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Innovative Strategy for Selecting Industries for Program-Target Stimulation of Regional Economic Diversification

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Abstract

The purpose of this study is to substantiate the approach to the selection of industries for program-target stimulation of regional economy diversification, focusing on developing new strong industries and increasing the economic complexity of the regional economy. The research methodology is based on the application of the concept of revealed comparative advantages and an assessment of the economic complexity of industries and regions of Russia (the Udmurt Republic, Republic of Mordovia, Kaliningrad Region, and Trans-Baikal Territory) using data on tax revenues by economic sectors. The novelty of this research lies in demonstrating the effectiveness of applying the revealed comparative advantage concept, an approach to assessing economic complexity based on the use of tax revenue data by economic sectors, and a strategy for modernizing intermediate opportunities when selecting industries for program-target stimulation of regional economy diversification. The practical significance of the results is determined by the possibilities of their use in the application of program-target mechanisms to solve problems of stimulating the development of individual sectors of the regional economy. Selecting priority areas for diversification based on economic complexity methods can contribute to the improvement of budget balancing, economic growth and sustainable development, and mitigation of interregional inequality.

Keywords: Innovation; Budget of a Federal Subject; Tax Revenues by Economic Sectors; Balassa Indicator of Revealed Comparative Advantage; Economic Complexity; Economic Diversification.

1. Introduction

Diversification and structural transformation play a significant role in the process of economic development of a country and its regions, contributing to the growth of per capita income, especially in the early stages of development. They are often accompanied by a structural transformation of production and exports, diversification through the production of new products, and improvements in the quality of existing manufactured products [1]. Recently, the COVID-19 pandemic has become another incentive to diversify the regional economy and facilitate the redistribution of resources from less viable to more viable economic sectors. Numerous studies have shown that a country's product structure predetermines its level of economic growth, future areas for economic diversification, and the degree of income inequality [2–13]. Countries that produce and export a diverse set of complex products, such as automobiles or medical equipment, tend to have significantly lower levels of income inequality and a higher GDP per capita than countries that depend on some products from resource-based industries, such as crude oil [5, 8].

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Russia is a typical example of a developing country whose export basket is dominated by low-value-added products mainly based on crude oil. In contrast, more complex industrial and chemical goods prevail among the main imported products to Russia, such as cars and other vehicles; transmitting equipment for radio broadcasting or television, including receiving equipment; medicines; and machines for automatic data processing and their components, including magnetic or optical readers, etc. The discrepancy between simple exports and complex imports suggests that Russia should diversify its economy by manufacturing more complex products and identifying specific industries for diversification.

Without a diversified and complex industrial structure, countries find it difficult to achieve a high standard of living and create well-paid jobs [11, 14, 15]. Natural resource or raw commodity income may temporarily allow the generation or loss of rent income, but such a country is vulnerable to price fluctuations and external shocks. In addition, the country's long-term economic development prospects are limited due to the lack of technologies to facilitate recombinant growth processes [5, 14, 16]. Therefore, state bodies, especially in developing and emerging countries, strive to promote economic diversification and development.

The related question of whether states or markets should be the key agents of structural transformations and economic development is a hotly debated topic. In recent decades, a consensus has emerged: the golden mean between an emphasis on market forces and reasonable government intervention may be necessary to overcome both market upsets and failures, as well as government failures [17–19]. It is necessary to provide incentives to facilitate the processes of development and growth for new types of activities, such as technologies or products that are novel to the domestic economy [14, 20]. There should also be clear criteria and the possibility of restricting the time limit for supporting these new activities if they do not become competitive [17].

The most significant arguments in favor of government intervention to stimulate diversification processes are based on the fact that the private sector tends to focus on the development of its economic activities and some of its areas, which in turn deepens regional specialization. Accordingly, if government economic policy is not oriented toward increasing the diversity of economic activities, this can lead to structural development traps, i.e., to a specialization that is difficult to change [21, 22]. Therefore, from the standpoint of the state's economic policy, an important issue is how to launch and expand the economic diversification process and ensure the creation and development of sectors that are technologically distant but still connected to the established strengths of the region or country, taking advantage of existing knowledge and competencies.

However, the above understanding of the need for economic diversification and sound industrial policy is insufficient to determine the specific type of economic activity or sector that needs to be supported.

To solve this problem, actively developing methods for studying networks and economic complexity can be applied, enabling the determination of priority areas for diversification and the production of novel products for each country/region [2, 5]. Moreover, these methods can link a country's food space with the expected level of income of the population, the economic complexity of production, and income inequality [23, 24]. The vast majority of studies rely on these new empirical methods to identify, in particular, areas for the diversification of regional economies, aimed at increasing their economic complexity [25–28]. At the regional level, diversification may be associated with the emergence of new economic sectors. At the same time, sectors whose development contributes to increasing the economic complexity of the region can be considered priority areas for diversification [29]. Kudrov & Afanasyev [29] conducted an analysis to select a priority area for diversifying the economy of Russian regions on the basis of tax revenue data by economic sectors in the regions, which enables characterizing the structures of regional economies, considering sectors oriented to the foreign and domestic markets, and thereby makes it possible to approximate the assessment of the region's economic complexity after the emergence of a newly developed sector.

As for the diversification of Russia's regional economy, the state is largely involved in this issue within the framework of state programs implemented in the regions. Grebennikov & Magomedov [30] and Grebennikov et al. [31] noted an important fact indicating that the set of program measures taken within the framework of state programs for the implementation of social projects (providing quality services to the population in the fields of social protection, healthcare, education, public safety, etc.) and commercial projects (initiated by regional business entities) differently impact the balance of regional budgets [30–32]. A hypothesis has been formulated and proven regarding positive feedback between the variable characterizing the share of financing market activities in the expenditures of the consolidated budget of the Russian region and the variable characterizing the share of economic activity taxes in the revenues of the consolidated budget of the Russian region.

Karaev et al. [33] analyzed the impact of the share of program expenses in the consolidated budget of the region on reducing the share of gratuitous revenues and increasing the share of economic activity taxes in the income of its consolidated budget, as exemplified by federal subjects such as the Republic of Mordovia, Udmurt Republic, Trans-Baikal Territory, and Kaliningrad Region for the period from 2001 to 2021. It was found that program expenditures of regional budgets for the development of the real sector have a significant impact on ensuring the budget balance of the Republic of Mordovia, Udmurt Republic, and Trans-Baikal Territory on certain time scales.

Thus, as follows from the research results of [30–33], state intervention in the regions to diversify the regional economy, maintain the balance of regional budgets, reduce interregional inequality, and stimulate the development of certain industries through the mechanism of state programs in the form of financing market activities leads to an increase in the tax base of the regions. Therefore, a further increase in the effectiveness of this intervention requires the identification of priority areas for the diversification of those sectors of the regional economy, the development of which contributes to a targeted increase in the tax base and economic complexity of the region [29].

It is worth highlighting the significance of the research by Hartmann et al. [34], who developed an analytical approach based on economic complexity methods to identify smart strategies for economic diversification and inclusive growth, applied to the Paraguayan economy. This approach reveals the real opportunities for each country/region to diversify its production structures and considers the weight that each country/region places on different socio-economic objectives [35]. Simultaneously, this approach does not ignore the structural constraints imposed by each country's production structure and capabilities, which helps assess the probable directions for development and the consequences of different diversification strategies. The approach of Hartmann et al. [34] considers and discusses four (of many possible) diversification strategies. The first strategy focuses only on diversification into the most related products/industries. The second strategy focuses on products/industries that already have intermediate levels of revealed comparative advantages (RCA). The third strategy is aimed at relevant products/industries associated with the high income levels of exporting countries. The fourth strategy sets minimum standards for all feasibility and desirability criteria, including income, complexity, technology, and equity.

From the viewpoint of the possible use of program-target mechanisms (state programs, national projects) to solve problems in supporting the balance of regional budgets, reducing interregional inequality, and stimulating the development of individual industries, the approach of Hartmann et al. [34] to identifying structural opportunities for smart and inclusive growth is particularly relevant for economies whose production structure is highly dependent on commodities and raw commodity producers, as is the case in Russia and its regions, and provides valuable information on what specific products/industries may be feasible and desirable for the country/region.

It is quite obvious that a reasonable combination of industrial, innovation, and social policies and interactive learning between different segments of society is necessary to successfully enter certain industries. In addition, research results on innovation systems in developing countries have shown that economically less developed countries/regions may require a simultaneous policy focus on human development and innovation to create high-performance and effective systems for enhancing competence and innovation and entering new industries successfully [14, 36, 37]. Moreover, examples from high-performing East Asian countries have shown that successful technological upgrading and economic development may require a reasonable combination of industrial and social policies [38, 39]. This assumes a rational combination of policy incentives in new industries and investments in skills training and research in these industries [40–42].

It should be noted that there are limits to diversification, which are constrained by the country's level of technological capabilities. In this regard, in the process of diversification, a rapid transition to technologically complex activities is unlikely. Rather, a strategy of gradual diversification should be pursued, with moves into more complex sectors linked to existing strong sectors as technological capabilities and opportunities accumulate over time. Therefore, this research proposes a second strategy [34], which involves the *modernization of intermediate capabilities*, within which industries with an intermediate level ($0.5 < RCA < 1$) were considered as possible areas of diversification. It reveals the comparative advantages of sectors that are not strong in the regional economy, and the task is to facilitate their transition to the category of strong sectors of the economy.

The implementation of the second strategy makes it possible to move the production competencies of a country/region in industries in which they already have intermediate levels of RCA ($0.5 < RCA < 1$), into the category of a strong industry with a revealed comparative advantage ($RCA > 1$). The ability to produce and sell a significant number of products/services and, accordingly, achieve an intermediate RCA demonstrates the actual ability to promote the products of this industry in the relevant country/region. A country/region may decide to further promote its existing but still ineffective product/industry to achieve competitiveness in this product/industry in the form of targeted development assistance programs, while each region must be considered unique, the specifics of which do not allow standard management decisions.

Thus, the choice of a priority direction for diversifying the regional economy is associated with the choice of an industry/sector for its strong development in the region. The emergence of such a new strong sector, which leads to an increase in the production and tax base of the region and its economic complexity and thereby maintains long-term prospects for economic development, can be considered a priority.

In this regard, this research solves two problems: 1) establishing strong industries in the regional economy; 2) selecting priority sectors for diversification of the regional economy with intermediate levels of revealed comparative advantages with the aim of developing them to the level of a strong industry in the regional economy through program-target incentives.

2. Research Methodology

This research uses an approach based on the concept of revealed comparative advantage [43] and the concept of economic complexity assessment developed in [26, 44, 45], based on the use of tax revenue data by economic sectors [46], to establish strong sectors in the economy of the constituent entities of the Russian Federation and select priority industries for their development to the level of a strong industry through program-target stimulation of regional economy diversification.

It should be noted that according to Lyubimov et al. [47], the level of export complexity of the economy and the potential for expanding and complicating the export of Russian regions are assessed using data on the export of goods from 80 Russian regions at the level of revealed comparative advantages, along with exports from 148 countries of the world, which allows us to obtain significantly more information on goods exported by Russian regions at the level of revealed comparative advantage.

In this research, to avoid some of the shortcomings of the approach to assessing complexity based on data on the volume of exports of products [47], the volume of production of the regional economy, as in Afanasyev & Kudrov [44], is estimated based on tax revenue data by economic sectors, since data on tax revenues reflect the proportions of production volumes of economic sectors in value terms. This approach assumes that the number of strong sectors is considered as an assessment of the region’s economy diversification. Thus, diversification is associated with the emergence of a new strong sector, and the task of setting priorities for developing sectors to the level of strong ones is considered. For clarity, a general diagram of the modeling stages is presented in Figure 1.

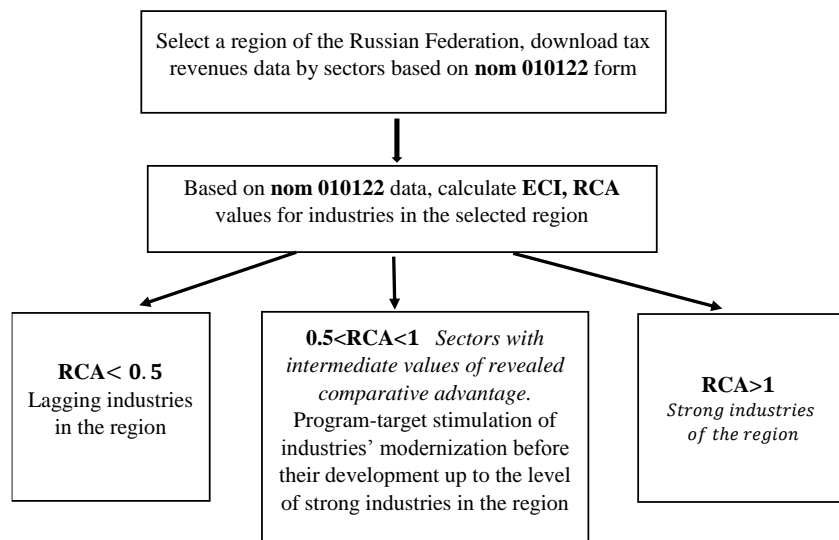


Figure 1. Simulation Process Flow Chat

As shown in Figure 1, at the first stage, a region is selected, and tax revenue data by industry are loaded on the basis of form *nom 010122*. In the next stage, the index of economic complexity of the region and industry and the indicator of revealed comparative advantages of industries in the selected region are calculated using tax revenue data for all regions. Next, for the selected region, industries with different levels of revealed comparative advantage are distinguished by selecting strong industries in the region and industries with an intermediate level of revealed comparative advantage.

Let us consider the methodology for identifying strong sectors of the regional economy in more detail. On the basis of the concept of the revealed comparative advantage [43], we calculate the index of the revealed comparative advantage RCA_{cp} :

$$RCA_{cp} = (y_{cp} / \sum_p y_{cp}) / (\sum_c y_{cp} / \sum_{cp} y_{cp}) \tag{1}$$

where y_{cp} is the volume of tax revenues from sector p of the economy of region c .

Next, a matrix, $A = (a_{c,p})$, is formed containing data on economic sectors and describing the structures of strong sectors/industries of regional economies:

$$a_{c,p} = \begin{cases} 1, & \text{if } RCA_{cp} \geq 1; \\ 0, & \text{if } RCA_{cp} < 1. \end{cases} \tag{2}$$

As it follows from expression (1), RCA_{cp} is the ratio of the share of tax revenues from sector p in the total volume of tax revenues from all sectors of the economy of region c to the share of tax revenues from sector p by all regions in the volume of tax revenues from all sectors of the economy of all regions [44].

If the value of RCA_{cp} exceeds the threshold value of unity, then, regarding expression (1), we can assume that the economy of region c has comparative advantages in the output of sector p . Otherwise, the revealed comparative advantages are considered to not exist. Using RCA_{cp} , matrix A is compiled, which contains data on economic sectors developed in different regions at the level of revealed comparative advantages, defined using expression (1). The rows of this matrix correspond to regions, and the columns present economic sectors. Element $a_{c,p}$ of matrix A is equal to 0 if region c has no revealed comparative advantages in the production of sector p products, determined using expression (1), and otherwise it equals 1 [44].

In accordance with the standard approach to assessing economic complexity [44], based on the description of the structures of strong industries, matrices are formed to determine the economic complexity of regions and industries, which are calculated as eigenvalues and eigenvectors of these matrices. As a result, estimates of economic complexity ECI_c , and ECI_p are known for each region and industry, respectively. Simultaneously, the economic complexity of a region is proportional to the average level of economic complexity of strong sectors in the structure of its economy:

$$ECI_c = a_1 \sum_p r_{c,p} ECI_p, r_{c,p} = a_{c,p}/k_{c,0}, k_{c,0} = \sum_p a_{c,p}, \tag{3}$$

where a_1 is a positive constant, and the economic complexity of the sector is proportional to the average level of economic complexity of the regions in which this sector has a strong economic structure:

$$ECI_p = a_2 \sum_c r_{p,c}^* ECI_c, r_{p,c}^* = a_{c,p}/k_{p,0}, k_{p,0} = \sum_c a_{c,p}, \tag{4}$$

where a_2 is a positive constant.

If we denote $c = (ECI_{c_1}, ECI_{c_2}, \dots)^T$ as a column vector of economic complexity values for regions; $p = (ECI_{p_1}, ECI_{p_2}, \dots)^T$ as a column vector of economic complexity values for sectors; $R_1 = (r_{c,p})$, $R_2 = (r_{p,c}^*)$ as weight matrices, the economic complexity of the region is determined as the eigenvector of $R_1 R_2$ matrix and the economic complexity of the sector is the eigenvector of $R_2 R_1$ matrix [43].

Thus, matrix $= (a_{c,p})$ makes it possible to calculate the characteristics of the level of the region's economy diversification, identifying strong sectors whose products the region produces at the level of revealed comparative advantages.

In this research, matrix $= (a_{c,p})$, containing data on strong economic sectors, is constructed on the basis of tax revenue data for 85 sectors in 85 regions of Russia for 2021*, and constants in Equations 3 and 4 are equal $a_1= 1.9305$; $a_2= 1.9756$, respectively [44].

The following constituent entities of the Russian Federation are considered as regions for which initial data are generated and the problem of choosing priority directions for economic diversification is solved: the Udmurt Republic, the Republic of Mordovia, the Kaliningrad Region, and the Trans-Baikal Territory†.

3. Results and Discussion

The calculation results for assessing possible areas for diversifying the economy of the analyzed regions are presented in Tables 1-8. Table 1 presents the results of calculating the identified strong sectors of the economy of the Udmurt Republic with the indicator of revealed comparative advantages $RCA_{cp} > 1$. Table 2 shows the economic sectors of the Udmurt Republic with intermediate values of the indicator of revealed comparative advantages $0.5 < RCA_{cp} < 1$. In Tables 1 and 2, the first column reflects the industry line code, in accordance with form *nom 010122*, the second column presents the assessment of the economic complexity of the industry (ECI_p), and the third column contains decoding of the industry. In Table 2, the fourth column reflects the assessment of the indicator of the revealed comparative advantage RCA_{cp} .

Similar results for the economy of the Republic of Mordovia are presented in Tables 3 and 4; for the Kaliningrad Region in Tables 5 and 6; and for the Trans-Baikal Territory in Tables 7 and 8.

The research results can become the basis for choosing priority industries in the regional economy (within the framework of the second strategy [34] – modernization of intermediate opportunities) for their development to the level of strong industries through program-target incentives of regional economy diversification.

Let us consider in more detail the results obtained for the constituent entities of the Russian Federation selected in this study: the Udmurt Republic, the Republic of Mordovia, the Kaliningrad Region, and the Trans-Baikal Territory.

* At the time of this scientific research, (2022), these were available tax revenue data for various sectors of the regional economy.

† The choice of these regions of Russia was initiated by the customer, in whose interests the research was conducted: the Kaliningrad Region is a western subject of the Russian Federation; the Trans-Baikal Territory is a region from the eastern part of Russia; and the Udmurt Republic and the Republic of Mordovia are regions of the Volga (Privolzhsky) Federal District in the central part of Russia.

3.1. The Udmurt Republic

The results of calculating the indicators of revealed comparative advantages and economic complexity of industries in the Udmurt Republic (Tables 1 and 2) made it possible to identify strong industries ($RCA > 1$) and industries with intermediate levels of revealed comparative advantages ($0.5 < RCA < 1$) in the descending order of RCA values.

Table 1. Strong industries in the Udmurt Republic with $RCA > 1$ in 2021

Line code	ECI_p (non-standardized)	Industry
1025	-0.0327	Mixed farming
1036	-0.0724	Mining and quarrying
1050	-0.2840	Extraction of crude petroleum and natural gas
1055	-0.3892	Extraction of crude petroleum and associated petroleum gas
1084	-0.3560	Mining support service activities
1100	0.0345	Manufacture of dairy products
1110	0.0218	Manufacture of beverages
1125	0.0740	Manufacture of wearing apparel
1130	-0.0078	From line 1129: dressing and dyeing of fur
1133	0.0056	Manufacture of wood and products of wood and cork, except furniture, manufacture of articles of straw and plaiting materials
1177	0.0290	Manufacture of basic metals and fabricated metal products, except machinery and equipment
1190	-0.1120	Manufacture of basic precious and other non-ferrous metals
1211	0.0038	Manufacture of computer, electronic, and optical products
1220	-0.0042	Manufacture of electrical equipment
1227	0.0140	Manufacture of machinery and equipment N.E.C.
1257	0.0268	Manufacture of gas and distribution of gaseous fuels through mains
1261	0.0168	Water collection, treatment, and supply

Table 2. Industries in the Udmurt Republic with intermediate RCA ($0.5 < RCA < 1$) in 2021

Line code	ECI_p (non-standardized)	Industry	RCA
1020	0.0460	Crop and animal production, hunting, and related service activities	0.930
1233	0.0124	Manufacture of motor vehicles, trailers, and semi-trailers	0.910
1201	0.0620	Casting of iron	0.830
1263	0.0140	Waste collection, treatment, and disposal activities, materials recovery, remediation activities, and other waste management services	0.820
1087	0.0380	Manufacturing	0.780
1200	0.0350	Casting of metals	0.770
1259	0.0160	Water supply, sewerage, waste management, and remediation activities	0.769
1015	0.0380	Agriculture, forestry, hunting, and fishing	0.740
1327	-0.0820	Freight transport by road and removal services	0.675
1258	0.0120	Steam and air conditioning supply	0.632
1090	0.0460	Manufacture of food products	0.613
1178	0.0310	Manufacture of basic metals	0.608
1095	0.0470	Processing and preservation of meat and production of meat products	0.570
1321	-0.0780	Land transport and transport via pipelines	0.531

The calculation results show that in the Udmurt Republic, according to tax revenue data for 2021, presented in Table 2, 14 economic sectors with an intermediate level ($0.5 < RCA < 1$) of revealed comparative advantages are recommended as possible diversification areas for their development up to the level of strong industries through program-target incentives.

It should be noted that, as shown in the second column of Table 1, the assessments of the economic complexity indicator for 17 strong economic sectors of the Udmurt Republic are low, which ultimately affects the low value of economic complexity assessment of this region of Russia: $ECI_c = - 0.0860$.

Table 2 shows that the assessments of the economic complexity indicator for 14 economic sectors of the Udmurt Republic with an intermediate level of the indicator of revealed comparative advantage are much higher than the assessment of the economic complexity of strong industries; therefore, their development to the level of strong industries through program-target incentives will significantly increase the economic complexity of this region.

3.2. The Republic of Mordovia

The results of calculating the revealed comparative advantages and economic complexity of industries in the Republic of Mordovia (Tables 3 and 4), made it possible to identify strong industries ($RCA > 1$) and industries with intermediate levels of revealed comparative advantages ($0.5 < RCA < 1$) in the descending order of RCA values.

Table 3. Strong industries in the Republic of Mordovia with $RCA > 1$ in 2021

Line code	ECI_p (non-standardized)	Industry
1015	0.0276	Agriculture, forestry, hunting, and fishing
1020	0.0420	Crop and animal production, hunting, and related service activities
1025	-0.0327	Mixed farming
1087	0.0540	Manufacturing
1090	0.0460	Manufacture of food products
1100	0.0345	Manufacture of dairy products
1105	0.0480	Manufacture of sugar
1110	0.0230	Manufacture of beverages
1133	0.0050	Manufacture of wood and products of wood and cork, except furniture, manufacture of articles of straw and plaiting materials
1162	0.0520	Manufacture of basic pharmaceutical products and preparations
1165	0.0530	Manufacture of rubber and plastic products
1168	0.0330	Manufacture of other non-metallic mineral products
1177	0.0290	Manufacture of basic metals and fabricated metal products, except machinery and equipment
1178	0.0560	Manufacture of basic metals
1190	-0.1120	Manufacture of basic precious and other non-ferrous metals
1200	0.0360	Casting of metals
1211	0.0960	Manufacture of computer, electronic, and optical products
1220	-0.0040	Manufacture of electrical equipment
1259	0.0110	Water supply, sewerage, waste management, and remediation activities
1261	0.0168	Water collection, treatment, and supply
1263	0.0140	Waste collection, treatment, and disposal activities, materials recovery, remediation activities, and other waste management services
1270	0.0090	Construction
1295	0.0070	Wholesale and retail trade and repair of motor vehicles and motorcycles
1301	-0.0270	Wholesale trade, except for motor vehicles and motorcycles
1320	-0.0840	Transportation and storage
1321	-0.0780	Land transport and transport via pipelines
1327	-0.0820	Freight transport by road and removal services
1328	-0.1200	Transport via a pipeline

Table 4. Industries in the Republic of Mordovia with intermediate RCA ($0.5 < RCA < 1$) in 2021

Line code	ECI_p (non-standardized)	Industry	RCA
1326	-0.1135	Taxi operation. This class also includes: – other renting of private cars with driver	0.911
1243	-0.0200	Other manufacturing	0.871
1355	0.0030	Hotels and similar accommodation	0.851
1256	0.0340	Electric power generation, transmission, and distribution	0.850
1345	-0.0010	Postal and courier activities	0.840
1255	0.0340	Electricity, gas, steam, and air conditioning supply	0.771
1340	-0.0250	Warehousing and support activities for transportation	0.756
1258	0.0120	Steam and air conditioning supply	0.722
1373	-0.0560	Telecommunications	0.627
1350	0.0060	Accommodation and food service activities	0.622
1185	0.0460	Manufacture of other products for the first processing of steel	0.557
1233	0.0140	Manufacture of motor vehicles, trailers, and semi-trailers	0.527
1227	-0.0020	Manufacture of machinery and equipment N.E.C.	0.519
1155	-0.0120	Manufacture of chemicals and chemical products	0.514

The calculation results, recorded in Table 4, show that in the Republic of Mordovia, according to tax revenue data for 2021, 14 economic sectors with an intermediate level ($0.5 < RCA < 1$) of revealed comparative advantages are recommended as possible diversification areas for their development up to the level of strong industries through the use of program-target mechanisms for providing funds.

It should be noted that, as shown in the second column of Table 3, the assessments of the economic complexity indicator for 28 strong economic sectors of the Republic of Mordovia are rather high, which ultimately impacts the high value of economic complexity assessment of this region of Russia: $ECI_c = 0.0510$.

Table 4 shows that the assessments of the economic complexity indicator for 14 economic sectors of the Republic of Mordovia with an intermediate level of the revealed comparative advantage indicator are lower than the assessment of the economic complexity of strong industries; therefore, their development to the level of strong industries through program-target incentives will insignificantly increase the economic complexity of this region.

3.3. The Kaliningrad Region

The results of calculating revealed comparative advantages and economic complexity of industries in the economy of the Kaliningrad Region (Tables 5 and 6) made it possible to identify strong industries ($RCA > 1$) and industries with intermediate levels of revealed comparative advantages ($0.5 < RCA < 1$) in the descending order of RCA values.

Table 5. Industries in the Kaliningrad Region with intermediate RCA ($0.5 < RCA < 1$) in 2021

Line code	ECI_p (non-standardized)	Industry	RCA
1259	0.0110	Water supply, sewerage, waste management, and remediation activities	0.972
1178	0.0460	Manufacture of basic metals	0.918
1255	0.0340	Electricity, gas, steam, and air conditioning supply	0.769
1256	0.0340	Electric power generation, transmission, and distribution	0.652
1182	0.0870	Manufacture of tubes, pipes, hollow profiles, and related fittings of steel	0.621
1327	-0.0820	Freight transport by road and removal services	0.538
1263	0.0150	Waste collection, treatment, and disposal activities, materials recovery, remediation activities, and other waste management services	0.520
1168	0.0690	Manufacture of other non-metallic mineral products	0.511

Table 6. Strong industries in the Kaliningrad Region with $RCA > 1$ in 2021

Line code	ECI_p (non-standardized)	Industry
1015	0.0276	Agriculture, forestry, hunting, and fishing
1033	0.0140	Fishing and aquaculture
1081	-0.0840	Other mining and quarrying
1090	0.0460	Manufacture of food products
1095	0.0510	Processing and preservation of meat and production of meat products
1100	0.0345	Manufacture of dairy products
1105	0.0480	Manufacture of sugar
1120	0.0710	Manufacture of textiles
1125	0.0810	Manufacture of wearing apparel
1129	-0.0050	Manufacture of leather and related products
1130	-0.0060	Dressing and dyeing of the fur
1140	0.0610	Printing and reproduction of the recorded media
1165	0.0520	Manufacture of rubber and plastic products
1211	0.0960	Manufacture of computer, electronic, and optical products
1233	0.0350	Manufacture of motor vehicles, trailers, and semi-trailers
1237	0.0270	Manufacture of other transport equipment
1238	0.1400	Building of ships and boats
1243	0.0790	Other manufacturing
1257	0.0280	Manufacture of gas and distribution of gaseous fuels through mains
1258	0.0240	Steam and air conditioning supply
1261	0.0180	Water collection, treatment, and supply
1270	0.0070	Construction
1295	-0.0840	Wholesale and retail trade and repair of motor vehicles and motorcycles
1301	-0.0270	Wholesale trade, except for motor vehicles and motorcycles
1320	-0.0840	Transportation and storage
1321	-0.0780	Land transport and transport via pipelines
1326	-0.0680	Taxi operation. This class also includes: – other renting of private cars with driver
1350	0.0040	Accommodation and food service activities
1364	0.0230	Publishing activities
1373	-0.0720	Telecommunications
1388	-0.0170	Insurance, reinsurance, and pension funding, except compulsory social security

The calculation results, presented in Table 5, show that in the Kaliningrad Region, according to tax revenue data for 2021, 8 economic sectors with an intermediate level ($0.5 < RCA < 1$) of revealed comparative advantages are recommended as possible diversification areas for their development up to the level of strong industries through the use of program-target incentives.

As shown in Table 6, the assessments of the economic complexity for 31 strong economic sectors of the Kaliningrad Region are high, which ultimately impacts the high value of economic complexity assessment of this region of Russia: $ECI_c = 0.0190$.

Table 5 shows that the assessments of the economic complexity for 8 economic sectors of the Kaliningrad Region with an intermediate level of the revealed comparative advantage are higher than the assessment of the economic complexity of strong industries; therefore, their development to the level of strong industries through program-target incentives will increase the economic complexity of this region.

3.4. The Trans-Baikal Territory

Based on the use of tax revenue data by sectors over 2021, the results of calculating revealed comparative advantages and economic complexity of industries in the Trans-Baikal Territory (Tables 7 and 8) made it possible to identify strong industries ($RCA > 1$) and industries with intermediate levels of revealed comparative advantages ($0.5 < RCA < 1$) in the descending order of RCA values.

Table 7. Strong industries in the Trans-Baikal Territory with $RCA > 1$ in 2021

Line code	ECI_p (non-standardized)	Industry
1025	-0.0327	Mixed farming
1045	-0.1160	Mining of coal and lignite
1047	-0.1770	Mining of lignite. This class includes washing, dehydrating, pulverizing, and compressing of lignite to improve quality
1065.	-0.1810	Mining of metal ores
1080	-0.2240	Mining of non-ferrous metal ores
1081.	-0.0840	Other mining and quarrying
1084	-0.3200	Mining support service activities
1095	0.0510	Processing and preservation of meat and production of meat products
1100	0.0345	Manufacture of dairy products
1105	0.0620	Manufacture of sugar
1162	0.1200	Manufacture of basic pharmaceutical products and preparations
1243	0.1080	Other manufacturing
1255	0.0320	Electricity, gas, steam, and air conditioning supply
1256	0.0280	Electric power generation, transmission, and distribution
1258	0.0240	Steam and air conditioning supply
1259	0.0110	Water supply, sewerage, waste management, and remediation activities
1261	0.0180	Water collection, treatment, and supply
1270	0.0100	Construction
1320	-0.0030	Transportation and storage
1321	-0.0780	Land transport and transport via pipelines
1326	-0.0020	Taxi operation. This class also includes: – other renting of private cars with driver
1327	-0.0820	Freight transport by road and removal services
1350	0.0060	Accommodation and food service activities
1355	0.0030	Hotels and similar accommodation
1364	0.0040	Publishing activities
1373	0.0240	Telecommunications

Table 8. Industries in the Trans-Baikal Territory with intermediate RCA ($0.5 < RCA < 1$) in 2021

Line code	ECI_p (non-standardized)	Industry	RCA
1295	-0.0840	Wholesale and retail trade and repair of motor vehicles and motorcycles	0.965
1345	-0.0010	Postal and courier activities	0.669
1301	-0.0270	Wholesale trade, except for motor vehicles and motorcycles	0.601
1015	0.0276	Agriculture, forestry, hunting, and fishing	0.563

Based on the calculation results (Table 8), according to tax revenue data for 2021, four economic sectors with an intermediate level ($0.5 < RCA < 1$) of revealed comparative advantages are recommended as possible diversification areas in the Trans-Baikal Territory for their development up to the level of strong industries through the use of program-target mechanisms for providing funds. It should be noted that, as shown in Table 7, the economic complexity assessments for 26 strong economic sectors of the Trans-Baikal Territory are low, which ultimately affects the low value of the economic complexity assessment of this Russian region: $ECI_c = - 0.1910$.

Table 8 shows that the economic complexity assessments for 4 economic sectors of the Trans-Baikal Territory with an intermediate level of the revealed comparative advantage are higher than the economic complexity assessment of strong industries; therefore, their development to the level of strong industries through program-target incentives will increase the economic complexity of this region.

Thus, the results obtained for the regions of the Russian Federation (the Udmurt Republic, Republic of Mordovia, Kaliningrad Region, Trans-Baikal Territory) using the concept of revealed comparative advantage and economic complexity assessment based on tax revenue data for 2021 provide direction and strategy for selecting priority sectors in the economy of these regions (within the framework of the second strategy [34] – modernization of intermediate capabilities) for their development to the level of strong industries through program-target stimulation of the regional economy diversification.

It should be underlined once again that most similar studies use the index of economic complexity of export products from Russian regions. Considering that many Russian regions do not participate in the export of products, in this research, to avoid some of the shortcomings of such an approach to assessing complexity based on data on the volume of product exports, the production volume of the regional economy is estimated on the basis of tax revenue data by economic sectors, as in Afanasyev & Kudrov [44], since they reflect the proportions of production volumes of economic sectors in value terms. This approach assumes that the number of strong sectors is considered as an assessment of the region's economy diversification. Thus, diversification is associated with the emergence of a new strong sector, and the task of setting priorities for the development of sectors to the level of strong ones is considered.

4. Conclusions

The obtained research results develop a methodology for approaching the selection of priority areas for regional economy diversification. Application of the concept of revealed comparative advantages and an approach to assessing economic complexity using tax revenue data by economic sectors made it possible to identify in economics of the constituent entities of the Russian Federation (the Udmurt Republic, Republic of Mordovia, Kaliningrad Region, and Trans-Baikal Territory) strong industries of these regions, for which the indicator of revealed comparative advantages $RCA > 1$, and economic sectors with intermediate levels of revealed comparative advantages ($0.5 < RCA < 1$).

Based on the strategy for modernizing intermediate opportunities, this research considers industries with an intermediate level ($0.5 < RCA < 1$) of revealed comparative advantages of sectors that are not strong in the regional economy as possible areas for diversification of the constituent entities of the Russian Federation under study, and the possibility is determined to facilitate their transition into the category of strong economic sectors through program-target measures to promote regional economy diversification. The following industries are recommended as possible areas for diversification through program-target mechanisms: 14 economic sectors of the Udmurt Republic, 14 economic sectors of the Republic of Mordovia, 8 economic sectors of the Kaliningrad Region, and 4 economic sectors of the Trans-Baikal Territory.

The novelty and methodological significance of this research lies in demonstrating the effectiveness of applying the concept of revealed comparative advantages, an approach to assessing economic complexity based on the use of tax revenue data by economic sectors, and a strategy for modernizing intermediate opportunities when choosing industries for program-target stimulation of regional economy diversification.

The applied significance of the research results is determined by the possibilities of their use in solving project management problems, in particular, the application of program-target mechanisms (state programs, national projects) to support the balance of regional budgets, reduce interregional inequality, and stimulate the development of individual industries.

The choice of priority areas for diversification based on methods of economic complexity and a strategy for stimulating changes in the structure of economically strong industries in the region can help improve the balance of their budgets, economic growth and sustainable development, and reduce interregional inequalities. It should be noted that in the intermediate capability upgrading strategy, not all products/industries in which a country/region may be able to gain revealed comparative advantage ($RCA > 1$) are necessarily desirable options from the income/tax revenue perspective, complexity, and reducing interregional inequalities.

4.1. Limitations and Future Research

Some limitations of the approach based on the strategy of modernizing intermediate capabilities need to be regarded. Although product/industry structure is a significant factor, it is not the only factor explaining income, complexity, and income inequality. Other crucial factors such as institutions, demand structure, geography, technological changes, and innovation capabilities should be considered and studied in more detail.

Despite all the limitations, the approach considered in this work, based on government support (including through program-target mechanisms) for industries that already have intermediate levels of revealed comparative advantages (RCA), in some constituent entities of the Russian Federation (the Republic of Mordovia, Udmurt Republic, Trans-Baikal Territory, and Kaliningrad Region), provides up-to-date information on structural constraints and opportunities for reasonable and inclusive diversification of the economies in these regions.

Since this study was conducted on the basis of tax revenue data from the budgets of constituent entities of the Russian Federation for 2021, further research will consider data on norm 010123 and norm 010124 forms for 2022 and 2023 to analyze the dynamics of changes in *revealed comparative advantages* of the regions for the period of 2021-2023. In addition, further research is required to study areas for diversifying the economy of the constituent entities of the Russian Federation, the production structure of which is highly dependent on raw commodities and producers, related to the identification of structural opportunities for reasonable and inclusive growth.

5. Declarations

5.1. Author Contributions

Conceptualization, A.K.K. and O.S.G.; methodology, A.K.K.; software, A.K.K.; validation, V.V.P., M.L.V., and A.I.M.; formal analysis, V.V.P.; investigation, O.S.G. and M.L.V.; resources, E.V.M.; data curation, M.L.S.; writing—original draft preparation, A.K.K., V.V.P., and E.V.M.; writing—review and editing, O.S.G. and M.L.S.; visualization, A.I.M.; supervision, M.L.V.; project administration, V.V.P.; funding acquisition, V.V.P. All authors have read and agreed to the published version of the manuscript.

5.2. Data Availability Statement

The data presented in this study are available in the article.

5.3. Funding

This article was prepared based on the results of research conducted at the expense of budget funds under the state assignment of the Financial University under the Government of the Russian Federation.

5.4. Institutional Review Board Statement

Not applicable.

5.5. Informed Consent Statement

Not applicable.

5.6. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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