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Methodology to Analyze the Resource Potential of Innovative Clusters in the Context of SDGs

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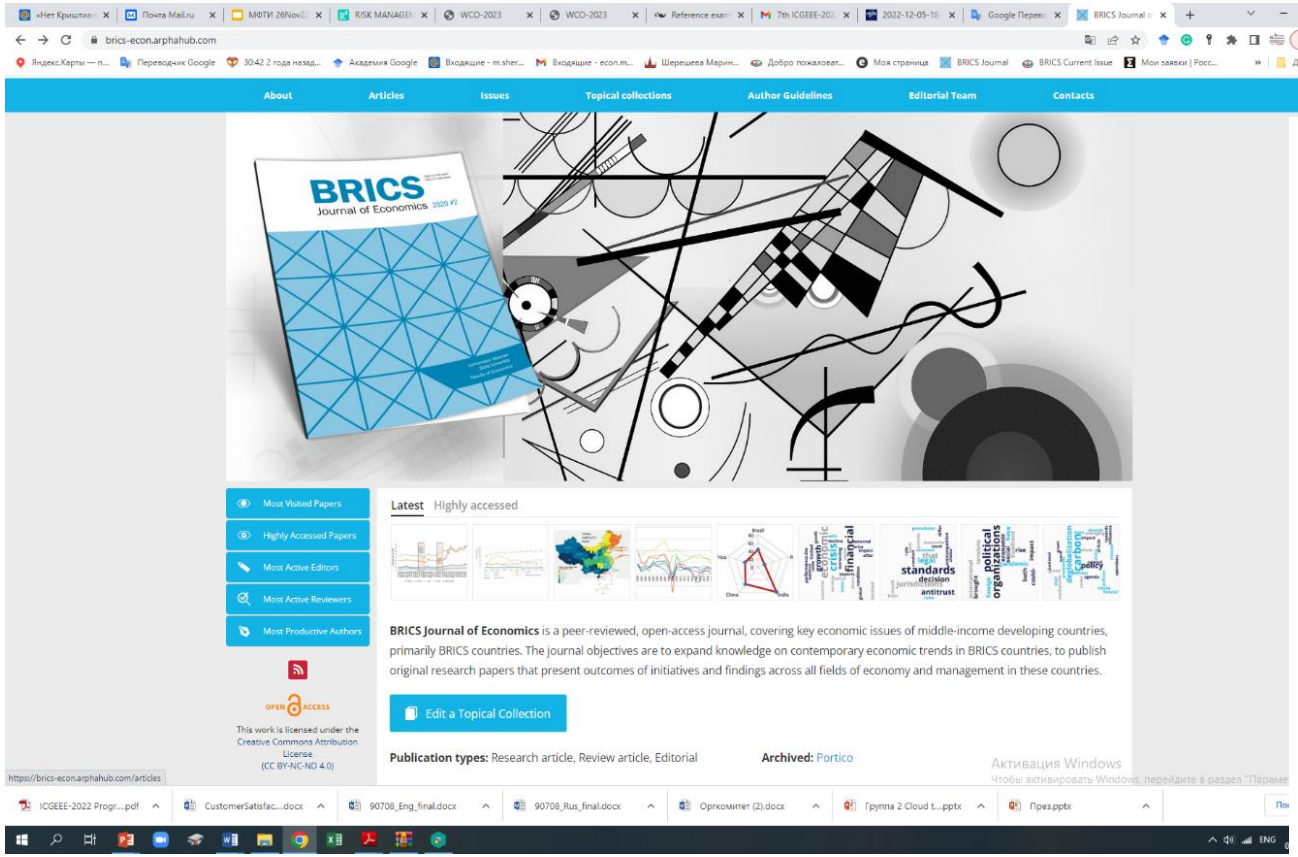

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Overview

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- **Concluding remarks**
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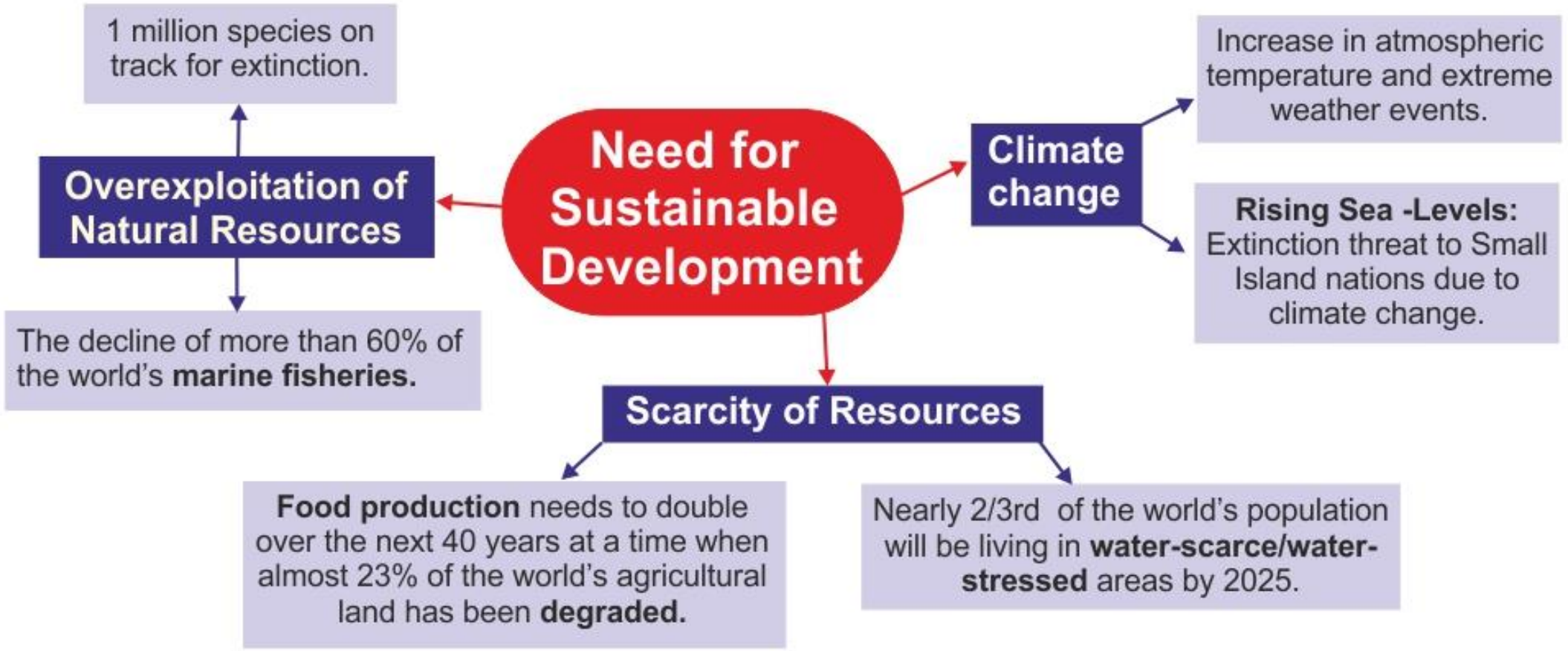
Introduction



17 SDGs

«Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs» *(International Institute for Sustainable Development)*

https://www.iisd.org/mission-and-goals/sustainable-development

https://www.drishtiias.com/to-the-points/paper3/sustainable-development-3

- Sustainability is an essential part of facing current and future global challenges, not only those related to the environment
- The 17 SDGs, with their 169 targets, form the core of the 2030 Agenda
- They balance the economic, social and ecological dimensions of sustainable development

THREE PILLARS of sustainability: environmental social economic → The problem of coordination and measurement → System of sustainable development indicators / integrated indicator?

Introduction

- Increased competition in the high-tech markets, growing challenges of global disintegration, as well as the external threats to national security and integrity of many countries, necessitate a proactive policy to strengthen the technological sovereignty and sustainability
- UN Decade of Action for achieving the SDGs
- In Russia, the need to ensure national economic security and sustainable regional socio-economic development actualizes the need for analysis and theoretical understanding of cluster development processes impact on the innovative development consistency

https://eng.rosstat.gov.ru/sdg/report/document/70355

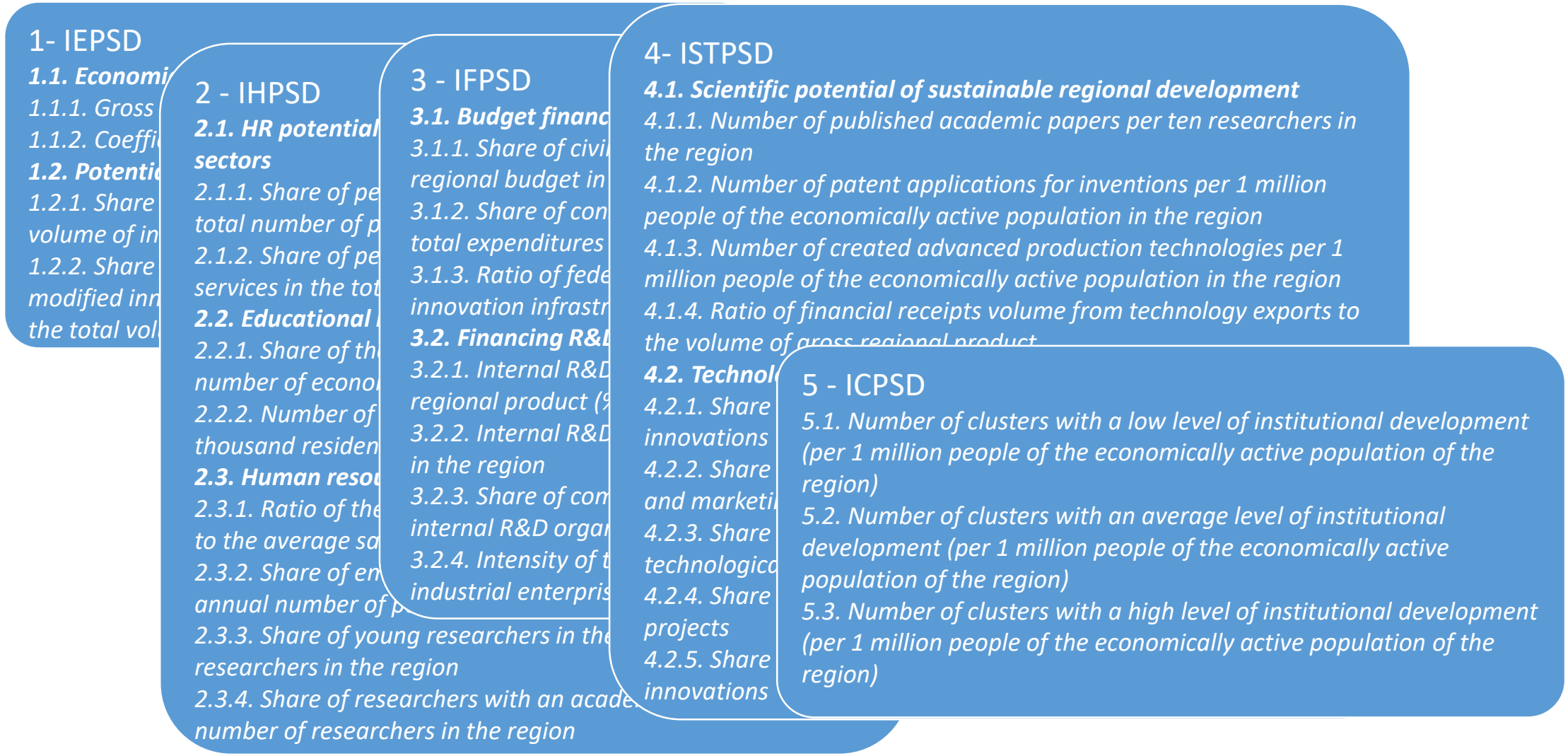
The purpose of the study

- To develop a comprehensive methodological approach to the analysis of the resource potential of regions with developing innovative clusters
- RQ1: *Is there mutual dependence between the consistency of innovative development and the degree of clustering in the regional economic space in Russia?*
- RQ2: *What can be a methodology to analyze the resource potential of innovative clusters in the context of SDGs?*
- RQ3: *Can the creation of new transnational clusters with BRICS countries and the Eurasian Economic Union be particularly relevant for Russian regions?*

Research Methodology

- The proposed methodology includes both indicators for assessing the factors of forming innovative regional economy, and indicators for the effectiveness of regional innovative development
- Index of Resource Potential for Sustainable Development (IRPSD) - 5 sub-indices:
    1. Index of Economic Potential for Sustainable Development (IEPSD)
    2. Index of Human Potential for Sustainable Development (IHPSD)
    3. Index of Financial Potential for Innovative Development (IFPSD)
    4. Index of Scientific and Technological Potential for Sustainable Development (ISTPSD)
    5. Index of Cluster Potential for Sustainable Development (ICPSD)
- These sub-indices in turn are combination of the second-level sub-indices and individual regional innovative development indicators calculated by the Federal State Statistics Service of the Russian Federation (Rosstat)

The indicators and sub-indices of the regional innovative development potential



Research Methodology

- When calculating the regional **Index of Resource Potential for Sustainable Development (IRPSD)**, as well as the sub-indices of both levels, all indicators have equal weighting factors
- At the same time, the initial values of the indicators should be normalized in order to make them usable within the framework of a single methodology
- Accordingly, the IRPSD is calculated using the following formula:

$$\mathrm{IIRPSD}^r = \frac{1}{n}\sum_{i=1}^{n}\frac{x_i^r - x_i^{min}}{x_i^{max} - x_i^{min}}$$

where IRPSD^r – index of innovative development potential of the *r*-th region;
n – the number of regional innovative development potential indicators used to calculate the final index;
x_i^r – the value of the *i*-th indicator of the regional innovative development potential in the *r*-th region;
x_i^{max} – the highest value of the *i*-th innovative development potential indicator in the analyzed sample;
x_i^{min} – the lowest value of the *i*-th innovative development potential indicator in the analyzed sample.

Empirical object choice

- Analyzing the processes of clustering in the Volga region

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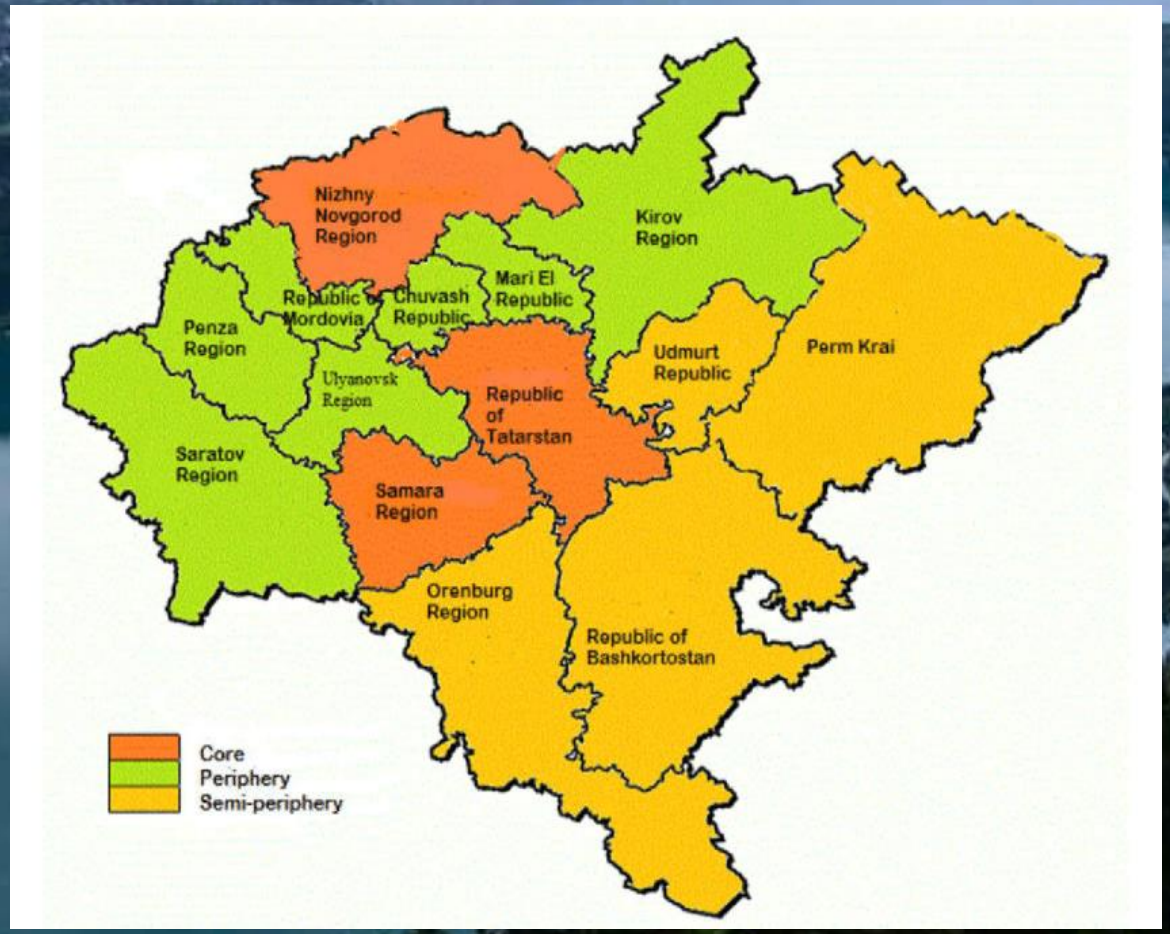

Empirical object choice

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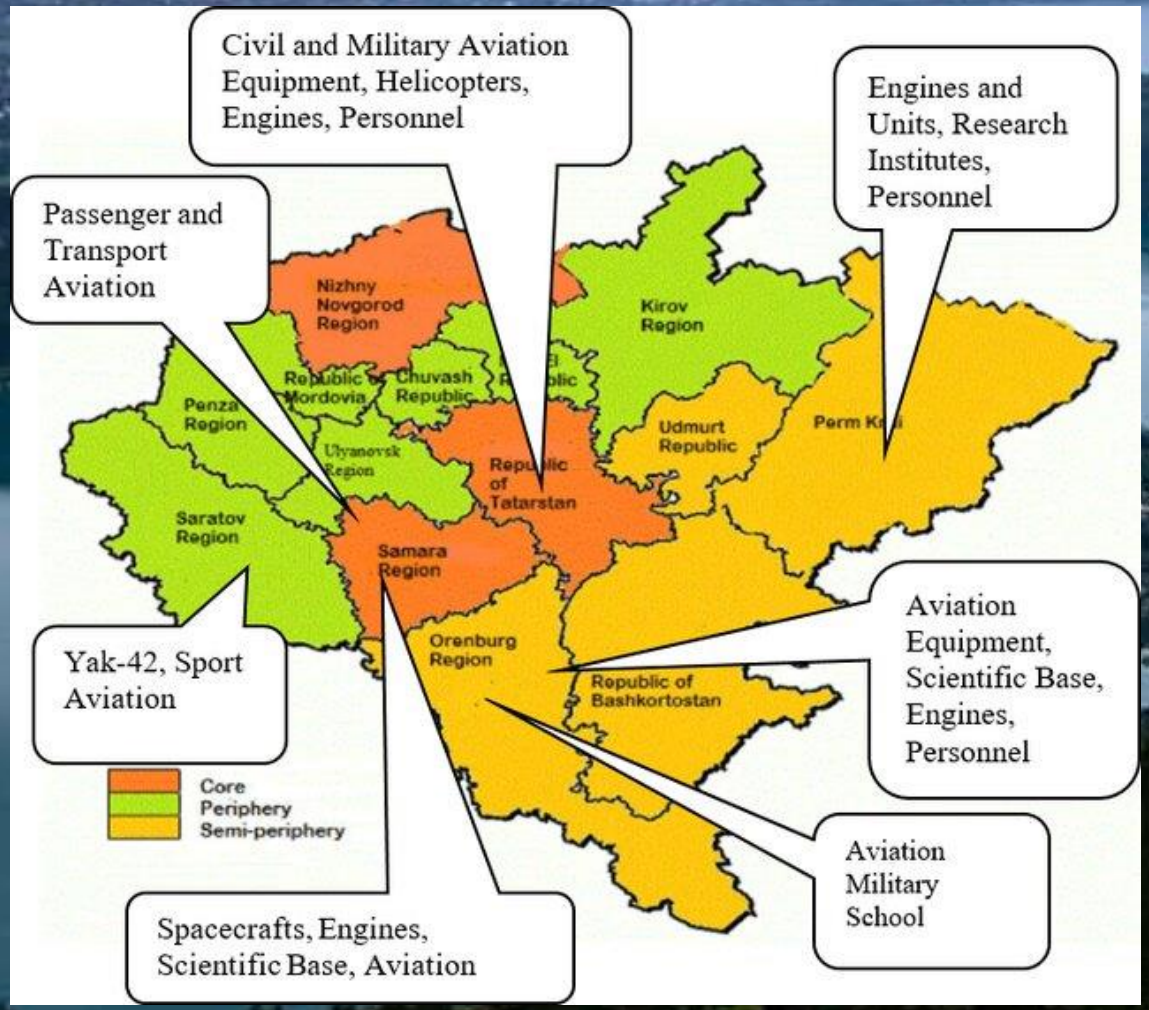


Preliminary results

- In addition to the official statistical data (Rosstat), we used the data of the Russian Regional Innovation Ranking (HSE University)* as an information base for calculating the index
- The grouping of regions was carried out on the basis of the our own model of clustering the economic space
- As a result, we have identified:
  - 2 macroregions (Volga-Kama, and Volga-Urals)
  - 4 districts (Volga-Vyatka, Kama, Middle-Volzhsky, and South-Pre-Urals)
  - 4 interregional clusters (Nizhny Novgorod, Kazan, Samara, and Saratov)

* The ranking comprises a system of 53 indicators for five key sub-indices: Socio-Economic Conditions for Innovation Activities Index, S&T Potential Index, Innovation Activities Index, Export Activities Index and Quality of Innovation Policy Index. Regions are ranked according to each of these sub-indices, and the final index is formed as the average of normalized values of all indicators included in the ranking

Preliminary results: IRPSD values of the Volga regions

- One can conclude that there is a fairly strong heterogeneity: in each group, one can identify a “leading region” and lagging regions
- Only two regions demonstrate a high index value and its positive dynamics over the analyzed period: the *Nizhny Novgorod Region* and the *Republic of Tatarstan*
- Taking into account these conclusions, we then considered the economic potential for sustainable development of the Volga regions

Regions	IRPSD
Volga Federal District	**0,356**
VOLGA-KAMA MACROREGION	**0,373**
Volga-Vyatka district	***0,392***
Nizhny Novgorod interregional cluster	0,426
Nizhny Novgorod region	**0,480**
Republic of Mordovia	0,373
Kasan interregional cluster	0,375
Republic of Tatarstan	**0,480**
Republic of Mari El	0,332
Chuvash Republic	0,390
Kirov region	0,299
Kama district	***0,315***
Perm Krai	0,346
Udmurt Republic	0,285
VOLGA-URAL MACROREGION	**0,332**
Middle-Volzhsky district	***0,345***
Samara interregional cluster	0,366
Samara region	0,346
Ulyanovsk region	0,386
Saratov interregional cluster	0,324
Saratov region	0,287
Penza region	0,360
South-Ural district	***0,307***
Republic of Bashkortostan	0,366
Orenburg region	0,247

Preliminary results: IEPSD values of the Volga regions

- *Republic of Tatarstan* plays key role in the innovative development of the entire *Volga-Kama region*, as well as in the activation of innovative effects within the framework of the *Kazan interregional cluster*
- *Republic of Tatarstan* is also one of the most active Russian regions in the cluster initiatives implementation

Regions	IEPSD
Volga Federal District	**0,24**
VOLGA-KAMA MACROREGION	**0,27**
Volga-Vyatka district	***0,28***
Nizhny Novgorod interregional cluster	*0,29*
Nizhny Novgorod region	0,25
Republic of Mordovia	0,32
Kasan interregional cluster	*0,27*
Republic of Tatarstan	**0,41**
Republic of Mari El	0,30
Chuvash Republic	0,22
Kirov region	0,16
Kama district	*0,25*
Perm Krai	0,28
Udmurt Republic	0,22
VOLGA-URAL MACROREGION	**0,21**
Middle-Volzhsky district	***0,22***
Samara interregional cluster	*0,27*
Samara region	0,31
Ulyanovsk region	0,23
Saratov interregional cluster	*0,17*
Saratov region	0,13
Penza region	0,21
South-Ural district	**0,18**
Republic of Bashkortostan	0,19
Orenburg region	0,16

Preliminary results: human resources of the Volga regions

- One can note the high values of the sub-index “Human Resource Potential of Regional Science” for all Volga regions, with the leadership of the *Nizhny Novgorod region*, the *Samara region*, and the *Ulyanovsk region*, with two cities of *Ulyanovsk* and *Dimitrovgrad* as scientific and educational centers

Regions	IHPSD
Volga Federal District	**0,44**
VOLGA-KAMA MACROREGION	**0,44**
Volga-Vyatka district	***0,46***
Nizhny Novgorod interregional cluster	*0,48*
Nizhny Novgorod region	**0,53**
Republic of Mordovia	0,42
Kasan interregional cluster	*0,45*
Republic of Tatarstan	0,49
Republic of Mari El	0,47
Chuvash Republic	0,47
Kirov region	0,39
Kama district	*0,38*
Perm Krai	0,41
Udmurt Republic	0,35
VOLGA-URAL MACROREGION	**0,43**
Middle-Volzhsky district	***0,46***
Samara interregional cluster	*0,50*
Samara region	0,50
Ulyanovsk region	0,50
Saratov interregional cluster	*0,42*
Saratov region	0,43
Penza region	0,41
South-Ural district	***0,37***
Republic of Bashkortostan	0,43
Orenburg region	0,32

Preliminary results: ISTPSD values of the Volga regions

- *Republic of Tatarstan* is leading in scientific and technical potential for sustainable development of the Volga region
- Overall, it is the key region for innovative transformation that possess two centers of transformation: the *Kazan city* and the *Nizhne-Kama agglomeration*
- The *Kazan city* is a potential point of boosting innovative activity growth and cluster initiatives in the *Chuvash Republic* and *Mari El Republic*
- The *Nizhne-Kama agglomeration* can play this role for the Vyatka-Kama zone (*Kama District* and *Kirov Region*)

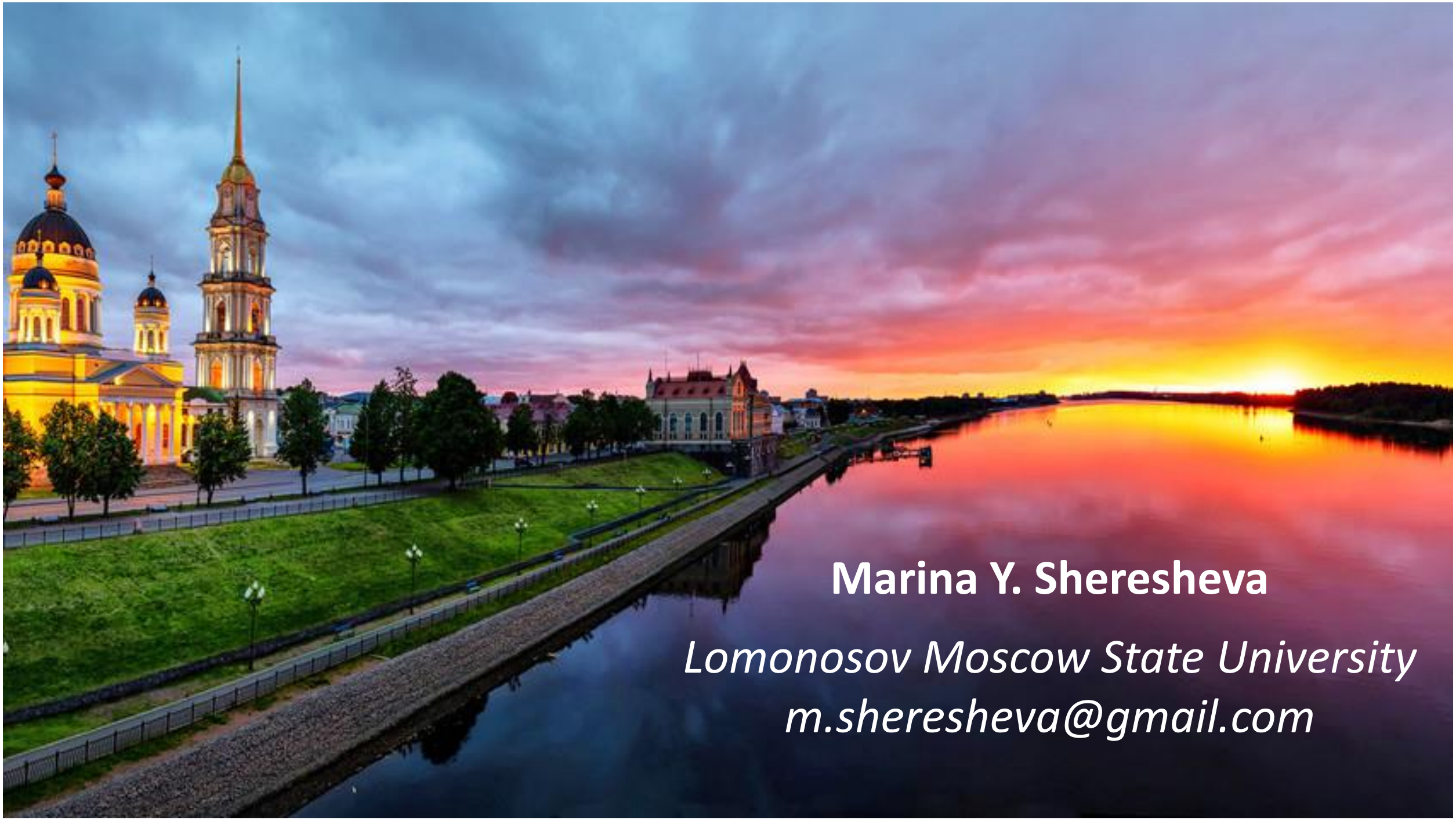
Regions	ISTPSD
Volga Federal District	**0,38**
VOLGA-KAMA MACROREGION	**0,42**
Volga-Vyatka district	***0,45***
Nizhny Novgorod interregional cluster	*0,47*
Nizhny Novgorod region	0,50
Republic of Mordovia	0,44
Kasan interregional cluster	*0,43*
Republic of Tatarstan	**0,61**
Republic of Mari El	0,32
Chuvash Republic	0,51
Kirov region	0,30
Kama district	*0,35*
Perm Krai	0,35
Udmurt Republic	0,34
VOLGA-URAL MACROREGION	**0,32**
Middle-Volzhsky district	***0,33***
Samara interregional cluster	*0,29*
Samara region	0,29
Ulyanovsk region	0,29
Saratov interregional cluster	*0,36*
Saratov region	0,29
Penza region	0,43
South-Ural district	***0,30***
Republic of Bashkortostan	0,34
Orenburg region	0,25

Concluding remarks

- The obtained results allowed us to assess the Volga region sustainable development based on the proposed multi-level model and to confirm:
  - *growing economic potential for sustainable development in these regions*
  - *positive impact of cluster development programs and complementary projects on the dynamics of the Volga regions' resource potential*
- The dynamics of indicators characterizing the financial potential shows that regions with active cluster policy attract innovation financing more effectively
- Uneven distribution of clusters by regions, as well as differences in the level of resource potential can be explained both by economic and geographical specifics, and the effectiveness of regional authorities activity

Limitations and future research

- Though the results helped us to trace *the relationship between innovative potential, innovative and cluster activity,* the key limitation for drawing conclusions about cluster policy impact on the resource potential of innovative clusters and sustainable development in the Volga regions is that *competitive industries in large economic, scientific, and educational centers were subjects of clustering at the first stage*
- Additional research is needed to confirm that the resource potential of clusters can be increased if they become parts of changing global production chains in the context of BRICS and the Eurasian Economic Union



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