

ISMGE 2020**II International Scientific and Practical Conference "Individual and Society in the
Modern Geopolitical Environment"****REGIONAL SPACE FROM THE PERSPECTIVE OF CIRCULAR
ECONOMY**

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Abstract

The basic principles of the development of territorial space have attracted the interest of researchers for several decades. An important aspect is a study and research for the relationship between impact factors and the resulting development effects. Achievement of sustainability in transforming space is extremely important not only from the economic and political perspective, but also from the perspective of social development. Recently, the focus has shifted from a linear-type economic model to a closed-loop model, due to a number of objective new economic and ecological reasons. To continue learning the phenomenon of circular economy on the example of regional subjects of Russia the article carried out the procedure of their clustering on the basis of actual statistical data, revealed the distinctive features describing the specific development of space due to "circular principles" and gave the characteristics of cluster formations on the basic descriptive features of each group of cluster elements. More effective implementation of the principles of circular economy in the socio-economic space of the regions opens new horizons for strategic planning and management of their development. The information obtained from the analysis will contribute to the optimization and early establishment of equalization and harmonization of regional policies on sustainable development and the circular economy.

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1. Introduction

The study of territorial space from the cluster approach has special advantages especially evident in the current crisis period of the global economy caused by the COVID-19 virus pandemic. Territorial clusters are strategic points of support for management decisions in the regional and national blocs, contribute to the formation of investment attractiveness of regions, create new jobs, thus strengthening the position of sustainable development. Nowadays it is extremely important to find new stimuli for economic growth, part of the scientific world community believes that its source is the shift of the economic growth paradigm model from linear to circular. Consequently, there is a certain interest in defining the specificity of economic space under the influence of circular economy.

2. Problem Statement

The Russian researchers repeatedly note the relevance of the cluster approach in improving management decisions. For example, in Savzihanova (2014) wrote about the role and formation of the cluster; Zharkova (2017) considered the integration of the cluster and the special economic zone; Groshev et al. (2019a, 2019b) paid a close attention to systemic contradictions in the cluster initiatives; Malov and Letyagina (2019) proposed a neural network model of the clustering of the economy; the work of Kookueva and Tserceil (2019, 2019b) and other researchers (Andreeva & Astanina, 2018; Yagolnitzer & Kolobova, 2018) studied the questions of the formation of innovative territorial clusters.

3. Research Questions

The hypothesis assumes that the circular economy imposes distinctive, specific features conditioning the development of the regional space, allowing to identify new cluster formations at the regional and sub-regional levels, thereby contributing, in the future, to modernize management decision-making and reach a qualitatively new level of development of regional sustainability, additionally forming a favorable circular environment for strengthening the key R-principles of circularity.

4. Purpose of the Study

As the main purpose the author designates identifying specific features of regional space development from the position of circular economy by conducting clustering and, based on the identified clusters, developing program proposals for the implementation of principles of circular economy.

The elements of scientific novelty are in the procedure of clustering the subjects of Russia from the position of the achieved level of circular economy development (using QuiiskMap2 software products, VBA Projects, IBM SPSS Statistics) and in the elaboration of possible scenarios for the strategic development of circular economy.

5. Research Methods

Due to the interest of the world scientific community in the search for new sources of social and economic growth and the increased interest of government and business representatives in ecological

issues, considering the move of ongoing programs related to sustainable development, it is necessary to have a picture about specifics of the impact of the circular economy on the activities of the Russian regions for developing the most effective managerial decisions.

Figure 1 shows the proposed standard algorithm for determining the type of territorial cluster belonging of the analyzed region from the perspective of the level of circular economy development in the common space of the Russian Federation.

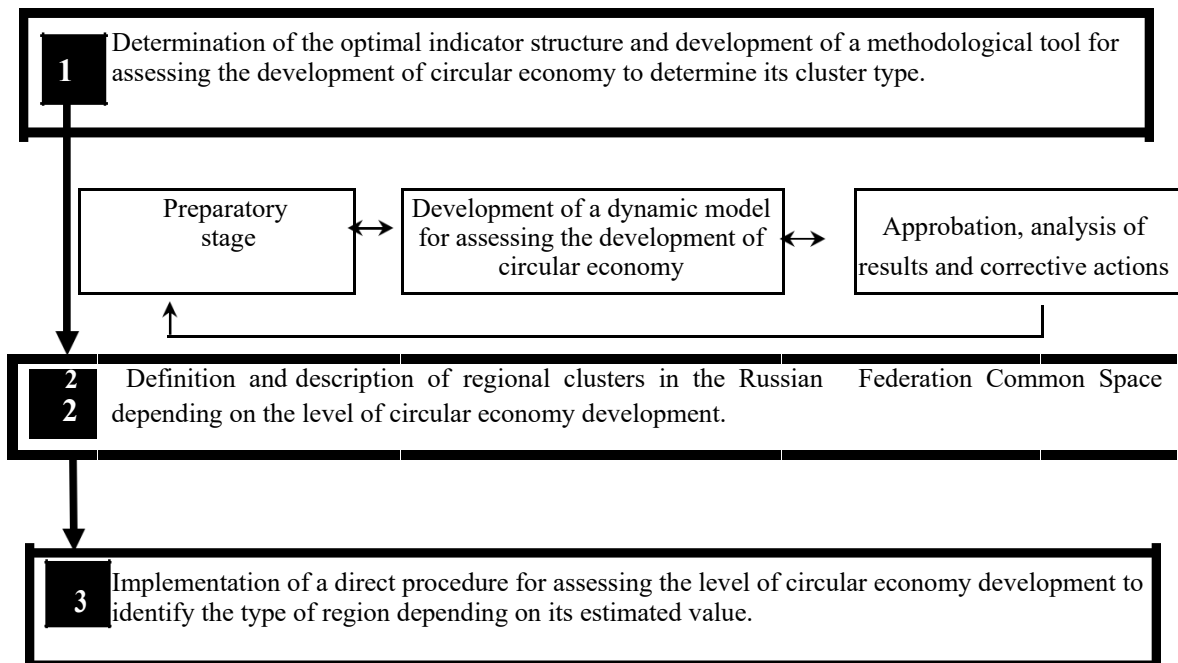


Figure 01. Algorithm of typologization and clustering of economic space subjects from the perspective of the level of circular economy development (compiled by the author)

According to modern ideas about the sustainable development of society, the research has previously identified key indicators that incorporate the main characteristics necessary to assess the level of development of the circular economy and reflect the specifics of the economic space. To continue the study, it tested the developed formula of dynamic model of circular economy described by the multiple regression equation (Guryeva, 2020). The scale of calculations is performed on the base of statistical data from 85 Russian regions in the 2014-2019 period (Federal State Statistics Service, 2019; Federal State Statistics Service, 2020; Russian Government, 2020; Unified portal of the budget system of the Russian Federation, 2020).

6. Findings

The received data are processed in the software product of QuiiskMap2 package (Practical Science, 2020) and visualized by means of equally filled distribution of the calculated values on 7 groups according to recommendations at social and economic space planning (Kurushina & Druzhinina, 2016; Decree of the Government of the Russian Federation of 17.11.2008 No. 1662-R, 2017). Figure 2 shows the infographic representation of the map of circular economy development in Russian regions for 2019.

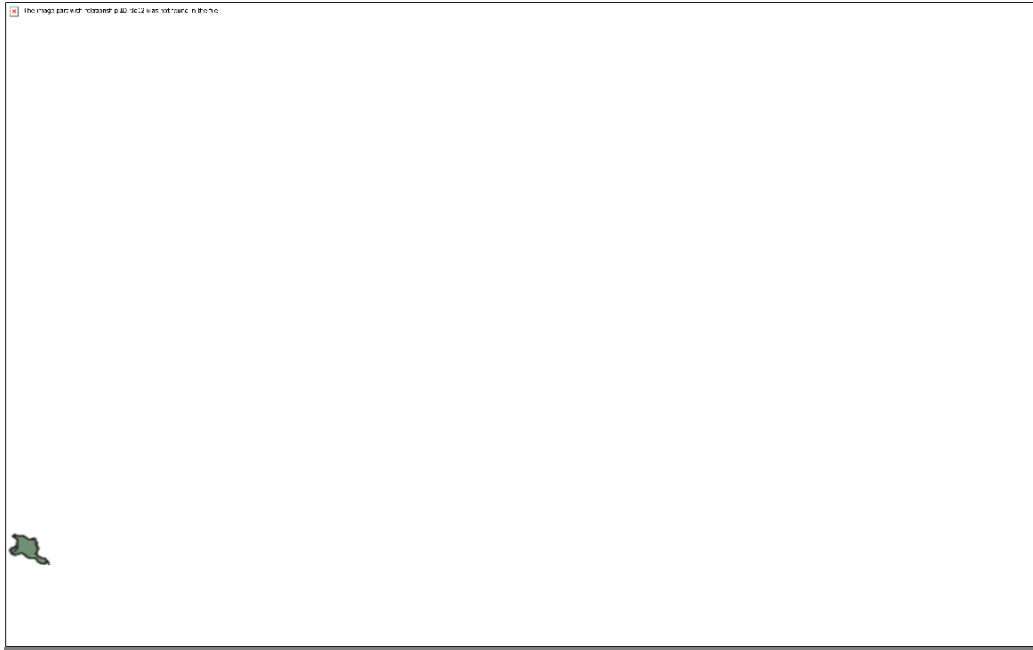


Figure 02. Map of circular economy development in Russian regions in 2019. (made by the author using the QuiiskMap2 software package)

The presented classification groups of regions make it possible to generalize several obvious specific features of space development under the influence of the circular economy:

1) the high level of development of the circular economy manifests largely in the regions with more favorable ecological conditions. Consequently, we can assume an interdependency between the degree of personal ecological literacy and society's ability to transmit it to the natural environment;

2) regions with increasing economic prosperity, as a rule, demonstrate a relatively negative level of circularity development, which directly proves the insufficiently balanced strategy of the region, where economic goals prevail over ecological ones. Targeted application of the existing competitive conditions and investment attractiveness of these subjects will contribute to the rapid growth of the circular economy;

3) regions with weakened economic component have higher level of circularity, which may mean, on the one hand, openness and flexibility in search of new opportunities to achieve a sustainable state, some increased readiness for dynamic changes; on the other hand, it may mean anthropogenic impact, caused by less active economic activity of the person, causes less damage to ecology. Subjects need a concentrated superstructure in the block of management decisions to realize the existing potential of the regions-subjects in the stability area.

To further study the phenomenon of circular economy on the example of regional subjects of Russia, the author conducted a procedure of vertical hierarchical clustering in the IBM SPSS Statistics 26 (Predictive Solutions, 2020) software package by means of the Classification tool, Ward methods and intergroup communication, using the interval measure "Euclidean Square" in both cases. The comparative

analysis uses the Ward method of clustering, which initially considers each subject as a single cluster (Table 1 and 2).

Table 01. The order of agglomeration (clusters) by the Ward method according to the level of circular economy development in the Russian subjects (fragment)

Stage	United cluster		Stage of the first appearance of the cluster		Next stage
	Cluster 1	Cluster 2	Cluster 1	Cluster 2	
1	70	81	0	0	6
2	63	80	0	0	66
3	74	79	0	0	4
4	66	74	0	3	9
5	67	73	0	0	8
6	57	70	0	1	12
...

Table 02. Structural completeness of clusters by level of circular economy development in the Russian subjects (made by the author)*

1st cluster	2nd cluster	3rd cluster	4th cluster	5th cluster	6th cluster	7th cluster
12, 21, 22, 31, 40, 42, 58	01, 29, 32, 33, 36, 48, 50, 51, 52, 55, 66, 79, 83	20, 25, 37, 68	23, 30, 43, 44, 53, 54, 69, 72, 76	03, 04, 05, 06, 10, 11, 13, 14, 15, 16, 24, 27, 34, 35, 39, 41, 45, 46, 47, 49, 60, 61, 64, 70, 73, 74, 77, 78, 86, 89	02, 18, 26, 38, 56, 57, 59, 62, 63, 67, 71, 75	07, 08, 09, 17, 19, 22, 65, 87, 91, 92
Total number of subjects in the created cluster						
7	13	4	9	30	12	10
Level of circular economy development						
High	Below	Low	Negative	Average	Above	Maximum
	average				average	
Symbol						
"M"	"BA"	"L"	"N"	"A"	"AA"	"M"

*Note: regions are listed under the subject number according to the Constitution of the Russian Federation (ConsultantPlus, 2020).

Table 3 shows the main descriptive characteristics of each cluster group.

Table 03. Main descriptive characteristics of cluster groups by the level of circular economy development in the Russian regions

Cluster name	Main descriptive characteristics
1st cluster "M"	It is the second smallest cluster, which has a high level of circular economy development. Subjects-regions have a high potential for intensifying the growth rate of the circular medium. There is a conscious ecological maturity of the society with an active public position.
2nd cluster "BA"	There are obvious prerequisites for learning the concept of circular economy, there is a slight decrease in the influence of classical economic factors. There is an active work on ecological education of the population, the level of circular economy development is described as "below average".
3rd cluster "L"	The smallest cluster, which includes four subjects with a low level of circular economy. There has been a first interest in the concept of circularity, perhaps signifying the beginning of preparatory work for a full-scale circular development program.

4th cluster "N"	The regions have obvious difficulties with the effectiveness of the proposed programmes in the circularity field. Ecological and economic activity of the population is relatively low. Economic interests prevail in strategic development. Presumably, there is a loss of systemic stability of regions with extremely undesirable destabilizing consequences in development.
5th cluster "A"	It is the most numerous cluster education with an average level of circular economy development. In fact, there is a balance of the classical triad of stability. Nevertheless, subjects are in a relatively vulnerable position and the nature of managerial decisions determines the further trajectory of their socio-economic development. There is a clearly formed view of the perspectives for the development of the circular economy, popularization of the new concept, and the way of functioning in the region.
6th cluster "AA"	The level of development of circular economy is assessed as "above average", with a phase of active formation of strategic priorities. Acceleration of the transition to R-impertitives of circularity requires improving the efficiency of all elements of the regional system.
7th cluster "M"	Subjects-regions have the maximum level of circular economy development achieved as of 2019. Their territory has unique natural and territorial components that provide relatively favorable ecological conditions, reducing the direct costs of anthropogenic impact as a result of economic activity of society; regions with relatively low levels of economic activity. We should note that these values are not benchmarks and there is a need for active stimulation for further growth.

More effective implementation of the principles of circular economy in the socio-economic space of the regions opens new horizons for strategic planning and management of their development. The information obtained through the analysis will contribute to the optimization and early establishment of the equalization and harmonization processes of the regional policy in the field of sustainable development and circular economy, which is fully consistent with the goal 2.3 "Sustainable nature management" and objectives 2.3.1 " Ecological education", 2.3.2 "Ecology of the natural environment, human ecology", 2.3.3 "Ecology of production, ecobusiness", prescribed in the Strategy of socio-economic development of the Tyumen Region until 2030 (Ministry of Economic Development of the Russian Federation, 2020).

7. Conclusion

Depending on the combination of external and internal factors, it is reasonable to provide for several most probable scenarios of strategic development of circular economy in the Tyumen region, presented in Table 4.

Table 04. Possible scenarios of strategic development of the circular economy in the Tyumen Region (compiled by the author)

Negative scenario	Target scenario	Ideal scenario
It provides for a low dissemination rate of the circularity concept. Traditional economic priorities focused on the fuel and energy sector are preserved. External impacts, including investment, have a low incentive to grow the circular economy. Ecological innovations are financed on the residual principle. The state of the environment and natural resources is gradually deteriorating. Society has very little understanding of the concept of sustainable development and the latest developments in the circular economy. Low level of introducing ecologically correct behavior in the everyday life of the population.	There is an active technical modernization of production according to BAT in the field of circular economy. There is a growing business initiative, circular services, digital economy, stable social and economic growth, generating an increase in consumer activity. The scientific and educational potential of the region steadily demonstrates positive dynamics, which generates an increase in the volume of investments and innovations considering the concept of circular economy. Along with a healthy lifestyle, a competent and responsible ecological consumption is taking root in a society oriented towards the hierarchical sector.	The circulating economy is becoming the main priority in regional development. New production facilities are being established at an accelerated pace, based on the circular paradigm of closed loops. There is the formation of effective circular models of business and public administration. It creates new jobs and increases the real incomes of the population. This has resulted in the overcoming of the ecological crisis with regard to the environment and natural resources, the creation of SPNAs, and the expansion of eco-tourism. The infrastructure is developing in line with ecological standards and circular eco-urbanism. The high ecological initiative of members of society.
Macro-CEDI index value range		
«0 – 0,4»	«0,41 – 0,7»	0,71 – 1»
"Initial"	"Middle"	"Advanced"

The main practical effects resulting from the study include increased efficiency in the elaboration of strategic development programs for regional subjects of the Russian Federation, optimization in the achievement of key parameters of life quality to fulfill basic obligations in the field of sustainable development, and circular economy. We see further development of the fundamental concept in the possibility of creating a regional integrated program of circular economy for the socio-economic territorial space of the region, which should be scaled up and modernized into national projects of Russia, in the case of proved efficiency of implementation.

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