

## REGIONALISATION OF EUROPEAN INTEGRATION IN THE REPUBLIC MOLDOVA: AN EXAMPLE OF INTERREGIONAL CONVERGENCE ALONG THE DNIESTER

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**Abstract :** *In the context of globalization and deepening integration processes within the European Union (EU), the Republic of Moldova is faced with the need to adapt its economic and social policies to EU standards. A central aspect of this process is the regionalization of European integration, which involves not only strengthening the role of central government but also the active involvement of regions in overall development processes. This article analyzes the transition from a centralized model of innovation management to a regional model using the example of six regions of Moldova. It examines the importance of integrating Moldovan regions into European research and innovation networks, participation in EU programs, and access to cross-border information spaces, which form the basis of Moldova's integration strategy into the EU. The paper utilizes theoretical approaches such as regional convergence theory, Porter's cluster development, intellectual specialization, and network economics theory, which serve as key tools for explaining and predicting regional integration processes. A comprehensive model is proposed to ensure interregional convergence and Moldova's integration into the European Community through innovative and research-based mechanisms that promote economic growth, social cohesion, and the development of local clusters. The study emphasizes that the active participation of regions in these processes is essential for Moldova's successful and effective accession to the EU.*

**Keywords:** *regionalization, integration, EU, innovation, research networks, cross-border data, cluster development.*

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### 1. Introduction

In the context of globalization and deepening integration processes within the European Union (EU), the Republic of Moldova faces the need to adapt its economic and social policies to EU standards. A central aspect of this process is the regionalization of European integration, which implies not only strengthening the role of central government but also the active involvement of regions in overall development processes. The aim of this study is to analyze the transition from a centralized model of innovation management to a regional model using the example of six regions (Republic of Moldova, 2017) of Moldova, including the North, Center, South, and Transnistria. The focus is on interregional convergence along the Dniester River (Republic of Moldova, 2026), the integration of Moldovan regions into European research and innovation networks, participation in EU programs, and access to cross-border information flows. The research questions of the article:

1. How are Moldova's regions integrating into European innovation and research networks?
2. What methodological tools and strategies facilitate interregional convergence?
3. How does regional participation in EU programs impact economic growth, social cohesion and cluster development?

## 2. Literature Review

The theoretical approaches to regional integration in contemporary research are based on several key concepts that define the mechanisms and patterns of integration processes:

- **Regional convergence theory** (Arvanitopoulos & Lazarou, 2023), explaining the trends of equalization of economic levels between regions.
- **Cluster development according to Porter** (Porter, 1998), focusing on industry concentrations and collaborative innovation.
- **Smart Specialization Strategy (S3)** (Foray, 2025), aimed at identifying the unique competitive advantages of regions.
- **Network economics theory** (Lombardo & Pasotti, 2004), which explains how interregional and cross-border connections influence innovative development.

Research by the JRC and the European Commission on **interregional cooperation and intellectual specialization** highlights the importance of such collaboration for lagging regions (Woolford et al., 2021). The key question is not only “how” to cooperate, but also “when” to include regions in joint projects to ensure maximum convergence and the effective exploitation of innovative opportunities. In this context, the timing and sequencing of cooperation initiatives play a crucial role in maximizing their impact, while alignment with smart specialization priorities strengthens the integration of regions into broader European innovation ecosystems.

**Driving forces and factors of interregional cooperation** are reflected in different types of proximity that influence the effectiveness of interregional interaction (Lalrindiki & O’Gorman, 2018), including *geographical proximity*, which facilitates personal contacts and the exchange of tacit knowledge; *functional proximity*, characterized by a similar technological level and industrial structure of enterprises; *relational or institutional proximity*, based on shared norms, laws, and cultural codes; and *cognitive proximity*, referring to a common knowledge base and scientific competencies, where a moderate level is considered optimal for innovation generation. These approaches form the basis for assessing interregional convergence in Moldova, making it possible to identify the key factors influencing the integration of regions into European networks and to design more targeted and effective cooperation strategies.

## 3. Methodology

The methodological approach of this study is based on a combination of complementary quantitative and qualitative methods, which allows for a comprehensive assessment of the impact of international support and investment mechanisms on regional development. The analysis utilizes the RHOMOLO (Di Comite et al., 2016) spatial model to assess regional convergence and policy effectiveness; a multiplier model to determine the economic impact of investments; an innovation activity index to measure the ability to transform external support into real innovation; an entrepreneurial discovery process (EDP) approach to identify unique market niches; and an analysis of proximity factors (geographical, functional, relational, and cognitive), which helps identify barriers and potential for interregional cooperation. The methods include:

1. **Spatial model RHOMOLO** to analyze regional convergence and policy effectiveness.
2. **Multiplier model** to assess the economic impact of investments
3. **Innovation Activity Index** to assess the effectiveness of the transformation of international support into real innovations:
4. **entrepreneurial discovery (EDP)** to identify hidden market niches and unique opportunities in each region.
5. **Analysis of proximity factors** (geographical, functional, relational and cognitive) to assess barriers and potential for interregional cooperation.

The methodology allows for the integration of quantitative data (GDP, structure of entities, innovation indices) and qualitative observations (interviews, expert assessments, institutional analysis).

## 4. Results and Discussion

### *4.1 Historical and modern approaches to regionalism and their limitations*

Between the 1960s and 1980s, many researchers and policymakers assumed a universal "model" of regionalism applicable to all developing countries. However, the experience of the European Union demonstrated that this hypothesis failed to account for the specificities of individual regions and institutional systems. Most scholars focused on individual territories and countries, neglecting cross-regional comparative studies - a phenomenon Thompson (footnote 30) characterized as "region-centricity."

The political and historical context of regionalism (Behr & Jokela, 2011) was widely recognized as fundamental. Consequently, different regions were considered too diverse for direct comparison. The scholarly avoidance of interregional comparisons encouraged the proliferation of new concepts or the idiosyncratic use of existing ones that assessed only the specificities of individual regions. Rather than seeking to generalize knowledge and derive universal principles, research remained localized, limiting itself to analyzing a single region or individual cases of cooperation. This "local" tradition in regional studies fostered fertile ground for parochialism, which largely echoes Problem №1, characteristic of EU studies (footnote 31). In this context, regional initiatives were perceived as unique and poorly comparable, limiting the possibility of developing integrative strategies for cross-border or neighboring territories.

Nevertheless, modern approaches to regionalism emphasize the need to consider both the internal specifics and external connections of regions. For Moldova and its regions along the Dniester, this means that a convergence strategy cannot be limited to centralized resource allocation mechanisms; it must rely on interregional and cross-border instruments that take into account the institutional, economic, and innovative differences between the North, Center, South, and Transnistria. To realize the potential of the Convergence Fund and ensure the effective allocation of resources between regions, it is necessary to rely on the Smart Specialization Strategy (S3) methodology and modern spatial analysis models. This integrated approach combines quantitative and qualitative methods, enabling the convergence of regions at the economic, institutional, and innovative levels. To compare Moldova's regions with those of the EU and OECD countries, it is necessary to use a methodology that takes into account both economic and institutional differences. Simple aggregate indicators of GDP or the

number of enterprises do not capture the complex interactions between regions, their innovative activity, and the impact of policy decisions on economic growth. In this context, spatial general equilibrium models provide researchers with a tool for complex analysis, allowing them to quantitatively predict the consequences of different resource allocation strategies and assess the effectiveness of interregional coordination.

To unlock new opportunities in the area of "Smart specialisation", regions and countries must analyse their position within European and global value chains. Based on this analysis, "Smart specialisation" strategies should be coordinated not only with national priorities and programmes, but also with regions in other countries, as no single region has complete and comprehensive information on all cooperation opportunities at the regional, national and European levels in their areas of "Smart specialisation". Consequently, the development of effective policies requires the development of targeted transregional cooperation that takes into account the distribution of administrative responsibility, risk management and the delineation of powers between participants. In this context, there is a need to use analytical tools that can take into account interregional interconnections, institutional differences and the spatial structure of the economy, which allows for a transition from descriptive analysis to quantitatively substantiated modelling of convergence processes.

#### ***4.2 Spatial model RHOMOLO***

To compare Moldova's regions with those of the EU and OECD countries, it is advisable to use the spatial general equilibrium model RHOMOLO. This model allows:

- evaluate the effectiveness of regional policy management;
- to analyze the dynamics of regional convergence in the EU and neighboring countries;
- to quantitatively predict the impact of institutional changes and investments on economic growth.

RHOMOLO enables the modeling of resource allocation scenarios and assessment of their impact on the economic performance of individual regions, and goes beyond quantitative assessment. The model also allows for the identification of potential imbalances between regions, the assessment of the impact of institutional reforms and investment initiatives on innovation dynamics, and the prediction of how coordination and targeted resource allocation can contribute to the convergence of the economic and technological levels of the Northern, Central, Southern, and Transnistria regions. Combined with the Smart Specialization (S3) strategy tools, RHOMOLO provides an analytical basis for the Convergence Fund's strategic planning and the formulation of long-term recommendations for the development of interregional clusters and innovation chains.

#### ***4.3 Quantitative assessment of the investment effect***

After spatially assessing the regions, it is important to determine which investments will yield the greatest economic impact. For this purpose, a multiplier model is used, which takes into account the propensity to consume and the tax base of regions. Differences in income levels and infrastructure development across regions require a targeted approach to distributing the Fund's resources. This can be accomplished using a multiplier model, which allows for assessing the overall economic impact of investments:

$$Y = \frac{1}{1-c(1-t)} \times I \quad (1)$$

Where:

- Y is the total economic effect of investments;
- c - propensity to consume (e.g. 0.6);
- t - business tax rate (e.g. 0.2);
- I - the amount of initial investment (for example, 1,625,000 MDL – the amount of the grant and co-financing).

Example of calculation. Input data: I = 1,625,000 MDL; c = 0.6; t = 0.2.

Calculation:

$$\begin{aligned} Y &= \frac{1}{1 - 0.6(1 - 0.2)} \times 1,625,000 = \frac{1}{1 - 0.6 \times 0.8} \times 1,625,000 \\ &= \frac{1}{1 - 0.48} \times 1,625,000 = \frac{1}{0.52} \times 1,625,000 \approx 3,125,000 \quad (2) \end{aligned}$$

The multiplier model allows us to assess which regions (for example, the agricultural North or the industrial Center) will have the greatest impact on economic growth, taking into account regional consumption patterns and tax burdens. Thus, it ensures the rational allocation of Convergence Fund resources, taking into account the multiplier effect on local economies.

**Interpretation of the result:** this means that an investment of MDL 1,625,000 generates a cumulative economic impact of approximately MDL 3,125,000. This represents a nearly twofold multiplier effect, confirming the high efficiency of investments in the Moldovan economy and its SME sector.

#### ***4.4 Assessment of innovative and intellectual capital***

The next step in bridging the innovation gap is to assess the ability of regions to transform investments into innovation and new technologies. This is done using an innovation activity index, which takes into account both the number of joint projects and their degree of novelty:

$$I = \frac{\text{number of joint projects} \times \text{degree of innovation}}{\text{total number of projects in the region}} \quad (3)$$

- I = index of regional innovation activity;
- Number of joint projects - the number of projects with international or interregional participation;
- Degree of innovativeness – an indicator of novelty (for example, the introduction of new technologies, R&D components, etc.);
- Total number of projects in the region - total number of projects being implemented.

The use of this index allows:

- identify regions that effectively use international support to create innovative products;
- identify the potential for the formation of clusters integrated into European research networks;
- plan strategic investments of the Convergence Fund to strengthen the innovative potential of less developed territories.

The use of the innovation activity index complements spatial and economic assessment, providing a comprehensive analysis of the innovative and intellectual capital of regions.

#### ***4.5 Entrepreneurial Discovery Process (EDP)***

Quantitative models and indices provide only a partial picture of a region's potential. To identify hidden opportunities and niche advantages, the entrepreneurial discovery process (EDP) (Perianez Forte & Wilson, 2021) is used. This method is based on:

- active dialogue with business, science and local authorities;
- identification of new market niches;
- development of strategies aimed at integrating regions into global value chains.

The EDP is particularly important for "lagging regions" (the South and Transnistria), where traditional GDP and employment indicators fail to capture the hidden potential for innovation. The method helps regions determine when and how to engage in interregional cooperation, minimizing the risk of ineffective investments and enhancing convergence.

#### ***4.6 Intimacy factors***

An important dimension of interregional cooperation is the role of proximity - referred to here as intimacy factors - which determine the intensity and effectiveness of interactions between regions. In this context, several types of proximity shape the conditions for successful collaboration and innovation exchange:

1. **Geographical proximity**- support of personal contacts and cross-border information flows that facilitate the exchange of tacit knowledge;
2. **Functional proximity** - compatibility of technological levels of enterprises and industry structures;
3. **Relational/Institutional Proximity** - harmonization of norms, rules and cultural codes;
4. **Cognitive proximity** - a level of common knowledge that ensures effective exchange of experience and innovation.

Analysis of these factors allows us to:

- to identify barriers to cooperation between regions;
- to identify the potential for joint development of innovative clusters;
- to stimulate socio-economic rapprochement between the Northern, Central, Southern regions and Transnistria.

#### ***4.7 The prospect of "lagging regions"***

Building on the previously discussed analytical tools - such as the RHOMOLO model, multiplier effects, innovation indices, and proximity factors - it becomes essential to focus specifically on regions that demonstrate comparatively lower levels of economic and innovation development. These "lagging regions" require tailored policy approaches, as their integration into interregional and European networks presents both significant challenges and unique opportunities for accelerating convergence. The S3 Strategy places special emphasis on "lagging regions," focusing on "how and when" they should engage in interregional cooperation to maximize convergence. For the South and Transnistria, this means:

- identifying unique niches for "smart specialization";
- integration of regions into European networks;
- stimulating entrepreneurial discovery to identify competitive advantages.

Thus, the strategic inclusion of lagging regions into interregional cooperation frameworks not only enhances their individual development trajectories but also contributes to the overall cohesion of the national economic system. To operationalize these objectives and ensure evidence-based policy implementation, it is necessary to complement strategic approaches with robust analytical tools. In this context, the application of both quantitative and qualitative mapping methods becomes a critical next step for identifying regional potential and guiding investment decisions.

#### ***4.8 Application of quantitative and qualitative mapping***

**Quantitative mapping** - this analysis includes GDP dynamics and the distribution of economic entities to identify industry leaders. It allows us to determine where investments will have the greatest multiplier effect. **High-quality mapping** is based on the entrepreneurial discovery process (EDP). This mechanism involves:

- active dialogue with business and scientific organizations;
- identifying hidden market opportunities;
- assessment of proximity factors and potential for interregional cooperation.

The combination of quantitative and qualitative mapping provides a comprehensive assessment of the potential of regions along the Dniester and forms the basis for the strategic allocation of resources of the Convergence Fund.

#### ***4.9 Integration into macro-regional strategies***

Sustainable development of macro-regions, such as the Danube Strategy and the Baltic Sea Region Strategy, reduces uncertainty and promotes internal and external convergence:

1. **Formation of critical mass and synergy of efforts:** transnational cooperation pools resources and knowledge, creating the necessary critical mass for global competitiveness;
2. **Uncertainty Reduction through EDP:** the participation of business and science in determining investment priorities minimizes the risk of errors and government dirigisme;
3. **Harmonization through proximity factors:** institutional, functional and cognitive proximity reduce barriers and accelerate innovative collaboration;
4. **Coordination to prevent duplication:** macro-regional frameworks allow for the identification of unique specializations and the avoidance of competition on identical technologies;
5. **Using RHOMOLO analytical models:** quantitative assessment of policy effectiveness and forecasting the dynamics of regional convergence.

Thus, the integration of the Republic of Moldova's development regions with the regions of the countries of the Danube Strategy Macroregion (European Commission, 2021) (*Danube*), the Baltic Sea (European Commission, 2021a) (*Baltic*), and the Alpine Macroregion

(European Commission, 2021b) (Alpine) transforms geographic proximity into a strategic partnership, creating a predictable environment for investment, accelerating socio-economic convergence, and integrating into European innovation networks.

## Conclusions

1. **The role of regions in European integration:** Moldova's successful integration into European networks is impossible without the active participation of regions in innovation and research projects.
2. **The effectiveness of interregional convergence:** the use of S3, RHOMOLO, and the multiplier tools allows us to evaluate and strengthen the convergence of regions in terms of economic and innovation indicators.
3. **Removing barriers:** the harmonization of norms, the development of institutional and cognitive proximity, and the process of entrepreneurial discovery reduce the differences between the North, Center, South and Transnistria.
4. **Practical recommendations:** the Convergence Fund should strategically invest in innovative projects, create clusters, and stimulate the participation of “lagging regions” in international initiatives.

**Contribution of the study:** the article demonstrates how the combination of quantitative and qualitative analysis, proximity factors and interregional strategies can contribute to the sustainable integration of Moldovan regions into the European economic and innovation space.

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