ANNOTATION

on the dissertation
"State regulation of the circular economy's development in the Republic of Kazakhstan"
submitted for the degree of Doctor of Philosophy (PhD)
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Relevance of the research topic. The global economy is currently facing a systemic crisis due to the linear resource consumption model, which operates on a "take-use-throw away" principle. This approach results in the inefficient use of natural resources and worsens environmental challenges. According to the Circularity Gap Report 2024, only 7.2% of materials worldwide are returned to the economy after use. This critically low level of material recycling indicates serious risks to both economic sustainability and environmental safety.

Transitioning to a circular economy (CE) is viewed as a crucial strategy for mitigating climate change, reducing waste, and promoting sustainable economic growth. The urgency of this research topic arises from the growing scarcity of natural resources and the rapid increase in waste generation. Forecasts from the UN and OECD predict that 2050 global material consumption will double while waste volumes will rise by 70%.

In response to these challenges, the European Union implemented the "Circular Economy Action Plan: for a cleaner, more competitive Europe" in March 2020. Similar national strategies have been adopted by countries such as China (for example, "14th Five-Year Plan of China for Circular Economy Development" in 2021) and Japan ("Basic Act on Establishing a Sound Material-Cycle Society" in 2000), along with various other developed and developing nations. The shared goal of these initiatives is to ensure long-term sustainable growth, reduce the climate footprint, and achieve Sustainable Development Goal 12: "Ensure sustainable consumption and production''

In Kazakhstan, establishing an effective mechanism for state regulation of the circular economy is of paramount importance. The increasing focus on sustainable development as a strategic objective of the state further emphasizes this relevance. In his addresses for 2020-2024, President K. Zh. Tokayev repeatedly highlighted the need for a transition to a "green'' economy, the rational use of water and other natural resources, as well as the digitalization of infrastructure and modernization of waste management systems. For instance, the September 1, 2020, address called for the introduction of water-saving technologies and the digitalization of the irrigation network; the 2021 address emphasized the modernization of reservoirs and digital monitoring of water bodies; the 2022-2023 addresses focused on developing

renewable energy, reforming the waste management system, and implementing circular principles in industry and agriculture; and the 2024 address advocated for large-scale adoption of “green” technologies across all economic sectors.

Consequently, it can be concluded that the creation of comprehensive state policy and legal frameworks for a circular economy aligns directly with the priorities set forth by national leaders and serves as a vital tool for achieving the goals of sustainable growth and environmental safety in Kazakhstan. The transition to a circular economy is particularly crucial for Kazakhstan as it continues to rely heavily on oil, gas, and mineral exports. By adopting a circular model, the country can decrease its dependence on primary resources through the reuse and recycling of materials, thereby enhancing economic resilience against fluctuations in raw material prices and reducing the risks associated with resource depletion.

According to the “Concept of Transition to a Green Economy’’ the goal is to increase the share of waste recycling to 40% by 2030 and to 50% by 2050. The program outlines measures for separate waste collection, the construction of green infrastructure, and attracting investment in waste management. Additionally, this concept describes various implementation stages, highlighting the need for the national economy to adopt principles that prioritize the use of renewable and sustainable natural resources, aligning with the concept of a circular economy.

The inclusion of the circular economy as the fourth principle in the “Strategy for Achieving Carbon Neutrality by 2060’’ underscores the idea that widespread use of secondary resources and reduced consumption are essential for significantly lowering greenhouse gas emissions and promoting sustainable economic growth.

That’s why it is crucial to implement the principles of a circular economy in Kazakhstan to ensure environmental sustainability and economic security.

While the country has a foundation of legislative frameworks in place, there is a need for further improvements and additions. It is also essential to establish systemic incentives for the implementation of circular models. Therefore, studying practical approaches and recommendations for accelerating the transition to a circular economy is relevant and timely.

The purpose and objectives of the study. The purpose of this study is to undertake a comprehensive analysis of the processes underlying the establishment of a circular economy in the Republic of Kazakhstan and to develop evidence-based recommendations for strengthening state regulatory mechanisms that support the transition to a circular development model.

To achieve this goal, the following tasks are solved in the work:

1. To study theoretical and methodological approaches to the formation and development of the circular economy, as well as to clarify the conceptual apparatus used in this area.

2. To analyze the international experience of state regulation in the circular economy and determine the possibilities for its adaptation to the context of Kazakhstan.

3. To examine methodological approaches for studying public policy related to the circular economy.

4. To evaluate the current development status of the circular economy in the Republic of Kazakhstan at a macro level, considering institutional, regulatory, organizational, and economic factors.

5. To conduct an empirical analysis of the circular economy development in the Republic of Kazakhstan, focusing on public perception, key stakeholders' positions, and industry specifics, using the agro-industrial complex as an example.

6. Identify the primary problems, obstacles, and institutional constraints that hinder effective government regulation of the circular economy.

7. Develop scientifically-based proposals and recommendations for enhancing government policies in the circular economy at the macro level.

8. Develop practical recommendations for advancing the circular economy within the agro-industrial sector of the Republic of Kazakhstan.

The subject of the study. Organizational and economic relations arising from state regulation of the circular economy.

The object of the study. Circular economy in the Republic of Kazakhstan.

The theoretical basis of the research. The theoretical and methodological foundation of this study draws on the works of both domestic and international scholars in the fields of circular economy, government regulation, and sustainable development. It also references regulatory legal acts of the Republic of Kazakhstan, program documents, and methodological frameworks from international organizations. Throughout the research, theoretical insights into the formation and evolution of the circular economy were explored, leading to the identification of its core principles and features within the context of public policy. This integrated approach allowed for a thorough examination of government regulation and the advancement of the circular economy, resulting in actionable recommendations to enhance measures that support the transition to a circular economy.

The information base of the study. The study's information base includes regulatory and legislative acts from the Republic of Kazakhstan that govern natural resource management and the transition to a circular economy, as well as relevant international documents and strategies from other countries. The empirical and analytical foundation of the study is supported by statistical data from the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, as well as organizations such as the OECD, the World Bank, Eurostat, UNEP, and others.

Additionally, the research incorporates data and reports from international organizations, including the Ellen MacArthur Foundation and the World Economic Forum, which are influential in advancing the circular economy agenda globally. The study also draws upon scientific publications and monographs by both Kazakhstani and foreign researchers, utilizing bibliographic and abstract databases such as Scopus, Web of Science, ScienceDirect, and SpringerLink. Furthermore, online resources and open access repositories were employed to gather pertinent information and best practices from around the world that align with the study’s objectives.

The main scientific results and their novelty.

— the theoretical and conceptual content of the circular economy has been clarified with an emphasis on the role of the state in the formation of sustainable production and consumption models;

— a comparative analysis of international experience in government regulation of the circular economy in countries with different income levels has been conducted; institutional and regulatory models recommended for adaptation in the Republic of Kazakhstan have been identified;

— methodological approaches to assessing the development of the circular economy at the macro, meso and micro levels have been systematized; tools for conducting empirical research have been developed;

— the current state of development of the circular economy in Kazakhstan has been analyzed based on secondary data and a review of the regulatory framework reflecting the specifics of national regulation;

— a comprehensive empirical analysis has been conducted using quantitative research methods (population survey, expert stakeholder survey); the determinants of circular behavior have been identified and the degree of readiness of key groups for the transition to a circular development model has been assessed;

— based on expert interviews, barriers to the implementation of the circular economy in the agro-industrial complex were identified and opportunities for its development in the industry context were determined;

— proposals were developed to improve the mechanisms of state support for the circular economy at the macro level, including tax and financial incentives, regulations and strategic documents;

— support measures were proposed at the meso level, including the creation of eco-industrial parks and introducing digital technologies (IoT, AI) as tools for integrating the principles of the circular economy into industry practice.

The main statements for the thesis defense:

1. A multi-level framework has been established to evaluate the circular economy's progress in the Republic of Kazakhstan at the macro, meso, and micro scales that capture institutional, economic, and behavioral dimensions.

2. It has been established that an increase in costs does not have a statistically significant effect on the level of recycling and reuse of waste, which is confirmed by regression analysis and emphasizes the importance of intangible factors - environmental awareness, government regulation and infrastructure.

3. A comprehensive analysis of the results of a population survey (SPSS 25) and an expert survey using the structural modeling method (SmartPLS 3) made it possible to identify the key determinants of circular behavior and assess the degree of readiness of various stakeholder groups to transition to the principles of a circular economy.

4. Drawing on semi-structured interviews with agro-industrial representatives in the Republic of Kazakhstan, key barriers to circular-economy implementation were identified, including inadequate economic incentives, fragmented regulations, limited stakeholder engagement, and insufficient infrastructure support.

5. Practical recommendations were developed to stimulate the circular economy at the macro and meso levels, including tax and financial instruments, standards, and strategies. For the agro-industrial complex, the introduction of eco-industrial parks and the implementation of digital technologies for implementing the principles of the circular economy was proposed.

Theoretical and practical significance. The theoretical significance of the research lies in the contribution to the scientific understanding of the circular economy as a new model of sustainable economic development, as well as in the development of conceptual and methodological approaches to state regulation in the context of the circular transition. The results help expand the theoretical foundations of environmental economic policy, public administration, and sustainable development by contextualizing the principles of the circular economy within Kazakhstan's institutional and economic environment. The practical significance of the research is reflected in the proposed recommendations for improving regulatory, institutional, and economic mechanisms for supporting the development of the circular economy in Kazakhstan. The findings and tools developed within the dissertation can be used by government agencies in shaping and implementing circular economy policies, by development institutions in creating sectoral roadmaps and supporting pilot projects, and by local executive bodies in integrating circular principles into regional development strategies.

Approbation and implementation of the research results. The results of the study were reported and discussed at a number of international and national conferences, including the International Conference of Students and Young Scientists “Farabi Alemi” 2022, the IV International Scientific and Practical Conference “Fundamental Scientific Discoveries”, the IV International Scientific Conference “Sustainable Development of Bioeconomy 2024: Theory and Practice”, the International Scientific and Practical Conference “Paradigm of Sustainable Economic Development” in the Context of Global Change: Challenges, Consequences, Opportunities”, “Challenges of Modernity and Strategies for the Development of Society in the New Reality” (MKVSS).

The relationship of this work with other research works. The dissertation work was carried out within the framework of the implementation of scientific projects of grant funding AP09259851 “Development of a circular economy in Kazakhstan: potential, trends, prospects” (2021-2023) and AP19576593 “Responsible production in Kazakhstani enterprises as a tool for achieving SDG 12: assessment of potential and development prospects” (2023-2025).

Publication of research results. The results of the dissertation research have been published in 12 publications, including 5 in journals recommended by the “CQAFSHE of the Ministry of Science and Higher Education of the Republic of Kazakhstan”, 2 in Q1 journals included in the Scopus database, 1 in a collective monograph, and 4 in the materials of international scientific conferences.

The structure of the dissertation. The work consists of an introduction, three chapters, a conclusion, a list of sources used, and contains 39 tables, 61 figures and 10 appendices.