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Transition to a circular economy: Exploring stakeholder perspectives in Kazakhstan

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Abstract. The development of circular economy entails systemic changes at various levels involving all stakeholders. Stakeholders play a crucial role in creating and ensuring the necessary conditions for the establishment and thriving of the circular economy. They set the primary direction for and act as the driving force behind sustainable development. In this regard, this study aimed to determine the readiness of stakeholders for the formation and development of the circular economy in Kazakhstan. An expert survey was conducted among representatives of business, academia and non-governmental organizations (NGOs). The survey involved 54 experts, and the data were analyzed using the SPSS 25 software. The analytical findings underscore that the sector of science and education manifests the highest state of readiness among stakeholder segments. Conversely, sectors encompassing society, consumers, governmental bodies, and financial institutions

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demonstrate relatively modest levels of preparedness. Furthermore, this study delved into distinct statistical variances across stakeholder readiness levels and proffered targeted recommendations aimed at mitigating challenges hampering the establishment of a circular economy framework within Kazakhstan.

Keywords: circular economy, stakeholder analysis, sustainable development

JEL Classification: Q30, Q57, Q56

1. INTRODUCTION

Sustainable development implies a balance between economic growth, social responsibility, and environmental equilibrium, where satisfying current societal needs is combined with preserving the environment and resources, while involving all interested parties. With the intensification of ecological issues and technological advancement, the concept of forming a circular economy is gaining more traction. The term "circular economy" has emerged relatively recently and has been interpreted in various ways by different scholars. It is understood as the antithesis of a "linear" economy, which has lost its potential due to the limited availability of natural resources. In a circular economy, or a closed-loop economy, the flow of resources is cyclical or "circular." This is explained by the principles of the concept "reduce - reuse - recycle."

The concept of a circular economy appeared long before its peak in popularity. The precursors of the circular economy include the works of Boulding, Brundtland, Pearce and Turner, Kirchherr, Murray, and Ghisellini, as well as research by international organizations such as UNEP, OECD, the Ellen MacArthur Foundation, and others.

Government institutions, the realm of science and education, business, NGOs, regions, and cities – all play a decisive role in creating and ensuring the necessary conditions for the establishment and flourishing of the circular economy in a country. They set the primary direction for the country's economy and act as the driving force behind innovations and investments (EMAF, 2012).

The circular economy provides a foundation that allows the business sector and governments to achieve long-term growth by reducing consumption and, consequently, waste. The essence of the concept lies in the regeneration and restoration of natural capital (Zengwei Y. et al., 2008). Sauvé et al. (2016) also described the importance of transitioning from a linear economic model to a circular one due to rapid anthropogenic changes in the environment. During the transition to a circular economy, stakeholders play a vital role (Seles, B. et al., 2022; Guzzo D. et al., 2022; Kayikci, Y. et al., 2022).

The waste issue has affected nearly all developing economies, including the Republic of Kazakhstan (Aubakirova et al., 2023; Sembiyeva et al., 2023). The circular economy, as a superior alternative to the linear economy, offers solutions to excessive consumption and waste problems. There are already basic concepts for transitioning to a circular economy in the Republic of Kazakhstan, such as green economy, sustainable development, waste management, etc. Research on the circular economy is conducted within the academic community. Universities tend to update their curriculum to include green economy and sustainable development. Additionally, civil organizations are implementing various projects related to waste sorting, green consumption, etc. However, the term "circular economy" is not officially common in governmental documents. Also, financial mechanisms and incentives for transitioning to a circular economy are lacking. Therefore, this research aims to provide an expert assessment of stakeholders' readiness for the formation and development of a circular economy in Kazakhstan.

2. LITERATURE REVIEW

2.1. Circular economy

The term "circular economy" emerged relatively recently, while its foundational concept had been described by preceding scholars. For instance, it is widely accepted that the fundamental description of the circular economy was highlighted by Boulding in 1966 (Boulding, K., 1966), followed by Ms. Brundtland's report (Brundtland Report, 1987) on sustainable development in 1987, and subsequent works by authors such as Pearce and Turner (Pearce, D., Turner, R., 1991). This indicates that the concept of CE evolved over the years as environmental issues escalated. Based on this, the main characteristics of CE include preserving the value of products, components, and materials in the economy; reduced utilization of natural resources; increased proportion of renewable an recyclable resources and energy; emissions reduction; minimized material waste and residues (Fonseca, L. et al., 2018).

Transitioning to a circular economy implies not only reducing waste through recycling but also an overall reduction in resource consumption and extending the lifespan of products and services. In the scientific literature on CE, various classification options (e.g., 9Rs) have been proposed, derived from English words beginning with the letter "R": 1. refuse - preventing the use of raw materials; 2. reduce - reducing raw material consumption; 3. reuse - reusing products; 4. repair - maintenance and repair; 5. refurbish - renewing products; 6. remanufacture - creating new products from parts or entirely from old products; 7. repurpose - reusing products for different purposes; 8. recycle - material recycling and reuse; 9. recover energy - processing waste to generate energy in the form of heat, electricity, fuel, etc.

Kirchherr et al. have identified several types of barriers on the path to transitioning to a circular economy, including cultural barriers (lack of awareness or willingness for CE), regulatory barriers (insufficient governmental support policies), market barriers (lack of economic viability for circular business models), and technological barriers (lack of necessary technologies for CE). It's mentioned by the author that not all aspects of the principles of the circular economy are fully understood by companies yet. This implies that even if companies wish to be more circular, their supply chain might not be prepared for such changes. However, achieving full circularity requires a company and its supply chain to fully comply with CE requirements (Kirchherr, J. et al., 2018).

Regarding the necessary resources for transitioning to CE, Bag et al. expressed their perspective in their study. The authors confirmed that implementing Industry 4.0 in the context of sustainable production requires specific resources: production systems, human resources, project management, managerial leadership, green logistics, green design, information technologies, big data analytics, and collaborative relationships. They also identified a positive relationship between Industry 4.0 implementation and sustainable production, which in turn is closely linked to the potential for transitioning to a circular economy (Bag, S. et al., 2021).

In conclusion, the formation and development of the circular economy involve implementing CE principles into production processes, societal relations through institutions, and overcoming existing barriers that hinder the transition to sustainable development and a circular economy at various levels.

2.2. Stakeholder theory

Stakeholders play a significant role in shaping and advancing the circular economy. Currently, there is a substantial body of research concerning stakeholder theory. Stakeholder theory constitutes a pivotal concept in business management. This theory posits that the world is structured in a manner where the most successful organizations generate value for all key and pertinent stakeholders. In essence, this theory

perceives stakeholders not merely as external factors for a company but as a crucial approach to achieving greater success in the contemporary world.

This theory contradicts the shareholder value maximization theory, which promotes the notion of increasing an organization's earnings to ensure shareholders' maximum benefit. Stakeholders, as defined by Freeman R., encompass "any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, R. & Mcvea, J., 2001). Therefore, based on this definition, stakeholders can be understood as specific interested parties of a company.

Freeman categorizes stakeholders into two groups: 1) primary stakeholders, who are the principal interested parties, and 2) secondary stakeholders, who are secondary interested parties. Primary stakeholders include clients, suppliers, employees, and financial investors. Secondary stakeholders, on the other hand, encompass individuals or entities that do not directly participate in the value-creation process of the company. Examples include government bodies, NGOs, associations, competitors, and others. However, this does not imply that secondary stakeholders play no role; their significance depends on the company's main mission. In certain cases, secondary stakeholders assume roles equally crucial to those of primary stakeholders (Goodman, J. et al., 2017).

The importance of stakeholders in the transition to circular innovations has been highlighted in the research conducted by Eisenreich et al., 2021. According to the findings of their study, it was revealed that both primary and secondary stakeholders play a crucial role in the transition to circular innovations. Among the primary stakeholders, the significance of customers and suppliers was particularly emphasized. Secondary stakeholders, who also play a vital role, encompass universities, non-governmental organizations (NGOs), startups, government entities, consultants, and competitors. In other words, based on the results of the conducted research, it can be concluded that in the circular economy, not only primary stakeholders but also secondary stakeholders occupy a central role.

When identifying stakeholders, it is important to determine the respective contributions of each party and the factors that influence the formation and development of the circular economy. It is worth noting that transitioning from one economic model to another requires not only financial resources but also human resources. The circular economy entails not only technological changes but also improvements and additions to existing knowledge related to this concept.

The task of developing competencies in sustainable development and the circular economy applies to both employers and higher education institutions (HEIs). Research on these competencies, essential for transitioning to the circular economy, was conducted by Janssens et al. in 2021. In their study, they categorized competencies into three groups: 1) values-based, 2) transversal, and 3) technical. The research involved respondents who were asked to select the most crucial competencies for the transition to the CE. Consequently, their results demonstrate that the field of education should allocate more resources to all three categories for an effective transition to the circular economy (Janssens, L. et al., 2021).

The authors identified the main stakeholders and classified the barriers and drivers into five categories (economic, informational, institutional, political, and technological). The main stakeholders are included at the internal level – clients and professionals, and at the external level – suppliers, the public, and government. They emphasized that the most significant obstacles are political and technological. They also stressed the importance of implementing a governance policy centered around regulatory measures, taxation, and the integration of waste and information management systems (Munaro & Tavares, 2023).

In their approach to plastic waste management, Kolade et al. concentrated on key stakeholder groups, which encompassed waste management organizations, civil society, academia, digital innovation firms/startups engaged in plastic waste solutions, policymakers, and the community (Kolade et al., 2022).

Coenen et al., in the context of infrastructure, identified a range of stakeholders involved in bridge projects. These stakeholders include internal ones such as project management, designers/engineers, asset managers, experts, program managers/portfolio managers, and external ones like engineering firms, contractors, suppliers, inspectors, local/regional authorities, financiers, maintenance contractors, road users, demolition contractors, and local residents.

The interfaces identified between stakeholders and circular actions unveil significant opportunities for stakeholders in the infrastructure sector to initiate the adoption of circular practices. Ultimately, the framework serves as a foundation for initiating a comprehensive conversation on the practical application of circularity. The insights gained and the discussions held are invaluable in directing stakeholder endeavors toward the transition to a circular economy (Coenen et al., 2020).

Scholars emphasize that the successful implementation of the CE necessitates systemic innovation and adjustments involving all relevant stakeholders, including companies, policymakers, and higher education institutions. Particularly, the role of higher education institutions is pivotal in offering guidance to their stakeholders on this subject and in fostering new societal and economic visions that extend beyond the classroom, promoting a CE mindset and environmentally responsible citizenship (Serrano-Bedia & Perez-Perez, 2022).

The Eco-5HM model encompasses five distinct operational and stakeholder levels: firms, governments, academia, society, and the environment. Each of these levels has its own systems, operations, interactions, scales, and indicators (van Bueren et al., 2023).

Tleppayev A. and Zeinolla S. conducted research related to the study of CE indicators' approaches in European Union and OECD countries. To assess one of the CE characteristics, namely secondary resource utilization, they developed a model that allows evaluating the impact of indicators on this characteristic. Implementing a circular economy model requires specific investments in research and development, technology, and innovation. The primary focus should also be on actively involving consumers and producers in CE principles. According to the authors, this approach can lead to sustainable economic development (Tleppayev, A. M., & Zeinolla, S. Z., 2021).

Thus, the literature review allows us to identify the following stakeholders in the development of a circular economy: businesses/industry, government and financial institutions, science and education, public institutions, society, and consumers.

The research question of this study is: What is the level of readiness among stakeholders for implementing a circular economy in Kazakhstan?

The main hypotheses put forward are as follows:

1. The implementation of circular economy principles is at a low level.
2. Among stakeholders, businesses and industries are not yet prepared to integrate circular economy principles into their business processes.
3. There is a low level of readiness among government institutions, and the general population is not well-informed about the concept of a circular economy.

3. METHODOLOGY

In the study of the circular economy, various research methods were employed, including empirical research methods and statistical data analysis. Elia and his co-authors, in their assessment of the implementation of circular economy practices in industrial supply chains, applied the method of multifactorial clustering. When selecting companies for their research, they categorized them based on factors and sub-factors such as company profile (industrial sector, geographical location), supply chain

profile (supply chain integration, core company processes), and circular economy profile (objectives, phases of the product/service life cycle) (Elia et al., 2020).

In this study, circular economy principles were identified through a literature analysis. Subsequently, factors were grouped according to stakeholders (business and industry, government and financial institutions, science and education, public institutions, society, and consumers), and their readiness levels were assessed. The indicators and sub-indicators we identified are presented in detail in Table 1.

Table 1

Parameters for assessing the readiness level of stakeholders for the transition to a Circular Economy (CE)

Parameter	Sub-parameter
1. Principles of CE (P)	Improving the efficiency of product use: reusing a product that performs its original function (reuse) (P1)
	Recycling (P2)
	Product restoration and renewal (remanufacture): repair and maintenance of the product, changing product parameters, using parts of an obsolete product in a new product (P3)
	Consumption of fewer natural resources and materials in the production of goods (reduce) (P4)
	Transferring the product to the category of excess. Product rejection (refuse) (P5)
	Transferring product features to another product (repurpose) (P6)
2. Business and industry readiness level (BI)	Efficient use of raw materials and environmentally friendly materials (BI)
	Efficient use of means of production, materials, human resources (BI2)
	Reducing the consumption of resources in the production of goods (BI3)
	Reduction of waste in the process of production and consumption (BI4)
	Minimization of environmental pollution (BI5)
	Availability of reverse logistics, extension of product life, reuse of components (BI6)
	Development of eco-design of the product, using the principles of the circular economy at the stage of product design (BI7)
	The level of competence of personnel in green technologies (BI8)
	The presence of a corporate environmental culture (BI9)
	Apply digital technologies for more efficient use of resources (BI10)
	Use of renewable energy sources and renewable materials (BI11)
3. Level of readiness of state and financial institutions (GFI)	State support for circular business models (GFI1)
	Investing in eco-projects (GFI2)
	Development of innovative projects on green technologies (GFI3)
	Development of "green" finance and socially responsible investment (GFI4)
	Legal and regulatory support for the development of a circular economy (GFI5)
	Development of infrastructure in settlements for efficient waste disposal (GFI6)
	Recycling household waste and ensuring its environmentally friendly disposal (GFI7)
	Recycling and reuse of industrial waste (GFI8)
4. The level of readiness of science and education, public institutions (SE)	Training in the circular economy (environmental industry, etc.) (SE1)
	Updating the content/competence of educational programs (SE2)
	Development of R&D on green technologies (SE3)
	Development of public initiatives, NGOs and other organizations on environmental issues, green technologies, etc. (SE4)
	Application of the principles of DE in the university/educational institution itself (SE5)
5. The level of readiness of society, consumers (SC)	The level of development of "green" consumption (SC1)
	The level of public awareness of the circular economy (SC2)
	Repair and reuse of products (second-hand market, repair of household appliances) (SC3)
	The level of waste sorting by the population (SC4)
	Reducing consumption or abandoning excesses in favor of the environment (SC5)
	The level of development of sharing consumption (rental, carsharing, etc.) (SC6)

Source: Authors' compilation

The importance of each parameter was assessed on a Likert scale, where 1 represents a low level and 5 represents a high level of stakeholder readiness for the formation and development of the circular economy. To obtain reliable assessments of barriers, opportunities, and prospects for the circular economy in Kazakhstan, an expert survey was conducted. Overall, an expert survey allows for obtaining informed evaluations from experts to comprehensively study the development of the circular economy and develop recommendations in line with the requirements of key stakeholders.

The internal consistency of the revised circular economy scale was examined using Cronbach's alpha coefficients for the total 36-item scale and each of the 5 subscales. All analyses were performed using SPSS 25. Overall, the analysis showed a high consistency among sub-variables, indicating the logical and internal coherence of the grouped factors by stakeholders, which is shown in Table 2.

Table 2

Cronbach coefficients by parameters

1. The level of implementation of circular economy principles	0,81	6
2. The level of readiness of business and industry	0,86	11
3. The level of readiness of government and financial institutions	0,86	8
4. The level of readiness of science and education, public institutions	0,83	5
5. The level of readiness of society, consumers	0,82	6
	0,84	36

Source: Authors' calculations

In the expert survey, a total of 54 respondents participated, representing various fields, including science and education, government institutions, business and industry, and non-governmental organizations (NGOs) engaged in issues related to the Circular Economy (CE), green and sustainable development, ecology, and similar areas. The selection of experts was based on qualifications, experience, years of work, and competence in the research topic. In the initial stage of sample formation, a list of potential experts was compiled (approximately 20-30 experts in each field, totaling 100 experts). Subsequently, the expert questionnaire was distributed through various channels, including official letters, postal mail, and WhatsApp messages. Table 3 provides an overview of the distribution of experts across their respective areas of expertise for the questionnaire distribution and the number of completed questionnaires received.

Table 3

Study sample

Field of activity	**Share**	**Number of experts for distribution**	**Final sample**
Business & Industry	30%	30	15
Science/Education	25%	25	13
Government institutions	25%	25	15
NGOs, international organizations, etc.	20%	20	12
Total	100%	100	54

Source: Authors' calculations

Brief information about the experts is presented in Table 4. The expert survey included representatives from business and industry, science and education, government institutions, non-governmental organizations (NGOs), and international organizations.

Table 4

Expert Profile

Question	Answer options	Frequency	Percent
Your activity	Business & Industry	12	22,2
	Science/Education	18	33,3
	State structures	13	24,1
	NGOs, international organizations, etc.	11	20,4
	Total	54	100
Number of employees in the organization	To 10	16	29,6
	11-50	13	24,1
	51-100	6	11,1
	101-250	8	14,8
	Over 250	11	20,4
Your position	Total	54	100
	CEO / Head	14	25,9
	Head of department	7	13
	Employee	33	61,1
	Total	54	100

Source: Authors' calculations

Empirical data were processed using both univariate and multivariate data analyses with the utilization of SPSS 25 software. Specifically, Spearman's correlation was used to assess the relationship between groups of variables by parameters. A pairwise comparison of parameters was carried out using the nonparametric Wilcoxon's test. Additionally, the most pertinent responses to open-ended questions were used to support the decoded values.

4. EMPIRICAL RESULTS AND DISCUSSION

Overall, based on the expert assessment, the implementation of circular economy principles in Kazakhstan is at a low level. The average score for the subgroup of parameters is 2.11 out of a maximum possible score of 5, which is considered a low indicator. Particularly, among the principles, "refuse," which involves categorizing a product as excess and refusing it, has the lowest score of 1.87. Experts also assigned low scores for "repurpose" (2.04) - transferring the functions of a product to another product, and "reuse" (2.11) - increasing the efficiency of product use through its repeated use in its original function.

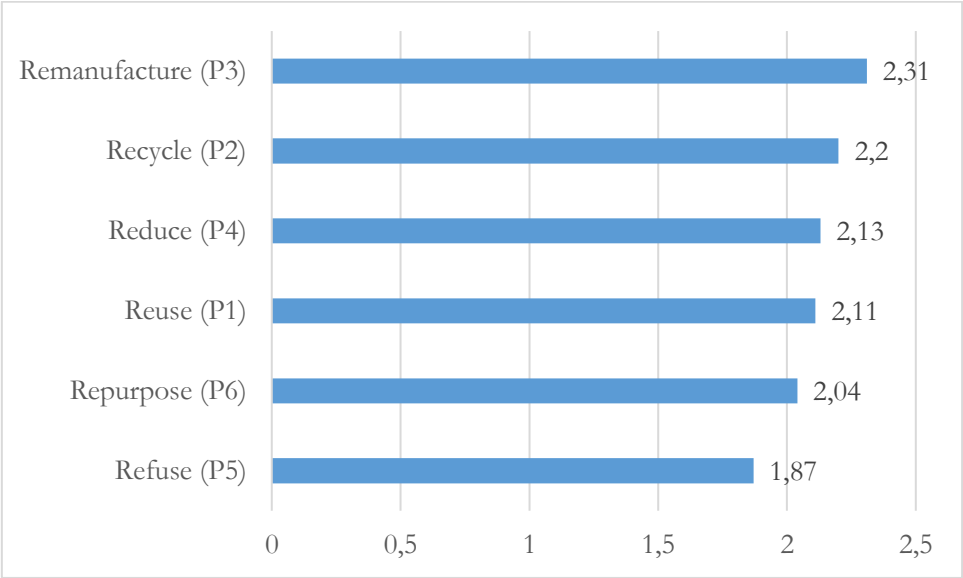

Figure 1. Assessing the implementation level of circular economy principles in Kazakhstan

Source: Authors' calculations

Based on the specified parameters (2-5) in Table 1 and according to the average values of sub-indicators, new variables were created for groups of parameters that reflect the level of readiness of stakeholders. Descriptive statistics of the generated variables are presented in Table 5.

Table 5

Descriptive statistics of the parameters

	N	Min	Max	Mean	Std. Deviation	Skewness	Std. Error	Kurtosis	Std. Error
Business and industry readiness	54	1	5	2,2424	0,86153	0,99	0,325	1,055	0,639
State and financial institutions readiness	54	1	5	2,1134	0,96253	1,144	0,325	1,491	0,639
Science and education, public institutions readiness	54	1	5	2,437	1,03819	0,625	0,325	-0,149	0,639
Society, consumers readiness	54	1	5	2,0648	0,90214	1,502	0,325	2,755	0,639

According to expert assessments, among parameters, the readiness level of science and education, as well as public institutions, is higher than others, with a score of 2.44. This can be attributed to the increased academic research on green economics and technologies in the country over the past decade, as well as the heightened activities of public institutions and non-governmental organizations engaged in various environmental projects.

Following this, in comparative terms, business and industry exhibit slightly higher scores. This can be explained by the current global trend in industry and business towards environmental and circular practices, which has also influenced the Kazakhstani market.

The lowest score was obtained by society and consumers (2.06) and government and financial institutions (2.11). It was found that stakeholders, society and consumers in Kazakhstan do not demonstrate a high level of engagement in environmentally-friendly behavior. This issue has been extensively studied by

the authors previously (Zhidebekkyzy et al., 2022), which revealed that among the inhibiting factors for the development of environmental behavior among the population are low awareness levels and infrastructural barriers, particularly in the regions of Kazakhstan (Zhidebekkyzy et al., 2023).

The low readiness level of government and financial institutions can be attributed to the absence of legislative documents regulating circular economy practices at the moment. Consequently, financial institutions and banks do not have specific proposals for green and circular projects.

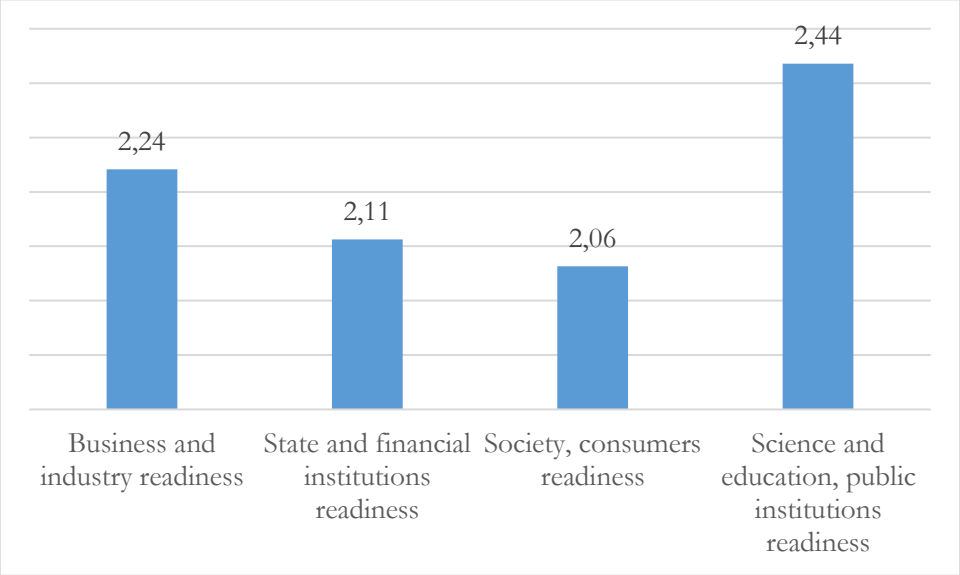

Figure 2. The readiness level of stakeholders for the formation of a circular economy, means
Source: Authors' calculations

The box plot shows differences in expert responses across groups of parameters according to the level of stakeholder readiness. As can be seen from Figure 3, the median value of "Business and industry readiness", "State and financial institutions readiness" and "Society, consumer readiness" is lower than "Science and education, public institutions readiness". We also see that the experts' answers are lower than 3, which demonstrates a low level of stakeholder readiness in general.

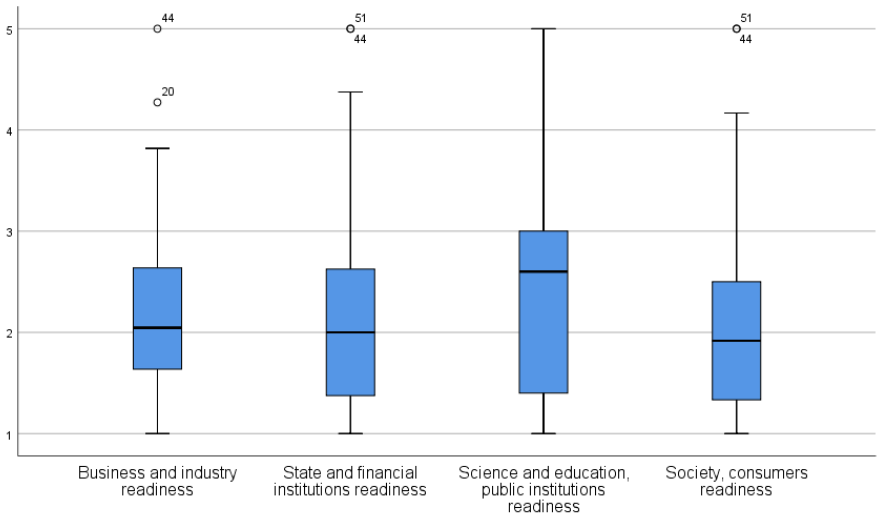

Figure 3. The readiness level of stakeholders for the formation of a circular economy based on parameters

Among the sub-factors, business and industry received low scores for Minimization of environmental pollution (BI5) (2.06), Use of renewable energy sources and renewable materials (BI11) (2.20), Availability of reverse logistics, extension of product life, reuse of components (BI6) (2.09), and the presence of a corporate environmental culture (BI9) (2.09).

Similarly, government and financial institutions have low scores, especially for Recycling household waste and ensuring its environmentally friendly disposal (GFI8) (1.85), Recycling and reuse of industrial waste (GFI7) (1.85), and Development of infrastructure in settlements for efficient waste disposal (GFI6) (1.87).

In comparative terms, society and consumers are not ready for Reducing consumption or abandoning excesses in favor of the environment (SC5) (1.72) and have a low level of public awareness of the circular economy (SC4) (1.89), as well as a low level of waste sorting by the population (SC2) (1.81).

Pairwise Spearman's correlation analysis of sub-parameters among stakeholders revealed that expert responses assessing the readiness level of stakeholders correlate with each other and have a statistically significant level (Table 6).

Table 6

Pairwise correlation of stakeholder readiness level

		N	Spearman's rho	Sig.
Pair 1	Society, consumers readiness & State and financial institutions readiness	54	0, 777**	0
Pair 2	Society, consumers readiness & Business and industry readiness	54	0, 806**	0
Pair 3	Society, consumers readiness & Science and education, public institutions readiness	54	0, 646**	0
Pair 4	State and financial institutions readiness & Business and industry readiness	54	0,804**	0
Pair 5	State and financial institutions readiness & Science and education, public institutions readiness	54	0,726**	0
Pair 6	Business and industry readiness & Science and education, public institutions readiness	54	0,731	0

** Correlation is significant at the 0.01 level (2-tailed).

The pairwise comparison revealed statistically significant differences in stakeholder readiness levels by parameters based on Wilcoxon's test. State and financial institutions readiness differ from business and industry readiness, state and financial institutions' readiness differs from business and industry readiness, and science and education and public institutions readiness (Table 7).

Table 7

Pairwise comparison of stakeholders by readiness level for shaping the circular economy

		Z	Asymp. Sig. (2-tailed)
Pair 1	Society, consumers readiness - State and financial institutions' readiness	-,578	0,56
Pair 2	Society, consumers readiness - Business and industry readiness	-1,716	0,09
Pair 3	Society, consumers readiness - Science and education, public institutions readiness	-3,716	**0,00**
Pair 4	State and financial institutions readiness - Business and industry readiness	-2,024	**0,04**
Pair 5	State and financial institutions readiness - Science and education, public institutions readiness	-3,786	**0,00**
Pair 6	Business and industry readiness - Science and education, public institutions readiness	-1,885	0,06
Wilcoxon Signed Ranks Test			

Source: Authors' calculations

Thus, expert assessment has revealed a low level of implementation of circular economy principles and varying levels of readiness among stakeholders for shaping and developing the circular economy in Kazakhstan.

Among the principles of the circular economy, remanufacture, renewal of products through repair and maintenance, altering product parameters, and using components from outdated products in new ones (recycle) and reducing the consumption of natural resources and materials in production (reduce) are of paramount importance, both in Kazakhstan and in other countries. It's worth noting that in European countries, the principles of refusing products, categorizing them as excess, and repurposing, transferring product functions to other items, are integrated into the daily lives of consumers, which is not observed in the behavior of the Kazakhstani population, especially in urban areas. The transition to a circular economy implies rational consumer behavior (Figge et al., 2022). Overcoming the cultural barrier is necessary for the formation of rational, environmentally friendly behavior. The authors emphasize that this barrier is fundamental when transitioning to a circular economy. They identified the following categories within the cultural barrier: lack of interest and awareness among consumers, indecisive corporate culture, and operating within a linear system. The first category, 'lack of interest and awareness among consumers,' was described as the most frequently encountered. However, it was noted that this barrier is the most challenging to change. Indecisiveness in corporate culture is the second most significant obstacle. The authors described how many companies limit themselves to corporate social responsibility and environmental departments, instead of extending to more influential departments (e.g., operations, finance). Thus, at both the consumer and business organization levels, the cultural barrier hinders the development of a circular economy.

According to the research findings, in the development of the circular economy in Kazakhstan, science and education stand out among other stakeholders. It's worth noting that previous studies have highlighted the significant role of higher education institutions as drivers of circular economy development in the country. As the authors point out, the circular economy requires systemic changes, and in this context, higher education institutions have the opportunity to collaborate with industrial practitioners, consumers, and governments. Scholars particularly emphasize the following roles of higher education institutions in

shaping and developing the circular economy: teaching for the circular economy, leading innovation through students, stimulating research on the circular economy, leading and influencing local change, and managing campus sustainability (Serrano-Bedia & Perez-Perez, 2022). Thus, Kazakhstani higher education institutions have the task of serving as the scientific and educational foundation for other sectors transitioning to the circular economy.

5. CONCLUSION

The formation of a circular economy requires the readiness of stakeholders. Based on stakeholder theory, stakeholders in the development of the circular economy were identified, including business/industry, government and financial institutions, science and education, public institutions, society, and consumers. Their roles in shaping the circular economy were determined, and sub-factors contributing to each stakeholder's role in circular economy development were identified. The level of implementation of circular economy principles and stakeholders' readiness for circular economy development in Kazakhstan were assessed through an expert survey.

Data analysis revealed that the level of implementation of circular economy principles in Kazakhstan is low. Specifically, the principles of "refuse" - shifting products into the excess category and product rejection, as well as "repurpose" - transferring product functions to another product, scored low. Among stakeholders, science and education and public institutions exhibited a relatively higher readiness for circular economy formation, while society and consumers, as well as government and financial institutions, received low scores from experts. However, it's important to note that stakeholder parametres are correlated. Statistically significant differences were observed between society and consumers, business and industry, government and financial institutions, business and industry, and business and industry and science and education.

Based on the research results, several recommendations can be made for the formation and development of the circular economy in Kazakhstan:

- Establish legislative mechanisms for transitioning to a circular economy.
- Develop and implement financial instruments for the adoption of circular economy principles in business and industry.
- Allocate public and private funding for scientific and applied research projects.
- Enhance waste sorting infrastructure, among other measures.

The perspective of this study includes conducting case studies in stakeholder organizations such as manufacturing companies, educational institutions, and research institutes.

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