Research Article

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Linear and structural changes in rural space – the positive and problematic aspects (case of Latvia)

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Abstract: Rural areas as a space have many features in common: land as a significant resource for economic activity, forests as a natural kind of climate-friendly environment, a low population density, etc. At the same time, the natural resources of rural areas tend to be exploited in a different way, which is determined by the different activities of the population of a particular territorial unit about the exploitation of the natural resources. By employing cluster analysis, an analysis of 110 administrative-territorial units forming the space outside cities of national significance allowed identifying the geographical locations of the least economically developed territorial units and the most specific socio-economic characteristics of the units. Geographically, the territorial units were spread across all the planning regions in Latvia, while business and entrepreneurship there focused on the use of natural resources, i.e. agriculture, forestry and fisheries. The trend has been observed since 2009 and requires seeking innovative ideas for changing the situation, one of which could be the expansion of the e-environment and e-commerce in these areas as well as the establishment of a cooperation network for home producers.

Keywords: rural space, structural changes, economic and social innovations, collaboration, digitalization

1 Introduction

Rural development is a vitally important policy area in the European Union. It works to improve aspects of the

economic, environmental and social situation of the EU's rural areas (EC 2010; EC 2016). Rural areas in the EU represent, according to a standard definition, 91% of the territory and 56% of the population (EC 2014; EC 2019a).

This space becomes particularly important in the context of global changes in climate, technology and society as a whole (OECD 2012; OECD/FAO/UNCDF 2016; CORK 2.0 2016). However, most of the rural areas are also among the least favoured regions in the EU, with a GDP per head significantly below the European average (EC 2019a,b). Therefore, an objective of the research is to find solutions to the problem, and economic activity is given a prominent place in a set of problems. The vitality of the local economy is highlighted as one of the key factors in maintaining the vitality of any rural community (Scott 2010). The rural economy is an untapped source of jobs, growth and development (Alette van Leur ILO 2017). To maintain vitality and sustainability in rural areas, they need to change. Traditional industries need to change and new industries need to come in. In practice, the ongoing processes show that rural areas are increasingly diversified and increasingly rely on secondary and tertiary economic sectors (EC 2019a,b). Such changes require a skilled workforce. So, either the people living in rural areas need to change, or young and competent people need to move to this space – both for living and for doing modern business being possible in rural areas.

Unfortunately, these objectively important trends are not evolving in all the 28 Member States of the European Union. In some EU Member States, rural areas represent the most prosperous and well-performing areas, while in others they experience depopulation, demographic ageing, high levels of poverty and land abandonment. These disparities have become more marked since the 2008 financial crisis and have remained until now. Therefore, in October 2017, the Congress of Local and Regional Authorities decided that 'invites local and regional authorities in rural areas to raise public and policy makers' awareness on the diversity of rural areas, their potential and assets and their importance as part of Europe's heritage. It calls upon them to devise local rural strategies in partnership with all development actors; to set minimum service standards in order to

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guarantee continuity in the provision of essential services; to improve education and training; and to support entrepreneurship and innovation in order to diversify the local economy' (Leuba 2017).

The rural area in Latvia, also according to this EU standard definition (EC 2014: 2), is close to the EU average: it occupies 98.9% of the total area of the country and is populated by 49.0% of the country's population (CSB 2019). Although the introduction of innovations throughout Latvia is quite fast, the country currently belongs to a group of moderate innovators (EC 2018a). In Latvia, according to the CSB methodology, there are 9 national cities and 110 ATUs (Statistical Yearbook of Latvia 2017: 21). The total area of the 110 ATUs is the object of the study. The aim of this research is to assess linear and structural changes in economic development in these administrative-territorial units in 2009–2017. The national economy is a system consisting of a set of various territorial, organizational and economic elements that mutually interact to function as a sustainable phenomenon that satisfies the needs of individuals. The national economy as the structure of the system could be perceived in several different ways: in terms of geographical division – cities and rural areas; in terms of the type of economic activity – production of goods and provision of services; in terms of size of the economic operator (number of employees) – micro-enterprises and large enterprises; in terms of field or segment of economic activity according to NACE Rev.2. The authors of the research chose the last way of economic analysis of the national economy as a system, which, in any research study, is recognised as the most important way of analysis of changes in the national economy as a system (Marjanovič 2015; Vu 2017; Moussir and Chatri 2020). To achieve the aim, the following two specific research tasks were set based on an ATU cluster analysis (2016 g. data): (a), to perform an analysis of linear and structural trends in the economic development of clusters of ATUs (2009–2017) to seek optimal models for development in perspective and (b) to perform an in-depth analysis of ATUs having the lowest levels of economic development and make proposals for reducing their backwardness.

2 Materials and methods

The data were processed by quantitative and qualitative statistical analysis methods, as well as the grouping methods (the *k*-means cluster method) to identify linear and structural changes in the economic situation in the administrative-territorial units of the rural space. For the analysis, the following information sources were used:

the European Innovation Scoreboard (EC 2018a, 2018b); the Eurostat classification of industries (NACE Rev 2 2008); the database of the Register of Enterprises of Latvia (LURSOFT) and Central Statistical Bureau (CSB) data on changes in the national economy in the period 2009–2018.

3 Research results and discussion

Within the European Union, Latvia is viewed as a performance-oriented country. Since 2011, innovation performance has increased in 25 EU Member States and among them – all the three Baltic States – Estonia, Latvia and Lithuania belonging to the fastest growing innovators. Therefore, the innovation score (EIS) in the Baltic States is higher (Table 1) than in the EU as a whole (EC 2019a,b). The index shows significant changes in the society as a system, beginning with the characteristics of human resources (intellectual assets, research systems) through to economic performance (firm investments, sales impacts) as well as national assessment criteria.

Unfortunately, the real situation varies among the Baltic States. Estonia dominates and is already a strong innovator, while Lithuania is only a step away from reaching this level. Latvia's objective, however, is to expand its activities to approach the group of strong innovators, which requires reaching at least 90% of the European Innovation Scoreboard (EIS) average. The information obtained during the research confirms that the rural development of Latvia in general is undergoing linear development as well as structural changes (Rivza *et al.* 2019a, 2019b). However, these processes have only been analysed in terms of what they involve. The current research focuses on the spatial aspects of these processes – how linear and structural changes occur in different parts of the country's rural space and what conclusions could be drawn from an analysis of the administrative-territorial units. It is not enough

Table 1: EIS Summary Index for the period 2011–2018

Country	2011	2014	2017	2018	Change 2011–2018
EU average	100.0	99.9	106.3	108.8	+8.8
Estonia	87.2	85.9	83.3	103.7	+16.5
Latvia	48.0	55.8	61.1	65.7	+17.7
Lithuania	55.4	59.3	74.7	81.1	+25.7

Source: authors' data summary based on the European Innovation Scoreboard 2019.

to identify the average figures for the country as a whole for designing a national development strategy.

Interest in the diversification of rural areas through linear and structural changes in the economy is starting to take place in research both in Europe and in South America (Escobar et al. 2019; Mötte et al. 2019).

The linear and structural changes observed during 2009–2018 represent also the features of economic growth in the administrative and territorial units (ATU) making up the rural space of Latvia.

Since the economic development of a territory is characterised by three primary economic indicators: number of enterprises, number of employees and enterprise net turnover, according to the 2016 data, the authors grouped 110 municipalities making up the rural space of Latvia by using the *k*-means cluster method. Mathematical calculations allowed dividing the 110 municipalities into seven clusters, ranging from a cluster of municipalities with very high characteristics of the economic situation to a cluster of municipalities having the lowest economic situation, but at the same time the highest number of ATUs (Table 2).

This situation prompted the authors to perform a linear and structural analysis of the economic activity in the ATUs clustered to identify and assess the trends of changes in the ATUs between the years 2009 and 2017 (Table 2).

Linearly, the number of enterprises increased relatively steadily in all the clusters in the period 2009–2017. The

strongest growth was observed, of course, for Cluster 1 – a 2.53-fold increase – whereas the weakest growth was reported for Cluster 3 – a 1.9-fold increase in the number of enterprises – instead of, as expected, Cluster 7 that demonstrated a 2.53-fold increase. This allows concluding that the linear growth indicators of a phenomenon alone are insufficient to identify further growth of a system – the economy of some territorial unit.

At the same time, structural changes show quite divergent trends – both an increase and a decrease in the proportion of individual segments of the national economy. In super-strong ATUs, the proportion of service enterprises has increased, accounting for more than three-quarters of the total enterprises in 2017 and representing the dominant economic segment. The proportion of the knowledge-based economy segment approaches a third of the total enterprises in this cluster of ATUs. In contrast, the proportion of the segment of agriculture, forestry and fisheries in the economically weakest ATUs is the highest, which continued increasing from year to year. The proportion of the knowledge-based economy segment slightly increased as well. At the same time, the proportion of the segments of manufacturing and services decreased in terms of the number of enterprises.

ATUs could be classified into five groups by economic activity (Table 3), thereby facilitating a further analysis.

The quantitative indicators make it possible to calculate the average net turnover of enterprises of each cluster,

Table 2: Structural changes of enterprises in the clusters, 2009–2017

Clusters	Year	Number of enterprises	Structure of enterprises, %				KBE % from all enterprises		
			Agriculture, forestry, fisheries	Manufacturing	Services	Other	KBE, %	Including, %	
								HT, MHT	KIS
Cluster 1	2009	1,835	2.07	8.34	75.48	14.11	24.6	0.87	23.49
	2017	4,650	1.96	8.25	78.79	11.00	31.5	1.27	29.78
Cluster 2	2009	1,804	7.65	12.1	67.79	12.46	19.4	1.11	18.74
	2017	3,717	7.13	11	69.73	12.14	25.9	1.02	24.56
Cluster 3	2009	549	9.84	16.4	62.48	11.28	12.2	1.09	18.10
	2017	1,041	10.47	13.64	63.11	12.78	20.5	0.77	19.88
Cluster 4	2009	2,681	10.07	11.6	65.95	12.38	16.4	1.49	14.55
	2017	5,559	11.1	10.49	66.07	12.34	20.4	1.35	19.39
Cluster 5	2009	3,608	13.61	12.2	62.28	11.91	14.7	0.64	14.13
	2017	8,123	15.23	10.07	62.40	12.3	20.5	0.6	19.65
Cluster 6	2009	3,717	11.81	13.4	62.52	12.27	13.5	0.94	12.81
	2017	7,855	15.58	12.29	60.52	11.61	19.5	0.88	18.17
Cluster 7	2009	2,546	22.86	13.6	52.0	11.54	11.3	0.51	11.12
	2017	5,741	29.66	11.55	48.35	10.44	14.3	1.01	13.22

Source: authors' own compilation based on LURSOFT data for 2009–2017 and EUROSTAT NACE Rev.2.

KBE: knowledge-based economy sector in the economy, including High and Media High manufactories (HT, MHT) and knowledge-intensive services (KIS) based on NACE Rev2.

as well as net turnover per employee, which allows assessing the efficiency of economic activity as such and, particularly, the efficiency of employees in the particular geographical area and the particular economic structure. A comparison of the indicators for the first and fifth groups reveals that the efficiency of enterprises differed 4.6-fold, while the efficiency of employees 2.2-fold. Maybe an important cause of this situation is the distribution of economic activities regarding the structure of the economic system? Of course, all economically super-strong ATUs were located near the capital city, in the Pierīga region, whereas economically very weak ATUs were located in all the regions of Latvia. Of the total ATUs, 60.0% in the Zemgale region, 64.0% in the Vidzeme region, 66.7% in Kurzeme, 57.9% in the Latgale region and also 17.9% in the Pierīga region belonged to this cluster. The ATUs of Cluster 7 also differed significantly in indicators such as the territorial size of the ATU (from 110.0 to 950.0 km²; the average was 426.0 km²), the population density per square kilometre (from 5.42 to 34.84 km²; the average was 10.77 km²) and the unemployment rate (from 2.5% to 23.3%; the average was 7.10%), although the proportion of the working age population was relatively low (from 58.53% to 67.09%; the average was 62.69%). This means the low economic performance of ATUs was not directly related to their belonging to one region or another, the area of the ATU and even the population density of the ATU.

The data summarised and the resulting overall picture increasingly raises the question of the people themselves – the residents of an ATU. If two-thirds of them are of working age, do they:

- engage in economic activities to make a living;
- if yes, do they do that in their own ATU;

- if in their own ATU, do they meet the changing requirements of the modern world?

Another VPP INTERFRAME-LV researcher group works on giving answers to the questions; therefore, the present research does not analyse them.

4 An in-depth analysis of the ATUs with the lowest economic performance and potential ways of dealing with the problems

As a result of climate change, agriculture, forestry and fisheries (NACE Rev. 2.0 – Section A) are playing an increasingly important role in sustaining humanity as a means of maintaining and preserving the “green environment.” Therefore, the authors paid special attention to the analysis of this segment by making comparisons of CSB and LURSOFT data. According to the CSB data, there were 9,955 economically active statistical units included in Section A, while according to the LURSOFT data, there were only 1,600 Section A statistical units.

Registration in the LURSOFT database is determined by a statistical unit's net turnover from economic activity a year, which could range from EUR 14.2 to 40.0 thousand per year, depending on the kind of economic activity (SRS 2019). As a result, more than 4/5 of the units included in Segment A performed micro-economic activity in the ATUs of Cluster 7, and the registration of these units in the LURSOFT database was not compulsory.

Table 3: Administrative territorial units broken down by level of economic development (qualitative assessment)

No.	Characteristics	Characteristics of the economic situation – the cluster
1	Super-strong municipalities	Cluster 1. A very large number of enterprises, high employment and high net turnover (3 ATU)
2	Strong municipalities	Cluster 2. A very large number of enterprises, high employment and medium net turnover (3 ATU)
3	Medium-strong municipalities	Cluster 3. The number of enterprises and employment are slightly above the average and net turnover is slightly below the average (6 ATU) Cluster 4. An average number of enterprises, employment is below the average and low net turnover (11 ATU)
4	Weak municipalities	Cluster 5. A relatively small number of enterprises, employment is below the average and medium net turnover (3 ATU) Cluster 6. A very small number of enterprises, low employment and low net turnover (28 ATU)
5	Very weak municipalities	7 Cluster. The smallest number of enterprises, the lowest employment and the lowest net turnover (56 ATU)

Source: authors' own compilation based on LURSOFT data 2009–2017.

As shown in Figure 1, the situation with the economically active units considerably varies by region. The indicators for the ATUs of the regions of Vidzeme and Pierīga, which belong to Cluster 7, are better than the average for the cluster, while those of the ATUs of the regions of Zemgale and Kurzeme and especially the Latgale region are below the average. Similarly, the proportion of enterprises engaged in Segment A components – agriculture, forestry and fisheries – in the total enterprises of the ATUs of Cluster 7 varies across the regions. Among the ATUs of Cluster 7, the agricultural segment is dominant in the Latgale region, while forestry dominates in the regions of Vidzeme and Pierīga and fisheries – in the Kurzeme region.

Therefore, to assess the drivers of economic development, it is not enough to determine the purely entrepreneurial directions of development, i.e. what is produced or what services are provided. It is more important to identify the organizational forms of the activity – whether it is an individual work or a collective work – as the synergy effect is also specific to the economic field.

According to the CSB methodology, economically active statistical units are divided into market sector units producing goods or services at economically meaningful prices and non-market sector units providing services free of charge or at economically meaningful prices (CSB). If comparing the proportions of economically active statistical units in each of the two sectors, some significant conclusions could be drawn. The 110 ATUs analysed in the research could be divided not only into clusters but theoretically also into two groups, one consisting of Cluster 7 ATUs (56 ATUs) and the other of the other six clusters (54 ATUs), which allows comparing the data acquired because of the similar numbers of ATUs in each group (Table 4). Furthermore, the information obtained provides an opportunity to identify the drivers of successful economic development.

Table 4: Administrative territorial units broken down by level of economic development (quantitative assessment)

	Averages for each ATU group				
	1	2	3	4	5
Number of enterprises	1,991	1,629	801	773	161
Number of employees	22,551	16,282	6,725	4,481	867
Net turnover, thou. EUR	20,602	15,668	9,084	2,579	360

Source: authors' own compilation based on LURSOFT data for 2009–2017.

The data processed shows that each of the ATU groups focuses on different kinds of economic activity. The proportion of individual merchants is higher in economically successful ATUs, the percentage of enterprises in the market sector is twice as high as that in the other sectors, and the number of funds, foundations and companies of the market sector are twice as large as well. In the ATU group with the lowest economic performance, however, farms and fish farms dominate and the proportion of natural persons – economic operators – is higher.

A comparison of these two ATU groups supports scientific findings that more successful economic development occurs in a space where collaboration and cooperation tend to expand to increase competitiveness in the market, or business digitalization progresses that allows small manufacturers to increase the sales of their products or services through e-commerce (WEF 2019). A study of the e-environment in Latvia (Latvian e-index 2017) includes an assessment of e-environment infrastructure from the ATU perspective and therefore allows comparing this e-environment infrastructure between the economically least developed ATUs and the ATUs demonstrating more successful economic performance. The effective use of the e-environment as a tool to stimulate economic activity is confirmed by official EU documents (EC

Figure 1: Section A economically active statistical units for Cluster 7 broken down by region, %. Source: authors' calculations based on LURSOFT and CSB data for 2017.

2018b) and some research papers (Schalmo *et al.* 2017) as well as the research done by the authors and unpublished results on the problem (Rivza *et al.* 2019a, 2019b).

The results do not suggest that there is an absolute lack of e-environment infrastructure in the least economically advanced ATUs, which limits the opportunities for micro-enterprise digitization and e-commerce expansion. If we assume the average score of Cluster 7 e-environment infrastructure – 10.48 points – to be a benchmark, the ratings of e-environment infrastructure are below this level in more than one-quarter of the economically most successful ATUs (Table 5). In contrast, more than one-fifth of Cluster 7 ATUs have an average rating of e-environment infrastructure that is above the average for the e-environment infrastructure of the most economically successful ATUs. The availability of e-environment infrastructure is, of course, an important prerequisite for the digitalization of economic activities. However, the data acquired again lead to a conclusion that economic performance depends much more on people's willingness to seek innovative solutions than on reliance on existing objective circumstances, in this case e-environment infrastructure.

This is also confirmed by an expert survey conducted by the NRP EKOSOC-LV in 2017, which showed that only about half of the rural population of Latvia were more or less prepared for the changes occurring in the society as a whole and the field of economic activity. The other half, however, focused on the continuation of traditional individual farming and cultural and sports cooperation rather than expanding e-business, which is provided by the availability of e-environment infrastructure and establishing economic cooperation chains or even cooperatives to increase economic performance and quality (Kruzmetra *et al.* 2017; Rivza and Kruzmetra 2018). The analysis of the

trends being important for Latvia is also continued within the NRP INTERFRAME-LV, and the first results obtained in 2019 allow concluding that the situation was still improving. According to the experts, the proportion of the rural population beginning to understand the need for change and to engage in innovative actions continued increasing. This is also confirmed by an increase in the EIS index (see Table 1).

However, this does not eliminate the need to expand the public's knowledge and understanding of the world as a whole, the European Union, which we are a part of, and especially the objective processes that occur in the country. Whatever the role of public authorities and local governments in promoting smart growth in ATUs is, the level of activity of rural communities themselves and the course of action chosen are crucial to achieving the desired goals. This is evidenced by the results of the present research (Table 6).

5 Conclusions

Under the current circumstances, successful territorial development is increasingly dependent on the structural reorganization of the economy rather than on its overall linear growth. The growth of the segments of the economy that represents the mainstream of the 4.0 Industrial Revolution is particularly significant. The internal reorientation of traditional trends due to the 4.0 Industrial Revolution is equally important. The linear growth of Segment A, given the global and European shift towards 'green living' as a result of climate change, is positive. At the same time, the question arises whether, in the context of both the industrial revolution and climate change, an internal reorganization of Segment A

Table 5: Economically active statistical units broken down by kind, %

		Clusters 1–6, 54 ATUs	Cluster 7, 56 ATUs
Economically active enterprises		100.00%	100.00%
Total (market sector)		94.58%	94.80%
as % of sector	Natural persons – economic operators	40.33	47.71
	Farms and fish farms	10.38	21.46
	Individual merchants	4.49	3.62
	Commercial companies (market sector)	43.33	26.46
	Funds, foundations and associations (market sector)	1.47	0.75
Total (non-market sector)		5.42%	5.21%
as % of sector	Commercial companies (non-market sector)	1.03	2.14
	Funds, foundations and associations (non-market sector)	87.46	80.49
	State budgetary institutions	0.59	0.64
	Local governmental budgetary institutions	10.93	16.72

Source: authors' calculations based on CSB data for 2018.

Table 6: Ratings of e-environment infrastructure, points

	Minimal points in group	Distance between minimal and average	Average points in group	Distance between average and maximal	Maximal points in group
Clusters 1–6 group	5.04	6.96	12	6.31	18.31
Cluster 7 group	5.34	5.14	10.48	4.7	15.18

Source: authors' calculations based on Latvian e-index 2017.

occurs, using either content-driven (product, service), organizational (from individual to collective) or innovative technologies (digitalization). The analysis of the changes occurring in Latvia shows that in the last ten years, both general linear economic growth and structural adjustment have occurred in the country as a whole, which is confirmed by the growth of the knowledge-based economy segment caused by the 4.0 Industrial Revolution. This has led to a higher position of Latvia among the EU Member States, which is confirmed by an increase in the EIS Summary Index value for Latvia that approaches the EU average.

At the same time, the analysis of the data identifies a number of problems, which hinder the more rapid overall development of the country's economy that is also in line with the changes in the world. Dealing with the most important problems requires the following:

- expanding the process of geographical restructuring, as the knowledge-based economy could be developed in any part of the country by using ecological inputs;
- carrying out an internal reorganization of economic segments in relation to all of the above-mentioned options, especially digitalization as today's innovation;
- developing a programme for an internal reorganization of Segment A of the economy to expand the scope of work of digital platforms and achieve higher economic performance to improve the quality of life of the rural population;
- motivating people living in rural areas to acquire new knowledge and skills to be more involved in the conditions of climate change and new technologies.

The research allows drawing another important conclusion. There is much more to be done in exploring individual phenomena, individual segments of the society and segments of the economy, yet a systematic analysis of the society, economy, culture, etc. has to be extended, since any change in a system component has an effect on the system as a whole and also on each of its constituent components. This is confirmed by the cluster analysis of ATUs done in the present research.

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