, such as China, the potential of universities to contribute to the circular economy needs to be further explored and developed. Specifically, it is necessary to develop an adequate theoretical framework for the circular economy and an

operational asset management model towards the circular economy in Chinese universities.

They also increase influence global development through international students and alumni, campuses and capacity building activities. A few features make universities stand out from other institutions: they are small enough to keep it all under control while allowing for a relatively quick change; they are interlinked infrastructure with a stable number of residents; they have effective communication channels; they boats a possibility to set internal rules to be followed by everyone, and they have a strong intellectual climate. Hence making them a perfect testbed when it comes to walking the talk concerning circular economy. All this determined the choice of the topic, purpose and objectives of the study.

2. Connection of work with scientific programs, plans, topics

The study's subject is consistent with the basic principles of “The 2030 Agenda for Sustainable Development” (Resolution 70/1 of UN General Assembly), the “European Green Deal” (Announcement of the European Commission in 2019), the “Sustainable Development Strategy of Ukraine until 2030” (draft No. 9015 of 07.08.2018), and “China's National Plan on the Implementation of the 2030 Agenda for Sustainable Development” (Announcement of the Chinese government in 2019). The dissertation was carried out following the topic of scientific research of the Erasmus+ Programme of the European Union within the project “Towards circular economy thinking & ideation in Ukraine according to the EU action plan” (grant number 620966-EPP-1-2020), in which the author investigated the foreign experience of management of CE-related assets in higher educational institutions.

3. The scientific novelty of the results

The scientific novelty of the obtained results consists in the formation of a comprehensive asset management system of Chinese universities in accordance with the requirements of the development of China's circular economy models based on world-leading experience. The scientific essence could be concluded as follows:

- for the first time, the scientific use of the term university assets related to the circular economy was introduced in the university asset management system, which is based on a qualitatively new approach to the construction of university asset management mechanisms from the standpoint of circular economy principles

- improved the waste management program at Henan Institute of Science and Technology through comparison with Leiden University in the Netherlands through the application of artificial intelligence technology in the waste flow management process. This will provide a more efficient alternative to solving current waste separation and recovery problems by increasing the efficiency of waste separation processing and reducing the amount of solid waste entering landfills and waste incineration plants.

- the system of indices for evaluating the effectiveness of management of assets related to CE of the university was further developed, covering the target level, the criterion level with three factors and the index level with 29 indicators. It is more reliable than the traditional self-evaluation method because it is based on the principle of full participation and creates a feedback channel for the public to participate in the management of the university's activities.

- the methodical approach of analyzing the scientific potential of universities in the implementation of CE based on the method of spatial econometrics, which differs from the existing ones by taking into account factors of innovation of knowledge in universities and indicators of regional technological innovations, has been strengthened. In particular, the impact of research results of Chinese universities on enterprise technological innovation is mainly investigated using Moran's index analysis.

4. Theoretical and practical significance the results of the dissertation

Based on fundamental and applied research, it was established that the main provisions of the thesis are brought to the level of methodological developments and practical recommendations that can be used by public authorities during the

development of strategies and programs for the management of CE-related assets in colleges and universities. The proposal of the waste management program for Henan Institute of Science and Technology in this study has been considered by the decision-makers in improving the waste management at Henan Institute of Science and Technology and even could be applied to the urban waste management of the city where it is located after mature development. The results of the dissertation work can be used in the educational process when studying the disciplines “Sustainable Development”, “Management”, “Innovative Enterprise Development”. At the same time, the research results can be used in conducting fundamental and applied research in the direction of educational institution management.

5. Complete presentation of the dissertation material in scientific publications

The scientific results of the dissertation were published in 18 scientific works, including: 6 articles in international scientific publications, all included in the international scientometric databases Scopus and Web of Science; 2 articles were published in scientific and specialized publications of Ukraine; 1 in the scientific publications of the Organization for Economic Cooperation and Development of Countries, which are included in the scientific and metric databases; 8 theses in materials of scientific conferences; 1 chapter of the international monograph. The total volume of publications is 5.23 sheets, of which 3.25 sheets belongs to the author personally. The list of publications is presented below.

Scientific works reflecting the main scientific results of the dissertation:

1. Qu, D., Shevchenko, T., Shams Esfandabadi, Z., & Ranjbari, M.(2023). College students' attitude towards waste separation and recovery on campus. Sustainability, 15(2), 1620. <https://doi.org/10.3390/su15021620> (Scopus & Web of Science) (the author conducted the conceptualization, software, formal analysis, investigation, data curation, and visualization, and specifically prepared the initial draft.)

2. Qu, D., Shevchenko, T., Saidani, M., Xia, Y., & Ladyka, Y. (2021). Transition towards a circular economy: the role of university assets in the implementation of new model. *Detritus*, 17(4), 3-14. <https://doi.org/10.31025/2611-4135/2021.15141> (Scopus & Web of Science) (the author developed the methodology, formulated the models, and specifically prepared the initial draft.)

3. Qu, D., Shevchenko, T., Xia, Y., & Yan, X. (2022). Education and instruction for circular economy: A review on drivers and barriers in circular economy implementation in China. *International Journal of Instruction*, 15(3), 1-22. <https://doi.org/10.29333/iji.2022.1531a> (Scopus & Web of Science) (the author designed the research framework, conducted the literature collation, performed a statistical analysis of the results, visualized the results, and specifically prepared the initial draft.)

4. Qu, D., & Shevchenko T. (2020). University curriculum education activities towards circular economy implementation. *International Journal of Scientific & Technology Research*, 9(5), 200-206. <http://www.ijstr.org/final-print/may2020/University-Curriculum-Education-Activities-Towards-Circular-Economy-Implementation.pdf> (Scopus) (the author conducted the data collection and collation, performed the analysis of the results, and specifically prepared the initial draft.)

5. Bliumska-Danko, K., Charreire-Petit, S., Qu, D., & Shevchenko, T. (2022). Mapping organic packaging research: Environmental concern and health safety. *Environmental Economics*, 13(1), 155-170. [https://doi.org/10.21511/ee.13\(1\).2022.13](https://doi.org/10.21511/ee.13(1).2022.13) (Scopus) (the author conducted the literature collation and analysis and participated in the initial draft preparation)

6. Xia, Y., Qu, D., Stoyanets, N., & Zhao, H. (2022). Policy evolution of personnel management in Chinese educational institutions: A comprehensive policy circle analysis. *Problems and Perspectives in Management*, 20(4), 544-559. [https://doi.org/10.21511/ppm.20\(4\).2022.41](https://doi.org/10.21511/ppm.20(4).2022.41) (Scopus) (the author conducted the

conceptualization, investigation, visualization and participated in the draft editing)

7. Qu, D., & Shevchenko, T. (2019). University as a driving force for circular economy implementation in China. *Bulletin of Sumy National Agrarian University*, 1(79), 14-20. <https://doi.org/10.32845/bsnau.2019.1.3> (the author conducted the data collection and collation, performed a formal analysis of the results, and specifically prepared the initial draft.)

8. Shevchenko, T., & Qu, D. (2019). University's pro-circular activity in transition to circular economy model in China. *Sustainable Development*, 1, 46-51. (the author conducted literature collation, designed the research framework, and specifically prepared the initial draft.)

9. Qu, D., & Shevchenko, T. (2022). Advancing waste management program at university in China: enlightenment from the Netherlands. *Bulletin of Sumy National Agrarian University*, 3 (89), 54-65. <https://doi.org/10.32845/bsnau.2021.3.8> (the author conducted a survey of respondents, performed a formal analysis of the results, and specifically prepared the initial draft.)

10. Qu, D., & Shevchenko, T. (2019). Educational potential of Chinese universities for the implementation of circular economy model. [Monograph]. *New Stages of Development of Modern Science*, Izdevnieciba "Baltija Publishing", 434-450. <https://doi.org/10.30525/978-9934-588-15-0-44> (the author formulated the research goals and aims, conducted the data collation, and specifically prepared the initial draft.)

Scientific works certifying the approval of the dissertation materials:

11. Qu, D. (2021). Application of artificial intelligence in waste separation management at university. *Proceedings of the International Conference on Intelligent Vision and Computing (ICIVC 2021)*, Springer Book Series, Oman, 15, 330-343. https://doi.org/10.1007/978-3-030-97196-0_27 (Scopus)

12. Han, Y., Shevchenko, T., & Qu, D. (2022). Smart e-waste management in China: a review. *Proceedings of 2nd Congress on Intelligent Systems (CIS2021)*,

Springer Book Series, Singapore, 111. https://doi.org/10.1007/978-981-16-9113-3_38 (Scopus) (the author conducted the literature collation and participated in the initial draft preparation and proof-reading.)

13. Shevchenko T., & Qu, D. (2019). Management strategy for bike-sharing system operation at college campus in compliance with circular economy principles. Proceedings of Conference “Digital and Innovative Economy: Processes, Strategies, Technologies”, Poland, 175-177. (the author conducted the literature collation, designed the methodology, and specifically prepared the initial draft.)

14. Shevchenko, T., & Qu, D. (2019). Formation of universities’ pro-circular assets in China to meet the needs of circular economy model. Proceedings of Conference “Modern Problems of the Enterprise management: Theory and Practice”, Ukraine, 1-3. (the author conducted the collation of data and relevant literature and specifically prepared the initial draft.)

15. Qu, D., & Shevchenko, T. (2019). Development of education for the circular economy in China. Proceedings of Conference “Answers on Nowadays Economic and Environmental Challenges in a Vision of Scientists”, Ukraine, 124-127. (the author designed the research framework, conducted the development of the methodology, and specifically prepared the initial draft.)

16. Qu, D. (2021). Management model of sustainable university: Top-down directives or bottom-up participatory? Proceedings of Conference “Сучасний менеджмент: тенденції, проблеми та перспективи розвитку”, Ukraine, 10-13.

17. Qu, D., Shevchenko, T., & Yan, X. (2021). Circular economy models implemented in China. Proceedings of Conference “Answers on Nowadays Economic and Environmental Challenges in a Vision of Scientists”, Ukraine, 62-64. (the author conducted the literature collation, created the research framework, and specifically prepared the initial draft.)

18. Qu, D. (2019). Technology to optimize the university asset management system. Proceedings of Conference “Management of the XXI Century: Globalization

Challenges”, Ukraine, 25-26.

6. The validity’s degree of scientific provisions

The scientific provisions, conclusions and recommendations obtained from the research results are sufficiently substantiated and reliable.

The dissertation is characterized by a clear adherence to the structural and logical scheme of the research, the correspondence of the scientific results and the provisions issued for the protection of scientific novelty to the set goal and the specific task of the research.

At the dissertation student used a sufficient number of information sources from open databases, regulatory and legal literature, statistical and analytical materials. The results of the research and the author’s recommendations have undergone practical testing, which is confirmed by relevant documents.

The above is evidence of a sufficient level of validity and reliability of the results of scientific research, conclusions and proposals.

7. The structure and content of the dissertation, its completeness and compliance with the established requirements for design

The first section “Theoretical background of higher education institutions in promoting CE implementation”, was based on the literature analysis, this study proposed that the institutional design, technological progress, and pilot experience dissemination are the significant dependence for China to realize CE transition. The university assets are closely related to these dependency factors. Moreover, it is identified that the main drivers of CE in China are government policy support, public participation, economic benefits, CE awareness and knowledge, and CE technological support, and the main barriers are cultural barriers, market barriers, regulatory barriers, and technological barriers. Universities could bring prospects in enhancing the drivers and eliminating barriers through educational and scientific research activities. Further, it is clarified that the main factors that involve universities in the CE include the green campus initiatives, CE responsibilities of universities under

laws, the evolution of universities' functions, the need for ecological civilization, and the need for the scientific development of universities, as well as the potential on reducing corruption in universities. That is, universities should and could exert an irreplaceable significant influence in the CE transition. The previous research on university CE activities is fragmented and disconnected from each other, which mainly focuses on the major construction and talent training, curriculum design, instruction approaches and tools, and CE practice on campus. It is of great necessity to draw on the existing management experience of sustainable universities to establish a more practical CE management system in universities that could integrate the various isolated activities for an augmented effect.

The second section "Construction and evaluation of CE-related asset management system in Chinese universities" clarified the different from the previous studies, the CE-related university assets are the first to focus on the scientific management of university assets with the CE principles. In essence, CE-related university assets are the basis for universities to implement various CE activities and an important indicator for evaluating a university's CE performance. This novel concept contains four basic elements. The ownership subject of the CE-related university assets is the university. The forms of the assets are diverse. The use process of the assets should follow the 3Rs principles of the CE. The orientation of the assets should include universal CE policy goals. The attributes and a multi-dimension classification system are identified to help the decision-makers and participants to have a better understanding of the new terms. The concrete CE practical activities mainly take operation managers and staff members as subjects. This management system integrates various CE activities into a whole rather than simply patching them together. Besides, the evaluation system proposed in this study takes account of the full participation principle and establishes an information feedback channel between the public with the universities, which is more reliable rather than the traditional method of self-evaluation.

In the third section “Case study of waste management program in Chinese university”, the results show that the problems of waste management at Henan Institute of Science and Technology mainly include the lack of plans and organizations, lagging waste classification standards and equipment, low degree of waste separation and recovery, insufficient waste classification education and publicity, and lack of control and supervision measures. Based on the enlightenment from Leiden University, the specific waste management program for Henan Institute of Science and Technology is proposed to help Henan Institute of Science and Technology implement waste management into practice in the top to bottom approach. The results of the questionnaire survey on college students’ waste separation attitudes and behaviors show that females outperform males across attitudes and internal and external contextual factors. To make the research more practical and effective, a framework of waste separation management on campus based on artificial intelligence technology was established, which is of practical significance to realize the universities’ demonstration and contribution to the future sustainable city.

8. Discussion clauses and remarks to the dissertation

Nevertheless, it is appropriate to note that there are certain debatable points in the work.

1. The item of scientific novelty “for the first time” would be appropriate not to divide it into components, but to talk about the development of a comprehensive system of university asset management, which is based on a qualitatively new approach to the construction of university asset management mechanisms from the standpoint of circular economy principles and contains relevant components, involves interaction adjacent segments of the campus, waste disposal, etc.

2. The wording of the subsection of scientific novelty “improved” is also not entirely successful, which emphasizes the use of artificial intelligence technology. Yes, it would be appropriate to combine the subsections and note that based on the European experience of introducing artificial intelligence into the waste management

process, it could provide a more effective alternative for solving the current problems of waste separation and recovery by increasing the efficiency of waste separation processing and reducing the amount of solid waste, that end up in landfills.

3. A similar discussion may appear in the sub-item of scientific novelty “scientific potential has received further development...”, but the author had in mind “further development has received a methodical approach to the assessment of scientific potential”. The author should pay more attention to the formulation of his contribution to science.

4. It would be advisable to supplement the system of university assets related to CE proposed in Chapter 2 with a methodology for assessing the contribution of each element to CE.

5. By analyzing the evaluation methods of sustainable universities (140-143 pp.), an evaluation method and implementation standards of CE-related university assets management performance are created based on full participation theory. In this evaluation index system additional substantiation is needed in what way all faculty and staff should participate in the content and process monitoring as evaluation subjects to ensure the effectiveness of the evaluation index system, which is more reliable than the traditional method of subjective self-evaluation.

6. General conclusions to the dissertation work should be clearer and prove the results of the conducted research. In particular, paragraph 8 should show the numerical result of the influence of variable factors on the result of the given task.

However, these remarks reflect the own scientific position the opponent and do not deny the existence of the author’s vision of ways and approaches to address problematic issues in solving the tasks of the dissertation research.

9. General conclusion

Dissertation work of Qu Dongxu on the topic “Formation of management system of university’s educational and scientific assets in the context of transition to

China's circular economy model", which was submitted for defence to the specialized academic council for obtaining the degree of Doctor of Philosophy in the field of knowledge 07 management and administration with a specialty 073 management according to its relevance, scientific and theoretical level, main results of validity, main provisions and the results published in professional publications, the novelty of the formulation and the practical significance meet the requirements of the order of the Ministry of Education and Culture of Ukraine No. 40 of January 12, 2017 "On approval of requirements for the preparation of a dissertation" and Resolution of the Cabinet of Ministers of Ukraine of January 12, 2022 No. 44 "On approval of the Procedure for awarding a degree doctor of philosophy and cancellation of the decision of the one-time specialized academic council of the institution of higher education, scientific institution on awarding the degree of doctor of philosophy" with changes introduced in accordance with Resolution of the Cabinet of Ministers No. 341 dated 03.21.2022.

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