REVIEW

by Candidate of Economic Sciences,
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on the dissertation of Zhong Demin on the topic "Benchmarking the formation of circular clusters", submitted for the degree of Doctor of Philosophy in the field of knowledge 29 "International Relations" in the specialty 292 "International Economic Relations"

Relevance of the research topic

In the modern context of a global economy undergoing significant transformations driven by digitalization, urbanization, and ecological shifts, the concept of the circular economy is gaining increasing importance. Growing concerns about environmental issues and the need to reduce the carbon footprint necessitate the search for new economic models capable of ensuring sustainable societal development. One such model is circular clusters, which integrate principles of resource reuse, waste minimization, and sustainable production.

The relevance of this topic is determined by several key factors. First, contemporary economic development requires effective tools for analyzing and implementing circular practices across various industries. Benchmarking serves as one such tool, enabling the identification of best practices and facilitating their adaptation to new economic conditions. Second, the formation of circular clusters has significant potential for fostering sustainable development at both national and international levels. Research into these clusters can provide new insights into resource optimization, enhance the competitiveness of enterprises, and contribute to the development of new market opportunities. This is particularly crucial for developing countries facing challenges related to environmental sustainability and economic growth. Third, international economic relations are becoming increasingly interconnected, necessitating the development of effective strategies for integrating circular economy principles into global trade and investment. Benchmarking can be

instrumental in assessing the success of such strategies and their impact on global economic processes.

Given the above considerations, the dissertation by Zhong Demin on the topic "Benchmarking the Formation of Circular Clusters" is highly relevant and significant for advancing theoretical and practical approaches to managing sustainable economic development. This research holds substantial importance for international economic relations and the global economy as a whole.

Connection of the dissertation with scientific programs, plans, and themes

The research was conducted within the framework of the scientific research activities of the West Ukrainian National University, specifically: "National Concept of Eco-Security of Society and Inclusion of the Circular Economy in Pandemic Conditions" (state registration number 0121U109485); fundamental scientific research project on the topic "Concept of Recovery and Green Reconstruction of Ukraine" (state registration number 0124U000003); implementation of an international project (Erasmus+ Jean Monnet Module) on the topic "European Inclusive Circular Economy: Post-War and Post-Pandemic Module for Ukraine" (registration number 101085640); Geoeconomic and Civilizational Challenges of the Development of the Global Economy (state registration number 0121U111077), these research initiatives incorporate the author's proposals aimed at improving theoretical and methodological frameworks for the implementation of the circular economy, as well as analyzing the evolution of circular economy development within high-tech sectors.

Personal contribution of the researcher to the obtained scientific results

The qualification work is an independently conducted scientific study in which the author has personally developed a new model of the circular economy. All scientific ideas, theoretical developments, generalizations, research methodology, conclusions, and recommendations presented in the dissertation are the sole work of the author. The author's contribution to collectively published works is specified in the list of publications; only those ideas that belong exclusively to the author have been used in the dissertation. The level of the author's personal contribution is sufficient.

Degree of justification of scientific provisions, conclusions, and recommendations

A review of Zhong Deming qualification work confirms the high level of the conducted research and the presence of scientific novelty. The justification of the scientific provisions, conclusions, and recommendations is based on modern theories and concepts of international economic relations, as well as relevant studies by scholars from various countries.

To substantiate the research results, the author employed a comprehensive set of general scientific and specialized methods, including theoretical generalization, qualitative and quantitative analysis, analysis and synthesis, monitoring, SWOT analysis, statistical analysis, an evaluation system with interdependent indicators, correlation and regression analysis, cluster analysis, as well as tabular and graphical methods for data visualization and presentation of key findings. A substantial number of literary and statistical sources, as well as analytical data on the formation of circular clusters, were examined.

The dissertation explores the theoretical foundations of the circular economy. Specifically, it examines the theories and characteristics of the circular economy (pp. 18-23), introduces the author's fundamental model of the circular economy (pp. 24-25), proposes a structure for the circular economy system based on material flows, and compares the circular economy with industrial clusters (pp. 26-49). Noteworthy is the author's approach to benchmarking the circular economy for cluster formation (pp. 50-70). As a result, a system of indicators for assessing the development of cluster-based circular economies has been constructed (pp. 71-78).

The dissertation develops a system of indicators for assessing the development of the regional circular economy (pp. 80-102), analyzes the evolution of the clustered circular economy, and proposes an original scheme for planning the circular economy in high-tech zones (pp. 103-112). An empirical analysis of the high-tech zone in Xinyu, Jiangxi Province, was conducted, leading to the development of an ecological evaluation mechanism for Xinyu high-tech zone and contributing to the transformation of the high-tech zone and large enterprises in this area (pp. 113-146).

The author has outlined the prospects for the development of Xinyu circular economy. Emphasis is placed on the evolutionary model of the circular economy in

Xinyu High-Tech Zone (pp. 148-165), and an original diagram of the resource utilization cycle in the high-tech zone is proposed (pp. 166-172). The study also examines the prospects for implementing a circular economy (pp. 173-178). The author has developed a new circular economy model that focuses on the efficient use of resources and environmental protection to ensure sustainable economic and social development. This model is characterized by resource management and environmental optimization, integrating resource management and environmental protection into economic and social activities. It requires the joint participation of the government, enterprises, and all social stakeholders (pp. 179-184).

The research objective aligns with the dissertation's topic. The object and subject of the study are sufficiently covered within the structure and content of the dissertation. The obtained scientific findings, conclusions, and recommendations are credible and well-founded, as confirmed by a sufficient number of publications in specialized journals and discussions of the main results at international scientific and practical conferences. Therefore, the content and structure of the dissertation fully correspond to its title, research objectives, and tasks. The scientific provisions are presented sequentially and logically, while the conclusions and recommendations are based on research results that have been tested at an adequate level.

In terms of structure and formatting, the dissertation meets modern requirements for dissertation formatting, as approved by the Order of the Ministry of Education and Science of Ukraine dated January 12, 2017, No. 40 "On Approval of the Requirements for Dissertation Design". The set of scientific provisions, conclusions, and recommendations presented in the qualification work, along with their practical significance, allow us to conclude that Zhong Deming qualification work is complete, coherent, and well-structured.

Scientific novelty of the provisions, conclusions, and recommendations formulated in the dissertation

The most significant results that characterize the scientific novelty of the study include:

– a methodological approach has been developed that, through a system of indicators, enables the assessment of regional circular economy development and its

classification based on specific criteria across China's provinces. This approach facilitated a spatial analysis of the circular economy, allowing for the classification of regions according to their level of resource utilization in China.

– the conceptual justification and theoretical positioning of industrial clusters within the circular economy system have been refined. This positioning considers global best practices in circular cluster formation and applies a global benchmarking approach.

– a detailed interaction system between enterprises, industrial parks, and government bodies at the micro level of regional circular economy development has been elaborated. This system emphasizes close cooperation aimed at the sustainable use of resources. To assess the development level of industrial clusters, a measurement methodology has been applied that considers the integration of enterprises into circular processes and the efficiency of their collaboration with government structures and industrial parks.

– a circular economy assessment system has been implemented in Xinyu High-tech Zone, based on benchmarking and the analysis of three-dimensional characteristics of the circular economy, as well as resource consumption indicators (B3) and (B4). Based on these data, a matrix has been created to evaluate resource utilization efficiency.

– key challenges in the implementation and operation of circular clusters, particularly in Xinyu High-tech Zone, have been conceptualized. This includes an analysis of obstacles faced by enterprises, industrial parks, and government authorities in planning and developing the regional circular economy. Among the primary barriers identified are resource limitations, deficiencies in coordination efforts, and difficulties in adapting to new circular economy models.

– an ecological mechanism for assessing the transformation of Xinyu High-tech Zone has been proposed. This mechanism is aimed at fostering the rapid development of green and low-carbon zones by promoting a carbon-neutral circular economy. It ensures the harmonious development of the economy and the environment through the integration of ecological standards and innovative technologies designed to minimize environmental impact.

– proposals for the development of the circular economy in Xinyu High-tech Zone have been formulated. These include industrial chain planning for the new circular economy-based steel industry, as well as the development of an industrial chain scheme for the coal-chemical industry. These proposals are based on an analysis of correlations between Xinyu High-tech Industrial Park and other domestic and international industrial parks, enabling the identification of best practices and opportunities for integration into global circular networks.

Thus, it can be concluded that the key scientific provisions, findings, and conclusions of Zhong Deming qualification work demonstrate scientific novelty and are sufficiently substantiated.

Theoretical and practical significance of the dissertation

The theoretical results of the conducted research contribute to the advancement of the theoretical foundation for studying regional circular economies by analyzing their structure, functions, objectives, characteristics, and evaluation methods. The research enhances the system of indices for assessing regional circular economies by critically examining the strengths and weaknesses of existing assessment frameworks established by the National Development and Reform Commission, the State Environmental Protection Administration, and the National Bureau of Statistics (at the macro level), as well as those proposed by relevant scholars. A new method for evaluating the development of regional circular economies has been introduced, utilizing a primary index system to identify key components and enhance scientific feasibility through Analytic Hierarchy Process (AHP) assessment. Additionally, recommendations have been formulated to strengthen regional circular economy development based on the evaluation of 31 provinces, municipalities, and autonomous regions of China.

The research findings have practical implications, as the core theoretical propositions regarding the formation of circular clusters can be applied in the activities of business entities and serve as a foundation for further scientific studies in this domain.

Completeness of the presentation of the main scientific results of the dissertation in published papers

The results of the qualification research have been published in 7 scientific works, including 1 article in a journal indexed in the Scopus international scientometric database, 4 articles in specialized scientific journals of Ukraine, and 2 articles in other publications based on conference proceedings. The findings of the research were presented and discussed at international scientific and practical conferences. Zhong Deming personally developed the scientific ideas, theoretical concepts, generalizations, conclusions, and recommendations presented in the dissertation, which are reflected in the published works and form the basis of the dissertation defense.

The profile of the publications and the content of the scientific works fully comply with the established requirements for the comprehensive presentation of the dissertation's results, in accordance with the academic standards for obtaining the degree of Doctor of Philosophy in the field of knowledge 29 "International Relations", specialty 292 "International Economic Relations".

Evaluation of the structure of the dissertation

The structure of Zhong Deming qualification research is coherent, logical, and comprehensive. The formatting fully complies with the requirements by the Ministry of Education and Science of Ukraine for qualification scientific thesis for obtaining the Doctor of Philosophy degree, as per the Order of the Ministry of Education and Science of Ukraine dated 12.01.2017, No. 40 "On Approval of Requirements for the Dissertation Design". The qualification research consists of an introduction, three chapters, conclusions, a list of references, and appendices. The total volume of the work is 216 pages, including 46 tables, 28 figures, and 2 appendices. The list of references comprises 220 items. The conclusions, proposals, and recommendations formulated by the author based on the dissertation results incorporate elements of scientific novelty and hold significant value for the development of theoretical and methodological foundations, as well as practical recommendations for the formation of circular clusters.

Language and style of presentation

Zhong Deming qualification research is written in English. The style of presentation is scientific, characterized by logical consistency in the disclosure of the content of paragraphs and chapters, precise definitions and categorizations, and a coherent interrelation between research objectives, scientific novelty, final statements, and conclusions. The work demonstrates objective comparisons of conducted scientific studies and the author's independent stance in the field of international economic relations and circular clusters.

Compliance of the qualification thesis with the specialization passport for submission for defense

In terms of content and formatting, the qualification paper by Zhong Deming titled "Benchmarking the formation of circular clusters" fully meets the established requirements of the Ministry of Education and Science of Ukraine, including the specialty passport for 292 – "International Economic Relations", knowledge area 29 – "International Relations"; the requirements set forth by the "Procedure for the Awarding of the Doctor of Philosophy Degree and the Cancellation of the Decision of the Single Specialized Academic Council of a Higher Education Institution or Scientific Institution Regarding the Awarding of the Doctor of Philosophy Degree", approved by the Cabinet of Ministers of Ukraine on January 12, 2022, No. 44; as well as the requirements for the formatting of qualification papers.

Absence (presence) of academic integrity violations

The text of Zhong Deming qualification paper, based on the results of the check for textual borrowing, does not contain any unreferenced borrowings and adheres to the principles of academic integrity. All references in the paper are made in compliance with the norms of copyright and related rights legislation.

Discussion points and remarks on the content of the dissertation

Along with the significant scientific achievements and the positive evaluation of the content and formatting of the qualification paper, it should be noted that there are certain remarks and contentious points, including:

1) In section 1, the author considers the theoretical foundations of the circular economy, conducts a review of circular economy theories, a comparative analysis for the formation of clusters and the construction of a system of indicators for assessing the development of a cluster circular economy. From the content of the work itself, the author's position on this issue is clear, at the same time, it would be worthwhile to specify the role of clusters in the global economy in the text of the work, which would be a logical and methodologically justified step.

2) In the dissertation, the author argues that the circular economy is a complex system that includes different functional sets with different roles (pp. 81-82), however, it would be advisable to conduct an analysis of the strengths and weaknesses of the implementation in identifying gaps and planning, which would make it possible to determine the level of development of the region, assessing the current state or ideal planning mechanisms.

3) On p. 114 the author stated that in order to develop a circular economy, it is necessary to rationally organize the scale, structure and layout of the economy in accordance with the capacity, spatial distribution of the environment and resources, regulate and control the inflow of resources and the outflow of pollutants into the economic system, minimize the demand for natural resources and the negative impact of economic activity on the environment. However, it would be worthwhile to conduct a more detailed analysis of the implementation of the principles in practice and to make a comparison with other countries of the world.

4) The author investigated the evolutionary model of the circular economy of the Xinyu High-Tech Zone, which is guided by sustainable development (p. 148). However, it would be worthwhile to use more examples, including other high-tech zones in China, which would allow identifying effective tools for ensuring sustainable development.

5) When developing general recommendations based on the results of the study, the author clearly specifies the existing problems of the circular economy, demonstrates an understanding of their impact on sustainable development. At the same time, the depth of recommendations for their elimination is mostly limited to

China. It is worth noting that considering the global level here would significantly increase the significance of the results obtained.

Overall, the aforementioned contentious points and remarks do not diminish the overall positive evaluation of the dissertation, nor the significance of the obtained conclusions and practical recommendations.

General conclusion

The qualification paper by Zhong Deming titled "Benchmarking the formation of circular clusters", submitted for the award of the Doctor of Philosophy degree in the specialty 292 "International Economic Relations", is a completed independent research project that meets the established requirements. The work is conducted at an appropriate theoretical level and holds practical significance. The topic of the dissertation is fully covered.

The analysis of the dissertation allows for the conclusion that the submitted dissertation complies with the requirements of the Ministry of Education and Science of Ukraine Order No. 40, dated January 12, 2017, "On the Approval of Requirements for the Formatting of Dissertations" (as amended), and the "Procedure for the Awarding of the Doctor of Philosophy Degree and the Cancellation of the Decision of the Single Specialized Academic Council of a Higher Education Institution or Scientific Institution Regarding the Awarding of the Doctor of Philosophy Degree", approved by the Resolution of the Cabinet of Ministers of Ukraine No. 44, dated January 12, 2022. Therefore, its author, Zhong Deming, deserves the award of the Doctor of Philosophy degree in the field of knowledge 29 – International Relations, specialty 292 – International Economic Relations.

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Підпис М. Жив
Завіряю:
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