Evaluation of smart economy development in the RIGA planning region (LATVIA)

B. Rivža, L. Āzena[*] and P. Rivža

Latvia University of Agriculture, 2 Liela street, LV-3001 Jelgava, Latvia
[*]Correspondence: azenaligita@gmail.com

Abstract. *Aim of the study: to evaluate the indicators of smart economy development and the interaction with other indicators for the Riga planning region.*
Methods: analysis of documentation and statistical data, the Analytic Hierarchy Process (AHP) method.
To evaluate the potential development of smart economy in the Riga planning region (henceforth – RPR), it is important to understand the present situation in the region, its specificity, and role in the context of provisional future trends. Two approaches have been employed in the present study to evaluate the situation on a regional level. One includes the collection and comparison of the basic economic development indicators, whereas AHP method has been used in the second approach, where 5 experts expressed their opinion on the options of potential development of smart specialisation in the RPR.
RPR as a capital city region is pronouncedly monocentric, with Riga city as its socioeconomic core that develops a wide network of functional ties, and creates a home for the part of the society that works in Riga, but lives in the adjacent suburban territories – Pieriga.
Traditionally the basic indicators of development include only the demographic and economic indicators. Sometimes these results are not objective, do not describe the potential for development, but clearly show the inequal social and economic situation in the region. To characterise the economic development in the RPR, we will include the economic profile data, statistical data and expert opinions on the population, regional government, state and EU influence on the development of the Pieriga region smart specialisation.

Key words: development of smart economy, smart specialisation.

INTRODUCTION

According to the classification of regions in the ESPON study 'EDORA – European Development Opportunities for Rural Areas' (2013), Riga planning region (RPR) can be characterised as a mostly urban region. This region, just like similar regions in other Eastern European countries has a high density of high added value manufacturers and service providers which are specialised in the knowledge economy, mostly in the capital city Riga and the adjacent Pieriga region.

Modern economy is pushed by globalisation, characterised by market liberalisation and ever increasing activity in the knowledge and creative economic fields. All regions need to adapt to the new situation by diversifying their economies and promoting manufacturing of higher added value products. Experience of many European regions

suggests that in 21st century every region can experience positive development trends by successfully understanding their competitive strengths and developing them. Inclusion in global knowledge networks by merging global knowledge with local resources is very important. Information and communication technologies play a significant role in this process, by allowing to create wide cooperation networks and reach the critical mass digitally.

The aim of the study is evaluation of smart economy development indicators in the Riga planning region. To reach the aim, we proposed the following **tasks:** 1) evaluate the indicators of the RPR economic profile; 2) compare them with the data gathered during the project 5.2.3. 'Latvian rural and regional development processes and opportunities of the knowledge economy in the context of smart economy' research methods: Analysis of documentation and statistical data, the Analytic Hierarchy Process (AHP) method. In the context of ECOSOC-LV 5.2.3. project objectives, the key task of the study is to see for ways how to establish and develop smart regions, using the capacity of all the resources affecting regional development.

The research object: Smart economy development indicators and their interaction with other indicators of the RPR. This research has been supported by the State research programme 5.2. 'Transformation of national economy, Smart development, government and legal framework for sustainable development of the state and society - new approaches for creation of sustainable knowledge society' (EKOSOC-LV). The author is using data gathered during the project 5.2.3. 'Latvian rural and regional development processes and opportunities of the knowledge economy in the context of smart economy'.

MATERIALS AND METHODS

During this process of the economic transformation significant role is played by the analysis of smart specialisation resources, strategy development, and bringing smart specialisation to life. Smart specialisation is focused on the development of smart economy within a certain territory, taking into account specific development priorities, unique needs and challenges. Per regulation No. 1301/2013 of the European Parliament and the Council 'Smart specialisation strategy is a strategy of national or regional level innovation, with priority for development of competitive advantage, by promoting business investment in research and innovation'.

To develop the knowledge economy, it is necessary to establish the strengths and competitive advantage of a certain region, which would allow for further innovation and increase the added value of the manufactured produce. It is important to note that smart specialisation applies not only to highly technological innovation, but also non-technological innovation. For example, an innovative tourism product or designer goods are equally significant part of the knowledge economy as high technology products, because the most significant trait of knowledge economy is the use of intellectual property to increase value of a product.

Comparative advantages of a certain region are revealed by evaluation of its competitiveness. Competitiveness of a region can be defined as the ability to fulfil the needs of the local population, and sustain a high quality of life via an efficient use of local and also imported resources. Efficient use of locally available resources and import of other necessary resources, increase the ability of local businesses to create and

develop new products, increase the competitiveness of existing products, which is one of the most significant prerequisites for regional development and a core task of smart specialisation strategy (see Table 1).

Table 1. Indicators of RPR economic development (RPR of the current situation description and analysis 2014

GDP (2011)	12, 858 EUR per capita
Income tax (2013)	590 EUR per capita
Unemployment (2012)	5.3%
Average wage (2013)	785 EUR
Economically active market statistic units (2012)	85,124
Startups (2012)	9,553
Worforce education	30% higher
	35% professional
	25% general

Location and territory of the region

The geographical location of the Riga region (Fig. 1) is unique in the sense that it is simultaneously situated on the shore and deep inland the continent. This is an excellent prerequisite to develop contacts and emerge as a national and international mediator. Riga region is easily accessible from many European countries. It is located right in the middle of Latvia and the Baltic states, it is right on the border the Eastern- and Western European cultural space, belongs to the central part of the Baltic sea area, which is one of the potential centres the rapid development of the modern world. Geographical location in the centre of the Baltic states, being on the borders of Eastern and Western European cultures has created Riga region as a bridge between different countries and their inhabitants.

Riga planning region consists of two NUTS III level statistical regions – Riga (includes Riga city) and Pieriga (includes the rest of the RPR territory). In the economic profile, data analysis is carried out not only of the Riga planning region, but also the Riga and Pieriga statistical regions. The total area of the RPR is 10,435 km², covering 16,2% of the state territory (RPR Economic Profile 2010).

Administrative division of the region

Riga region consists of two republic cities – Riga and Jurmala – together with regional governments of 28 further districts, including 10 cities. Average population density if 105 residents per km², but in the central parts of the region (Riga, Jurmala, Pieriga) – up to 280 residents per km² – tripling the national average (Fig. 2). The central parts of the region can be comparable with other European and Scandinavian metropolitan areas in terms of population density.

Population structure and variable placement in the regional area can be considered as a potential for development, an advantage, that creates positive prerequisites for development of various economic, social, and cultural activities and intensive exchange of values within the region. The last decades have seen development of highly populated areas just adjacent to the Riga city, thus giving rise to a Riga metro area – Pieriga. The cities of Riga and Jurmala, and the Pieriga region make up a regional core with the

highest concentration of population, manufacturing and services, accompanied by concentration of development-related problems (RPR Economic Profile 2010)

Figure 1. Riga planning region within Europe.

Figure 2. Administrative territories of the Riga planning region.

Human resources

Riga planning region is home to 1.1 million people – nearly half of the total Latvian population. This is significant in the Latvian scale, but might not be enough to be competitive internationally. Here, knowledge and skills that may translate to a competitive product, are the most important. RPR concentrates the absolute majority of higher education opportunities and scientific potential. Workforce skill levels, influenced by the accessibility and offer of higher education as well as the work ethic, is important. Multinational makeup of the population can be considered an advantage. The highest concentration of the workforce is in the Pieriga region – whereas other regions are affected by depopulation (see. Table 2).

Table 2. Characterisation of RPR smart population and smart resources (data from project 5.2.3. 'Latvian rural and regional development processes and opportunities of the knowledge economy in the context of smart economy')

RPR regions	Higher Ed.	Employment in the primary sector	Long term unemployment, %	Agricultural land, %	Forests, %	Mineral-resources, m³ x 1,000	Total density of motorway network
Ādaži region	31.9	2.09	11.52	0.89	0.46	0	1,175
Aloja region	11.4	20.77	43.43	0.79	0.52	886,95	0,645
Babīte region	34.7	2.52	11.43	0.59	0.40	206,44	0,944
Baldone region	22.5	4.77	11.46	0.73	0.57	110,24	0,909
Carnikava region	34.4	2.13	17.19	0.70	0.58	0	1,976

Table 2 (continued)

Engure region	18.8	6.67	16.57	0.82	0.56	1,290,76	0,809
Garkalne region	41	1.21	14.29	0.36	0.73	6,466,91	1,347
Ikšķile region	35.2	2.46	8.09	0.66	0.47	1,858,82	1,419
Inčukalns region	20.1	4.26	35.4	0.65	0.63	594,21	1,093
Jaunpils region	11.9	27.25	23.46	0.96	0.36	52,85	1,015
Kandava region	13.8	13.08	41.01	0.88	0.44	14,048,8	0,915
Krimulda region	18.1	11.67	31.79	0.90	0.42	2,975,42	0,910
Ķegums region	18.4	9.60	25.9	0.79	0.56	2,856,3	0,830
Ķekava region	30.1	2.21	9.2	0.60	0.53	3,522,65	1,031
Lielvārde region	18.8	7.22	16.67	0.86	0.32	522,88	1,316
Limbaži region	16.4	9.92	42.3	0.78	0.47	1,234,72	1,051
Mālpils region	17.6	8.09	20.15	0.91	0.47	147,3	1,049
Mārupe region	38.8	3.54	8.33	0.87	0.26	2,014,27	1,781
Ogre region	21.9	4.70	13.11	0.87	0.48	5,941,3	1,117
Olaine region	20.9	1.66	19.45	0.80	0.59	304,9	0,677
Ropaži region	19.3	4.17	12.58	0.70	0.64	15,744,7	0,906
Salacgrīva region	14.2	9.29	28.34	0.72	0.59	2,060,81	0,899
Salaspils region	25	1.26	15.49	0.53	0.35	6,662,05	1,355
Saulkrasti region	25.6	2.81	13.97	0.58	0.59	0	4,761
Sēja region	18.7	8.36	28.57	0.83	0.55	0	0,799
Sigulda region	25	4.14	22.42	0.82	0.50	2,121,53	1,062
Stopiņi region	29.3	1.03	17.09	0.52	0.45	141,44	1,683
Tukums region	16.7	9.18	24.39	0.92	0.35	14,526,1	0,907

There are pronounced problems with the negative population growth, aging population and external emigration, that decrease the perspective workforce resources for future growth. In the following years, a sharp decline in number of children and young people in education or training is expected. The relatively healthy demographic situation, when compared to other regions can be lost in the near future, which poses a huge burden on the future education and migration policies (RPR Economic Profile 2010).

Available natural resources, guarantees for the development of the region

RPR has the main vital and commercial resources. There are sufficient ground waters for communal needs, large areas of agricultural land (1/3 of the RPR territory), and forests (1/2 of the RPR territory). The unique water system of the Riga Gulf, 3 large rivers, numerous lakes and water reservoirs allow for creation of internal waterways. Numerous minerals, such as gypsum, peat, sand, gravel, dolomite, therapeutic mud and water are fit for commercial use (see Table 1).

Availability of financial resources and associated factors

The main types of RPR financial resources are regional government budgets, state support, incl. EU funding and private investments. Investment opportunities are dictated by many circumstances – state investments are dependent on the overall national financial situation, balance of payments, external debt, international commitments; for regional governments, it may be specifics of budget income, borrowing potential, loan payments; private investments are dependent on the crediting possibilities and

availability of personal investment capital; EU – the availability of programmes and EU support priorities (RPR Economic Profile 2010).

Within Latvia and even within RPR there are significant differences in the regional government income per capita. Regional governments mostly make up their budget on income from taxation. Most of RPR regional governments have the best parameters of income from taxation per capita nationally (see Table 3).

Table 3. Characterisation of the RPR smart government **(**data from project 5.3.2. 'Latvian rural and regional development processes and opportunities of the knowledge economy in the context of smart economy')

RPR regions	EU funding (ERAF_ESF_KF) EUR per 1,000 inhabitants	EU support (ELGF_ELFLF_ZF) EUR per 1,000 inhabitants	Voter activity	Changes in the regional e-index, %	NGA zone
Ādaži region	915,549	366,316	45	16%	2
Aloja region	1,227,372	3,331,471	49	115%	0.5
Babīte region	3,159,306	374,574	44	47%	1
Baldone region	840,036	314,484	45	21%	1
Carnikava region	908,007	128,766	52	26%	1
Engure region	444,278	993,499	44	17%	1
Garkalne region	113,019	48,675	52	19%	1
Ikšķile region	913,792	2,501,82	51	18%	1
Inčukalns region	3,924,477	129,402	45	-22%	1
Jaunpils region	152,316	7,261,915	45	28%	0
Kandava region	1,331,141	1,884,321	44	-7%	0.5
Krimulda region	166,119	2,427,684	52	35%	1
Ķegums region	386,088	1,388,203	47	-18%	1
Ķekava region	772,894	173,841	49	9%	1
Lielvārde region	409,321	837,121	46	25%	1
Limbaži region	979,490	1,726,744	40	-5%	1
Mālpils region	145,078	1,768,176	37	-11%	1
Mārupe region	2,951,158	369,938	48	-1%	1
Ogre region	1,403,267	758,001	42	5%	0.5
Olaine region	949,094	172,058	48	1%	1
Ropaži region	1,008,109	311,698	50	95%	1
Salacgrīva region	822,287	1,709,465	39	24%	1
Salaspils region	1,445,939	219,718	48	38%	1
Saulkrasti region	1,529,361	951,836	46	12%	1
Sēja region	376,907	1,989,269	51	0%	0
Sigulda region	727,982	469,338	46	39%	0.5
Stopiņi region	2,076,750	247,563	50	0%	2
Tukums region	1,308,391	1,934,721	35	3%	0.5

Economic development

Riga region is the driving force of Latvian economy. A report on the business environment by the Ministry of Economics of Latvia (henceforth – LR EM) states that, based on provisional data for 2014, there were 109,626 economically active individual merchants and commercial companies in Latvia (excluding farmer or fishermen companies and self-employed persons). 99,6% of the above can be categorised as small

or medium-sized businesses (henceforth SMB). Division of SMBs in Latvia is as follows: microcompanies – 89.6%, small businesses – 8.9%, medium-sized businesses – 1.5%. A significant indicator of economic activity is the number of businesses per 1,000 people. In the last 10 years, this number has steadily increase from 17 in 2001 to 83 in 2014 (LR Ministry of Economy 2016) (see Table 4).

Table 4. Characterisation of RPR smart economy (data from the project 5.2.3. 'Latvian rural and regional development processes and opportunities of the knowledge economy in the context of smart economy')

RPR regions	Innovative businesses	Innov. business turnover	Innovative businesses employees	Turnover per employee	Self-employed per 1,000 inhabitants
Ādaži region	31.5	1.13	20.2	95	19,1
Aloja region	18.63	2.28	11.58	1,776	40,52
Babīte region	29.93	8.66	13.89	32,589	20,85
Baldone region	22.54	4.33	11.88	13,494	16,49
Carnikava region	33.22	2.,24	26.05	29,748	21,21
Engure region	12.56	2.38	5.58	18,930	21,35
Garkalne region	34.82	6.54	21.73	22,306	24,04
Ikšķile region	31.06	10.48	20.11	17,847	31,91
Inčukalns region	21.89	1.19	6.56	25,681	12,23
Jaunpils region	13.64	9.95	9.03	64,350	17,79
Kandava region	11.92	1.2	3.78	8,275	26,44
Krimulda region	18.13	2.22	7.35	11,963	24,6
Ķegums region	26.28	5.65	12.22	16,688	21,71
Ķekava region	32.25	2.41	7.45	25,810	19,86
Lielvārde region	17.87	14.99	17.1	39,049	22,1
Limbaži region	18.06	6.63	11.08	5,020	41,07
Mālpils region	19.09	3.64	8.91	9,016	22,05
Mārupe region	31.38	11.43	20.62	912	20
Ogre region	27.82	11.92	19.9	24,168	23,4
Olaine region	26.85	30.93	32.85	59,929	11,37
Ropaži region	29.33	7.52	14.78	28,545	11,9
Salacgrīva region	15.34	2.74	9.91	12,907	30,48
Salaspils region	23	8.6	17.83	25,136	13,79
Saulkrasti region	26.36	3.73	19.52	10,384	21,52
Sēja region	17.44	3.89	12.85	15,335	18,35
Sigulda region	28.55	6.66	17.49	17,709	24,21
Stopiņi region	24.42	2.03	8.26	28,936	16,49
Tukums region	16.38	2.83	10.7	16,319	20,31

Economic structure and businesses

The economic structure of Riga region is dominated by the service businesses with associated fields – sales, professional services, real estate businesses. Each of these fields takes up more than 10% of the total economy in the Riga region based of the amount of economically active market sector statistical units, with sales reaching nearly 25%. By this measure, agriculture, construction, transport and storage also make up a significant portion of the total economy. Manufacturing takes up 6% of the total Riga region economy.

The share of total added value in Riga planning region makes up 67% nationally. In certain fields this share is more than 70% nationally (construction, sales, hospitality and catering, transport and logistics, real estate operations), which is a sign of concentration of these types of business activity in the region, mostly in Riga and Pieriga. In the banking and finance sector, Riga region takes an 85% share of the national economy. In all these fields, Riga region can be considered the main player in Latvia. This situation characterises the situation in the country quite well. (RPR Economic Profile 2010).

RESULTS AND DISCUSSION

Data from the project 'Latvian rural and regional development processes and opportunities of the knowledge economy in the context of smart economy' were divided into 4 main groups from all 28 regions of the RPR – smart population, smart resources (see Table 2), smart government (see Table 3), and smart economy (see Table 4). The studies were summarized in 28 Riga Planning Regional development fundamentals that were used to evaluate the smart economic indicators used in 16 of all 19 indicators for each county (EKOSOC- LV 5.2.3 Project data, the SCP data, 2015). Situation display, were processed Riga Planning Region (except the republic cities are Riga and Jurmala) regions data, the results shown in Rotated Component Matrix (see Table 6). In the calculation was based on smart economic indicators (see Table 5).

Table 5. Description of smart economy indicators (data from the project 5.2.3. 'Latvian rural and regional development processes and opportunities of the knowledge economy in the context of smart economy')

Smart resources
Agricultural areas, %
Forests, %
Mineral resources, m^3 x 1,000 (2013)
RSS expenses (2001–2015), EUR
Total density of motorway network (km/km^2, RAIM calc.)
Smart population
Population percentage with higher education, %
Percentage of workforce in the primary sector, %
Percentage of long-term unemployed amongst all jobseekers, %
NGOs per 1,000 pers.
Smart economy
Percentage of innovative businesses, %
Percentage of the turnover of innovative businesses, from total turnover, %
Percentage of the workforce employed by innovative businesses, %
Innovative business turnover per 1 employee, EUR
The number of self-employed persons, per 1,000 inhabitants
Smart governing
The amount of EU funding (ERAF_ESF_KF) EUR per 1,000 inhabitants, 2009–2014
EU support (ELGF_ELFLF_ZF) EUR per 1,000 inhabitants, 2009–2014
Voter activity %, Regional government elections 2013
Changes in the regional E-Index (2015–2014)
NGA zone

The data acquired during the project 'Latvian rural and regional development processes and opportunities of the knowledge economy in the context of smart economy' were processed with factor and cluster analysis.

During the factor analysis, we obtained four independent groups. It was shown that most characteristics that are corresponding to smart economy are in the group 'smart population', followed by 'smart economy' and 'smart government', with 'smart resources' being the least appropriate of the pack. Factor analysis showed that smart economy is influenced by the turnover of innovative businesses and the number of employees as well as turnover per employee and the number of self-employed individuals per 1,000 inhabitants. But smart economy is also influenced by smart population, with the main factors being the percentage of workforce with higher education, number of innovative businesses, availability of EU funding, EU support in EUR per 1,000 inhabitants., NGA zone etc. (see Table 6).

Table 6. Distribution of RPR district economic profile by factor analysis (by the author)

Rotated Component Matrix[a]

	Component			
	1	2	3	4
Mineralresources, m3 (in thousands)	.041	-.153	.078	-.797
Total density of motorway network	.276	-.087	.260	.580
Higher ed.	.730	.140	.483	.254
Long-term unemployment,%	-.608	-.400	-.289	-.063
NGO per 1,000 inhabitants	-.003	-.265	.744	.250
Innovative businesses	.668	.266	.562	.121
Innov. business turnover	.022	.871	.118	.161
Innov. business employees	.311	.640	.392	.261
Turnover per employee	-.203	.842	-.080	-.069
Self-employed per 1,000 employees	-.412	-.551	.242	.256
ERAF_ESF_KF, EUR per 1,000 inhabitants	.460	-.129	-.162	.036
ELGF_ELFLF_ZF, EUR per 1,000 inhabitants	-.907	-.049	-.068	.059
Voter activity	.149	.282	.645	.008
Changes in the region e-index,%	-.275	-.013	.625	-.396
NGA zone	.705	-.111	-.061	.170
Employed in the primary sector	-.938	-.169	-.068	-.046
	Smart population	Smart economy	Smart government	Smart resources

During the project, the Analytic Hierarchy Process (AHP) method was employed to study the creation and development of Pieriga region smart specialisation. The aim of the study was to establish the creation and development of smart specialisation of Pieriga region. A total of 6 experts from the Pieriga region took part in the study – 1 entrepreneur, 1 manager of the regional government, 1 scientist, 1 manager of a commercial farm and 2 members of a business support institution. Results showed that in the evaluation process, the largest share went to the smart economy – 0.42, a close second being smart population – 0.25. Experts deem smart resources (0.18) and smart government (0.15) to be the least influential on the smart economy (see Fig. 3). This shows that, according to experts, high indicators of smart economy are a prerequisitie

for creation and development of smart specialisation in the regions. Smart economy is the cornerstone of development and future specialisation of all RPR regions.
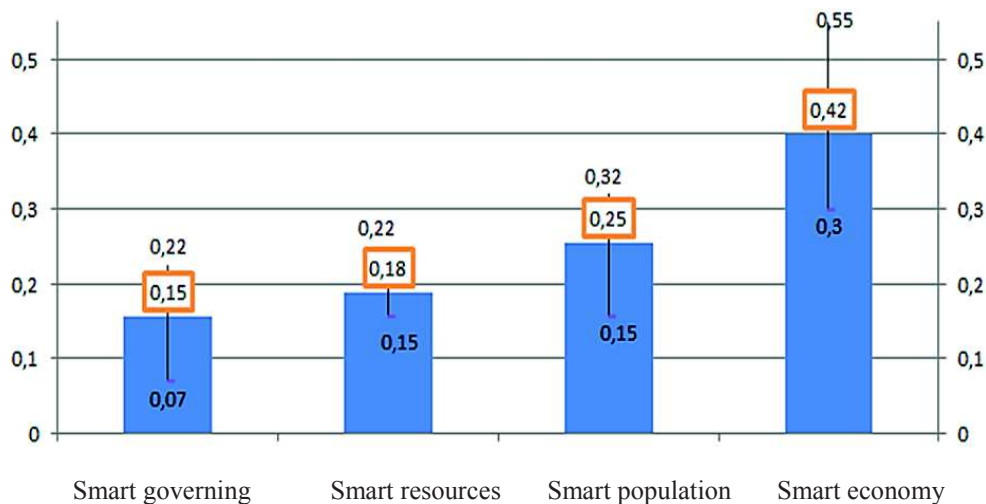

Figure 3. Evaluation of smart economy indicators in development of Pieriga region smart specialisation, 2016 (data from the project 5.2.3. 'Latvian rural and regional development processes and opportunities of the knowledge economy in the context of smart economy').

Cluster analysis divided 28 regions of RPR in 4 groups. The highest indicators are for group 3 followed sequentially by groups 4, 2 and, lastly, 1. Cluster analysis selects the most significant indicators – agricultural land, percentage of population with higher education, workers employed in the primary sector, long-term jobseekers, innovative businesses, employees working in innovative businesses, turnover per employee, self-employed individuals per 1,000 inhabitants, EU support and co-financing in EUR per 1,000 inhabitants, NGA zone (see Table 7).

Table 7. Distribution of RPR regional economic profile data clusters (by the author)

Final Cluster Centers

	Cluster			
	1	2	3	4
Number of Cases in each Cluster	1	9	4	14
Higher Ed.	11.90	16.14	30.73	26.46
Innovative businesses	14	18	27	27
Innov. bus. turnover	9.95	3.45	5,83	9.49
Innov. bus. employees	9	10	12	18
Turnover per employee	64350	10811	22030	23797
Self-employed per 1,000 inhabitants	18	27	17	20
ERAF_ESF_KF, EUR per 1,000 inhabitants	152316.28	749208.19	3027922.64	884332.04
ELGF_ELFLF_ZF, EUR per 1,000 inhabitants	7261914.66	2017783.86	280369.36	428252.46

CONCLUSIONS

1. RPR further development, it is necessary to plan the structural reforms in order to attract new technologies and promote innovation, improve the region's resource base, as these factors form the basis for regional economic development and defines smart specialization.

2. For counties happen smart specialization formation and development, it should be based on high intelligent Economic Indicators (Innovative businesses, Innovative businesses in the turnover, Innovative business employees, Turnover per 1 employee and Self-employed per 1,000 inhabitants) indicators, because they affect the entire RPR county's future development and possible specialization.

3. Expert assessment of regional smart specialization formation and development must be based on intelligent high economic performance, since they form the basis of all the RPR county's future development and possible specialization.

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