MAPPING "LEFT-BEHIND PLACES" IN LATVIA: A QUANTITATIVE ASSESSMENT USING MULTIVARIATE RANKING AND CLASSIFICATION

'NOMALES EFEKTS' LATVIJĀ: KVANTITATĪVS TERITORIJU DEMOGRĀFISKĀS UN SOCIĀI EKONOMISKĀS ATTĪSTĪBAS NOVĒRTĒJUMS

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Abstract. The notion of "left-behind places" has emerged as a prominent theme in the discourse of geographical inequalities and has gained widespread usage in urban and regional studies. This term is employed to denote the particularly salient challenges faced by former industrial and remote rural regions that have been adversely impacted by population decline, globalisation, economic shifts, and technological advancements. This research investigates demographic and socio-economic variables to classify and map "left-behind places," as well as more prosperous centres of development, across the regions of Latvia. This study employs a set of variables derived from the Central Statistical Bureau of Latvia, analysing quantitative data on demographic and social change as well as economic performance. The results were obtained through multivariate ranking and quantitative data-sorting analyses. This study identifies territorial units affected by deprivation and assesses the geographical patterns of "left-behind places" across regions. The findings provide critical insights for regional development policies by highlighting how different dimensions and temporalities of demographic and socio-economic changes necessitate varied policy responses.
Keywords: *left-behind places, regional disparities, demographic change, uneven development, polarisation*

Introduction

Uneven socio-spatial development and polarisation are nested, multidimensional and multiscalar processes (Lang et al. 2022). Moreover, persistent regional differences

in demographic and socio-economic development have been widely acknowledged to be an intrinsic feature of contemporary society (Kühn 2015; Wei 2015). The increasing socio-spatial polarisation of countries into core and peripheral regions has reached levels that challenge social and territorial cohesion across Europe (Dijkstra et al. 2020; Rodríguez-Pose 2018). Peripheralisation, an increase in "left-behind places," and the processes of regional polarisation are particularly pronounced in Central and Eastern Europe (CEE), which has led to renewed interest in the demographic and socioeconomic effects of the post-socialist transition (Sokol 2001, Lang et al. 2015, Dobrzanski et al. 2024; Dijkstra 2024). The Baltic states show extreme rates of demographic and socio-economic polarisation (Pužulis, Kūle 2016; Ubarevičienė, Van Ham 2017; Raagmaa 2023). In these three countries, a distinct concentration of growth and development in the capital cities, on the one hand, and growing disparities with rural and former industrial regions, on the other, can be observed (Dzenovska 2020; Pociūtė-Sereikienė 2021). This study contributes to the literature by constructing a transparent, data-driven approach in order to identify and map left-behind places in Latvia using multivariate ranking and classification techniques. Specifically, we compile indicators for territorial units of demographic change, human capital, labour market performance, income, jobs, and access to services; develop a composite index; and apply sorting technics to delineate profiles of disadvantage and resilience. We aim to explore the questions: (1) which urban and rural areas can be considered left-behind under a multidimensional perspective? (2) How do spatial patterns of deprivation change across the regions of Latvia?

This paper is structured as follows: the next section outlines the data sources and methodological approach employed to identify and classify left-behind places; this is followed by a presentation of the results, which maps the spatial distribution of disadvantage across Latvia's regions and examines temporal shifts between 2017 and 2022; the final section concludes by discussing the implications of these findings for regional development policy and identifying avenues for future research

Data and methods

The data employed in this study are derived from the Territorial Economic Development tool maintained by the Central Statistical Bureau of Latvia and data arrays available on the Latvian Open Data Portal. The data set comprises highly accurate

demographic and socio-economic information through 17 variables (Table 1). The variables describing the demographic development, population and employment composition, and human capital of the small towns under study were calculated from the relevant census data.

Table 1. **Variables used for the analysis** (authors' calculations based on data from the Central Statistical Bureau of Latvia)

Description	Variable	2017			2022		
		MIN	MAX	AVG	MIN	MAX	AVG
Mean age	AGE_{AVG}	31	51	42.5	31	53	43.7
Ageing index[1]	AGEING	22.2	444.4	146.5	18.3	392.3	134.9
Crude birth rate	BIRTH	0.64	44.9	9.4	1.47	22.1	8.1
Crude death rate	DEATH	2.85	139.3	17.6	3.57	109.9	19.3
Migration intensity[2]	MIG_{int}	2.93	51.3	9.0	2.05	95.3	10.0
Number of emergency medical service (EMS) calls	EMS	1.7	25.3	8.1	3.5	28.7	10.8
Share of university-educated[3]	EDU_{high}	7.1	55.8	17.4	7.8	60.6	19.6
Share of primary-educated[4]	EDU_{low}	9.5	49.5	26.9	9.6	44.6	24.6
Employment rate[4]	EMP	22.3	73.4	44.0	27.3	68.6	52.5
Unemployment rate[5]	UNEMP	4.1	48.6	15.1	3	49.3	10.7
Number of jobs per 100 inhabitants	JOBS	2	245.8	46.3	4.7	306.9	50.4
Share of managers and professionals[6]	OC_{high}	1.8	39.2	17.1	8.1	55.3	21.2
Share of elementary occupations[6]	OC_{low}	0.4	46	13.9	4.5	28.6	14.1
Share employed in primary sector (NACE B+C)	$NACE_{BC}$	0.4	67.4	16.0	3.3	35.1	13.9
Share employed in knowledge-intensive sector (NACE J+K+M)	$NACE_{JKM}$	1	19.7	4.6	0.4	19.2	4.2
Share of anti-system vote	VOTE	3.6	52	21.1	2	68	16.9
Average wage compared to national average, %	WAGE	59.5	228.2	100.0	66.9	204.4	100.0

Notes: [1]the ageing index refers to the number of the elderly aged 65 years or over per 100 individuals younger than 14 years old; [2]includes international migrants, internal migrants and residential moves; [3]among adults aged 18 and over; [4]among adults aged 15 and over; [5]among adults aged 15 to 74; [6]among adults aged 15 and over, based on the International Standard Classification of Occupation (ISCO).

The methodological approach adopted in this study combines multivariate ranking procedures with quintile-based classification to identify and map left-behind places. The analytical framework consists of several sequential steps. First, all 17 variables were standardised to ensure comparability across different measurement scales. Second, each territorial unit was ranked according to individual indicators, with rankings reflecting the degree to which each unit exhibits characteristics associated with either deprivation or prosperity. Third, variables were categorised into two groups: negative indicators (where higher values indicate worse conditions, such as death rates, unemployment rates, and shares with low education) and positive indicators (where higher values indicate better conditions, such as employment rates, shares who are university educated, and average wages).

For the negative indicators, the territorial units with the highest values were assigned to the bottom quintiles (Q5), representing the most disadvantaged areas, while those with the lowest values were placed in the top quintiles (Q1). Conversely, for positive indicators, the units with the highest values were assigned to Q1, indicating more favourable conditions, while those with the lowest values were placed in Q5. This inversion ensures that across all variables, Q1 consistently represents the most advantaged territorial units and Q5 represents the most disadvantaged. Following the quintile assignment, a composite index was calculated for each territorial unit by summing the quintile scores across all 17 variables. This composite index provides an overall measure of relative disadvantage or advantage. Territorial units with composite scores in the highest quintiles were classified as "left-behind places," while those in the lowest were identified as centres of development. Units in the middle quintile represented transitional areas with mixed characteristics.

The analysis was conducted for two points in time, 2017 and 2022, allowing for an examination of temporal dynamics in regional development patterns. Spatial visualisation was performed using geographic information systems (GIS) to produce maps illustrating the distribution of left-behind places and centres of development across Latvia's planning regions (Figure 1). This temporal comparative approach enables the identification of territorial units experiencing improvement, decline or stability in their relative positions within the national settlement system.

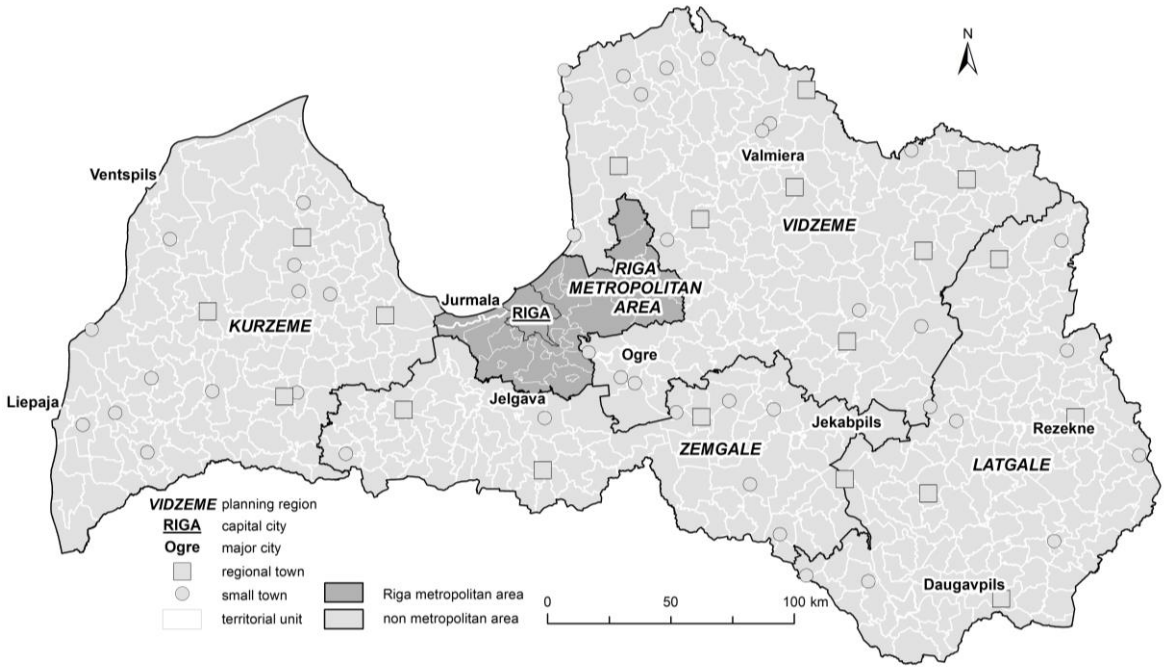

Figure 1. **Regional divisions and urban settlements in Latvia** (authors' figure based on the Central Statistical Bureau of Latvia)

Results

The multivariate quintile analysis reveals persistent spatial disparities across Latvia's municipalities between 2017 and 2022. Table 2 presents the average values of key demographic, socio-economic and labour market indicators for both years by quintile. The most disadvantaged quintile (Q5) consistently exhibits high mean ages, elevated ageing indices, low birth rates, and high death rates, reflecting demographic decline and population ageing in peripheral areas. For example, the mean age in Q5 increased from 44.8 years in 2017 to 46.2 years in 2022, while the ageing index remained above 185. Birth rates in Q5 had dropped to 6.1 per 1,000 by 2022, and death rates remained near 25, indicating natural population loss. Migration intensity was lower in Q5 than in Q1, suggesting lower population turnover and fewer inflows of working-age residents.

Human capital disparities remain pronounced. In 2022, only 14% of adults in Q5 municipalities had higher education, compared to 28.2% in Q1, while the shares of residents with only primary education were highest in Q5 (27.0%) and lowest in Q1 (19.8%). Labour market differences mirror these educational gaps: employment rates in Q5 increased to 46.9% by 2022, still well below the 57.6% observed in Q1, and

unemployment remained higher. Occupational structures and economic indicators highlight further inequality: Q5 areas employ fewer managers and professionals (16.2% in 2022 vs. 28.1% in Q1) and fewer workers in knowledge-intensive sectors. Average wages in Q5 were 12.3% below the national mean, while the inhabitants of Q1 municipalities earned 18.3% above the average. Anti-system voting, used as a proxy for political discontent, rose sharply in Q5 from 20.0% in 2017 to 30.9% in 2022, indicating growing socio-political divergence.

Table 2. **Variables ranked and divided into quintiles** (authors' calculations based on data from the Central Statistical Bureau of Latvia)

	2017					2022				
Index	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5
AGE_{AVG}	40.6	41.9	42.4	42.8	44.8	41.3	43.0	43.4	44.5	46.2
AGEING	110.2	133.0	147.0	150.5	192.0	95.4	119.9	126.5	147.2	185.7
BIRTH	12.1	10.3	9.2	8.5	6.8	10.1	9.0	8.2	7.3	6.1n
DEATH	12.9	15.3	17.2	18.1	24.6	14.4	17.0	18.6	21.7	24.9
MIG_{int}	11.4	9.2	8.5	8.1	7.6	13.7	9.6	9.0	8.8	9.0
EMS	8.1	7.3	7.6	8.2	9.2	9.9	9.6	10.2	10.9	13.6
EDU_{high}	25.2	18.1	16.3	14.6	12.9	28.2	20.4	18.6	16.9	14.0
EDU_{low}	21.2	26.2	27.7	29.4	30.1	19.8	23.8	25.7	26.9	27.0
EMP	51.1	46.7	44.3	41.8	36.1	57.6	54.7	52.7	50.6	46.9
UNEMP	8.8	11.9	14.5	16.7	23.6	6.5	8.2	9.9	11.5	17.8
JOBS	62.7	50.4	44.8	39.0	34.4	68.8	53.1	49.8	44.0	36.3
OC_{high}	23.4	18.8	17.7	15.0	10.7	28.1	22.0	20.6	19.2	16.2
OC_{low}	13.3	14.3	13.9	14.4	13.6	12.5	14.5	14.5	14.6	14.6
$NACE_{BC}$	18.8	17.0	14.9	15.5	13.6	14.6	14.1	14.6	13.3	12.8
$NACE_{JKM}$	7.0	4.1	4.0	3.9	3.8	7.6	4.2	3.6	3.3	2.6
VOTE	20.1	21.7	21.6	22.2	20.0	13.5	12.2	12.7	15.4	30.9
WAGE	121.1	102.2	97.0	93.5	86.0	118.3	101.8	97.4	95.1	87.7

The regional distribution in 2022 emphasises a clear core-periphery structure. Riga and the surrounding metropolitan region dominate the top quintiles, while eastern

and north-eastern regions, particularly Latgale and parts of Vidzeme, remain heavily represented in Q5 (Figure 1). Moreover, some scattered low-performing municipalities appear in the inner peripheries of Kurzeme, as well as in areas near the southern border in both Kurzeme and Zemgale.

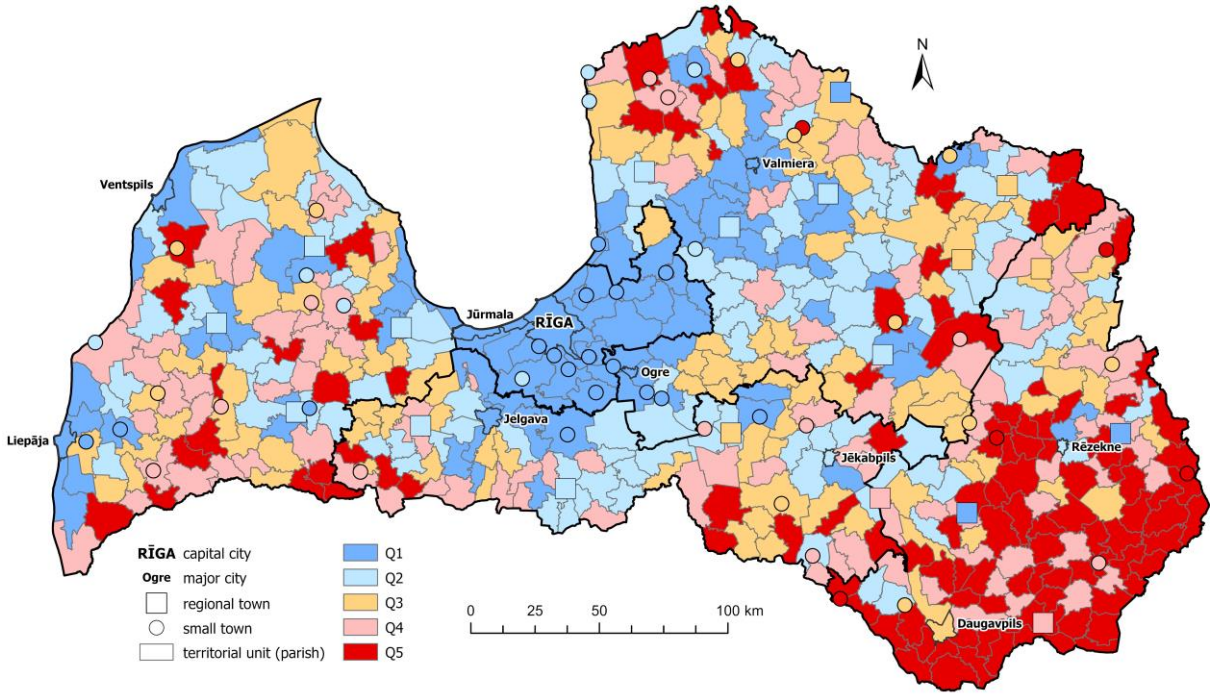

Figure 2. **Local geographies of left-behind places in Latvia, 2022** (authors' figure based on the Central Statistical Bureau of Latvia)

The spatial patterns of left-behind places in Latvia demonstrate both continuity and subtle shifts between 2017 and 2022 (Figure 3). In both years, the most disadvantaged municipalities remained concentrated in eastern Latgale and the north-eastern peripheries of Vidzeme, reflecting enduring core-periphery dynamics. The persistently low-performing areas are largely rural, distant from Riga and other regional centres, with limited access to economic opportunities and public services. While overall spatial clustering remained, some changes are evident: a few municipalities near urban centres such as Valmiera, Jelgava and Riga experienced moderate improvements due to spillover effects, including commuting and service sector growth. Conversely, new peripheries emerged in western Latvia – particularly in small towns in Kurzeme and the Zemgale plains – highlighting that left-behind status is not solely an eastern phenomenon, but can also develop where economic structures are vulnerable, infrastructure is ageing, and digital connectivity is limited. In Kurzeme, both inner

peripheries and municipalities closer to the southern border show scattered low-performing areas, suggesting multidimensional deprivation extends beyond the eastern regions where it is traditionally found.

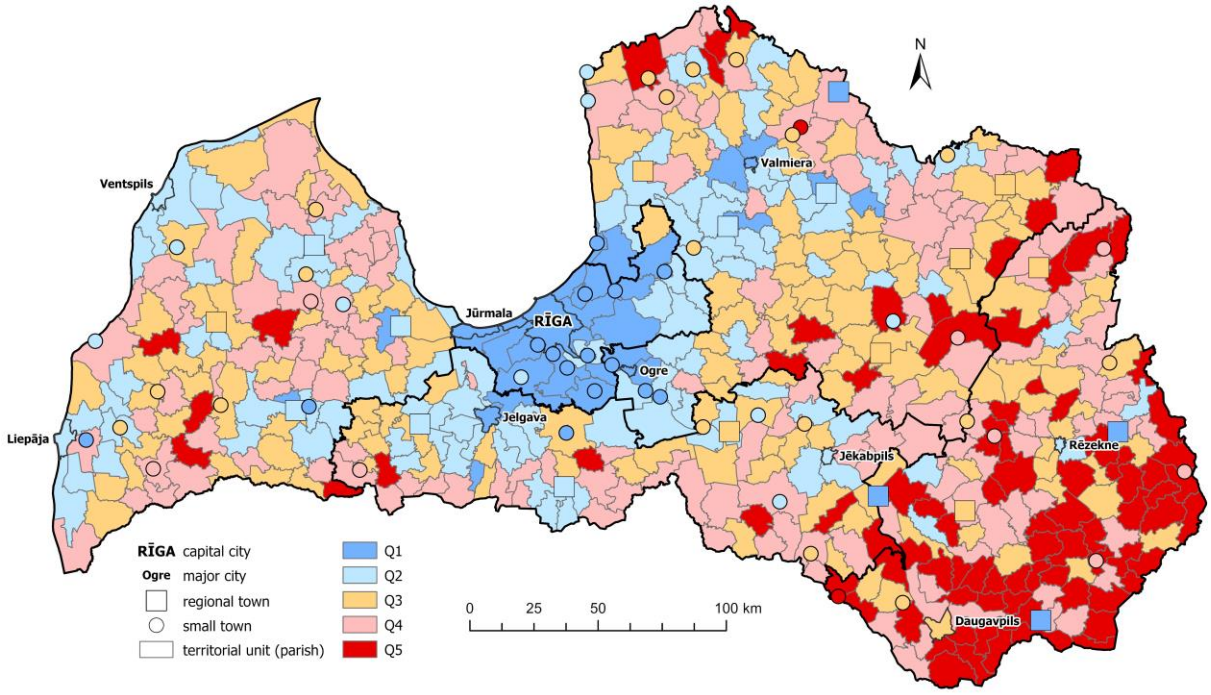

Figure 3. **Local geographies of left-behind places in Latvia, 2017** (authors' figure based on the Central Statistical Bureau of Latvia)

An analysis of quartile distributions across Latvia's regions between 2017 and 2022 highlights both stability and notable shifts in municipal performance (Figure 4). In Vidzeme, the number of municipalities in Q3 increased from 26 to 40, while Q4 declined from 40 to 25, suggesting upward mobility among previously lower-performing units. Zemgale experienced growth in Q2 and Q4, with Q2 rising from 28 to 32 and Q4 from 22 to 26, alongside a reduction in Q3 from 28 to 23, reflecting a partial redistribution of municipalities towards both higher and lower performance levels. Latgale remained heavily concentrated in the lowest quintiles, with Q5 largely unchanged at 75 municipalities, while Q4 increased from 24 to 36, indicating a decline among previously mid-ranking units. The Riga metropolitan region maintained its high performance, with minimal changes in the top quartiles. Overall, these patterns indicate gradual shifts in municipal rankings within certain regions, but persistent disadvantage in Latgale and sustained dominance in Riga, reinforcing the entrenched core-periphery structure observed in the quintile and spatial analyses.

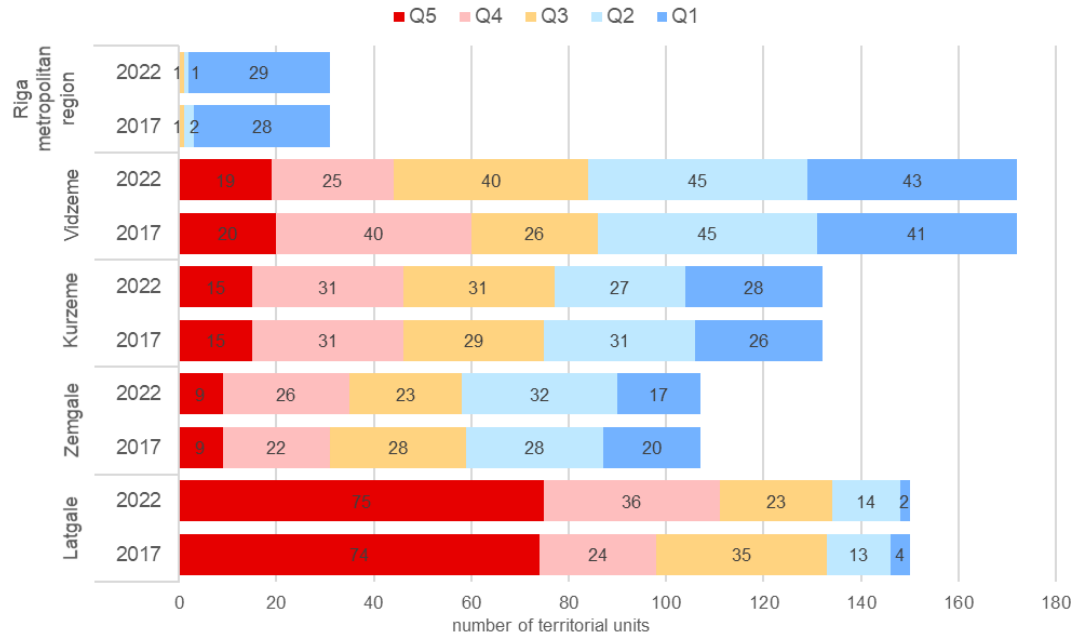

Figure 4. **Regional division of left-behind places in Latvia, 2017-2022** (authors' figure based on the Central Statistical Bureau of Latvia)

Conclusion

This study has mapped and analysed the spatial distribution of left-behind places in Latvia using a multivariate approach based on 17 demographic and socioeconomic indicators across two points in time, 2017 and 2022. The results reveal a clear and persistent core-periphery pattern, with peripheral rural and small-town areas – particularly in Latgale and north-eastern Vidzeme – consistently exhibiting the highest levels of disadvantage. These areas face overlapping demographic and economic challenges, including population decline, ageing, limited educational attainment, labour market weaknesses, and dependence on narrow economic structures. Such mutually reinforcing disadvantages reflect long-standing historical trajectories that continue to shape territorial development, contributing to path-dependent patterns of marginalisation.

The temporal comparison shows that these disparities have remained largely stable over time, while in certain domains they have intensified. This persistence underscores the difficulty of reversing entrenched socio-spatial divides through isolated or sector-specific measures. The multidimensional nature of the disadvantage highlighted in this study demonstrates the need for comprehensive, place-based policy

approaches that address demographic trends, human capital development, economic diversification, and access to public services simultaneously.

Methodologically, the integration of multivariate ranking and quintile-based classification provides a replicable framework for monitoring territorial inequalities and identifying areas where disadvantage accumulates. Future research could build on this by incorporating additional dimensions, such as social capital or environmental quality, or by complementing quantitative results with qualitative studies that explore local experiences of decline, resilience, and adaptation.

Overall, mapping left-behind places in Latvia reveals the urgent need for renewed attention to issues of spatial equity and territorial cohesion. The persistence and intensification of regional disparities threaten not only economic efficiency but also social justice and democratic legitimacy. Addressing these challenges requires political commitment, adequate resources, and innovative policy approaches that can reverse the trajectories of decline and create opportunities for all territorial units to participate in national development.

Acknowledgement

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Kopsavilkums

Jēdziens ‘nomales efekts’ ir nozīmīgs diskusijās par demogrāfiskās un sociāli ekonomiskās attīstības teritoriālajām atšķirībām starp reģioniem un apdzīvotajām vietām. Jēdzienu plaši izmanto ekonomiskajā ģeogrāfijā, vietu un reģionu pētījumos par teritoriju nevienmērīgo attīstību. Nomales efekts bieži tiek lietots agrāko rūpniecības centru ekonomiskā panīkuma un nomaļu lauku teritoriju sociāli ekonomisko problēmu izpētei. Galvenie iemesli nomales efekta attīstībai ir straujš iedzīvotāju skaita sarukums, sabiedrības novecošana, ekonomikas strukturālas pārmaiņas globalizācijas ietekmē, kā arī nespēja piemēroties dažādiem izaicinājumiem strauji mainīgos apstākļos. Rakstā analizēti vairāki demogrāfiskie un sociāli ekonomiskie rādītāji, lai klasificētu un vizualizētu teritoriju nevienmērīgās attīstības izpausmes Latvijas reģionos. Darbā izmantotas Centrālās statistikas pārvaldes apkopotās un publiski pieejamās teritoriju ekonomiskās attīstības rādītāju datu kopas. Rezultāti atspoguļo Latvijas pilsētu un pagastu sadalījumu, kas iegūts ranžējot teritorijas pēc aplūkotajiem rādītājiem. Šāda

daudzdimensionālu rādītāju un teritoriālā iedalījuma vienību šķirošana uzskatāmi atspoguļo ‘nomales efekta’ ģeogrāfiskās iezīmes Latvijā. Pētījums sniedz svarīgu informāciju reģionālās attīstības politikas pilnveidei, uzsverot demogrāfiskās attīstības un sociāli ekonomisko pārmaiņu nozīmi.

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