

INTRA-REGIONAL DIFFERENTIATION OF ENTREPRENEURSHIP OF MUNICIPALITIES OF THE ŚWIĘTOKRZYSKIE VOIVODESHIP IN TERMS OF SUSTAINABLE DEVELOPMENT IN 2010 AND 2020

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Abstract. Regions, as spatial socio-economic systems, are characterised by different levels of development and entrepreneurship. Entrepreneurship is an element of job creation, economic development and innovation. It is an element of local territorial capital and a development factor, an element that shapes both the structures of economies and their communities, a determinant of their sustainable development. The phenomenon of entrepreneurship is influenced by a number of factors, including social capital, demographic characteristics, the availability of infrastructure, access to natural resources, the economic structures prevailing in a given region, the quality of human capital, the standard of housing stock, and the quality of infrastructure facilities. The objective of this article is to assess the economic and demographic factors that contribute to the spatial differentiation of the entrepreneurial situation of municipalities, based on a synthetic measure. The empirical data were collected at the municipal level in the Świętokrzyskie region of Poland. The variables were selected based on the availability of data from Statistics Poland for the years 2010 and 2020. Synthetic measures were constructed using the Technique for Order Preference by Similarity to an Ideal Solution method. The Świętokrzyskie region is distinguished by a notable lack of economic competitiveness. The synthetic measure of entrepreneurship in the municipalities of the Świętokrzyskie region exhibited a range of 0.27 to 0.75 in 2010 and 0.30 to 0.65 in 2020. The diversity of the municipalities is attributable to a range of factors, including demographic, natural and socio-economic development processes. It is evident that additional support is required to facilitate the growth and development of entrepreneurship in the Świętokrzyskie province. Spatial polarisation in terms of entrepreneurial development is correlated with demographic and economic variables. Municipalities within the sphere of influence of urban centres had favourable conditions for the development of entrepreneurship. Municipalities with an agricultural character, located on the periphery of Kielce and other cities in the region, have the least favourable conditions for the development of entrepreneurship. The growth of entrepreneurship has mainly taken place in centres with long service or industrial traditions. Concurrently, a more pronounced expansion of services was witnessed in urban areas situated at a distance from the central hubs, driven by the necessity to address the demands of the local population. Conversely, industrialisation flourished in cities in close proximity to these central locations, where extensive collaboration and convenient transportation networks were feasible. Ongoing studies of entrepreneurship and the variables that shape it, such as demographics, should help authorities to evaluate and change policies. The rise or fall of synthetic measures should be a way of assessing the impact of current regional management. The results obtained can inform local authorities about the disparities that exist between units.

Keywords: entrepreneurship, Świętokrzyskie Voivodeship, synthetic measure, CRITIC-TOPSIS method.

JEL Classification: L26

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1. Introduction

Regions, as spatial socio-economic systems, are characterised by different levels and speeds of development. They are a system set up to achieve certain economic and social goals, functions and decision-making powers. In order to maintain their position, they need to seek new sources of development (OECD 2013). As M. Huczek (2016) notes, the process of regional development is understood as a spatial socio-economic system shaped by general regularities and specific features. These features encompass the region's position and role within the national economy, as well as its initial level of development.

H. Sun, A. Kemajou Pofoura and co-authors (2020) link sustainable development to the achievement of both environmental, social and economic sustainability goals, given the scarcity of resources and rapid population growth in the regions. Development includes stimulating employment, increasing economic performance and fundamentally changing social structures, strengthening entrepreneurship. Entrepreneurship is considered the main driver of development, which promotes innovation and technological progress, is an element that prevents unemployment.

Entrepreneurship can be conceptualised as an element of local territorial capital and a factor of development, as postulated by A. Klasik (2006). It is an element that shapes the structures of economies or their communities, and is a determinant of sustainable development. Regional disparities in entrepreneurial activity are attributable to structural and territorial capital-related factors. Factors that determine the level of entrepreneurship in a region include the demographics of the region and its labour market, the economic structure of the region, the quality of human capital, the housing stock and its standard, and infrastructure facilities (Huczek, 2016). The development of entrepreneurship brings many benefits to the economy, including better satisfaction of community needs, creation of new jobs and increased economic innovation. E. Skawinska (2009) writes that entrepreneurship plays an important role in the efficient allocation of available resources.

The objective of this article was to evaluate the impact of economic and demographic factors on the spatial distribution of entrepreneurial activity. To achieve this, the following question was addressed: What is the relationship between entrepreneurship and demographic change in the region? To what extent do economic variables influence the level of entrepreneurship in the region? Empirical data were collected at the level of municipalities (102) of the Swietokrzyskie region (in Poland). The choice of variables was based on the availability of data at the Central Statistical Office in 2010 and 2020.

The Technique for Order Preference by Similarity to an Ideal Solution (TOPSIS) was used to construct synthetic measures.

2. Literature Review

The economic potential of municipalities, as presented by F. del Olmo-García, I. Domínguez-Fabián, F.J. Crecente-Romero, and M.T. del Val-Núñez (2023), is contingent upon a number of factors, including the labour force participation of residents, the local labour market, entrepreneurship, the state of the environment, and the demographic contraction of regions. The loss of population, particularly of young people, has significant implications for the economic, social and environmental stability of regions. A. Krakowiak-Bal (2006) emphasised that an adequate economic potential is conducive to an increase in the standard of living, increased production, a better social situation and greater public security. Furthermore, I. Pomianek (2016) posited that the potential of a municipality, which is the result of a combination of local conditions, determines their opportunities and directions of development. As M. Rutkowska and Ł. Popławski (2017) observe, the transition to a more closed-loop local economy can facilitate competitiveness and innovation. This approach is designed to create conditions that will result in the creation of additional jobs with a more efficient use of resources. The idea of a closed loop is to incorporate sustainable thinking at every stage of working with a product or service, reducing waste and being energy self-sufficient (Susan Evans, 2023).

Entrepreneurship entails the introduction of novelties to the market and the generation of new value for individuals, the economy, and society. The transition towards a circular economy necessitates the implementation of strategic policies, business models, structures, and processes, thereby facilitating societal and economic advancement. In light of the findings presented by G. B. Dragan, W. Ben Arfi, and colleagues (2024), it is recommended that companies adopt the SRs (Reduce, Reuse, Renew, Repair, and Recycle) as action aspects, independent variables, and predictive resources. This approach is expected to result in a cascading triple bottom line. A. Sreenivasan and M. Suresh (2023) have emphasised the importance of minimising negative impacts on society, the environment and the efficient use of products and services. This has led to the emergence of closed-loop business models, which have in turn given rise to a number of entrepreneurial initiatives within the so-called sustainable economy.

As R. Watson, K. Roed Nielsen and colleagues (2023) observe, sustainable entrepreneurship can facilitate sustainable development by identifying and exploiting synergies between social, environmental

and economic outcomes. It represents the utilisation of opportunities for the production of goods and services that simultaneously sustain the natural and social environment and provide economic and non-economic benefits. X. Gao, J. Meng, Y. Ling, M. Liao, M. Cao (2022) emphasise that entrepreneurship is an important determinant of innovation and growth with uneven spatial distribution, which is an important determinant of regional economic disparities. The benefits of locating firms in the local economy and create external benefits by linking labour markets and knowledge transfer.

Entrepreneurship constitutes an essential component of job creation, economic development and innovation. The phenomenon of entrepreneurship is subject to a number of external influences, including social capital, access to resources, landscape and biodiversity. In their 2021 study, Xie, Wang, Xie and Duan define the entrepreneurship ecosystem as a complex and diverse system of actors and environmental characteristics that addresses the institutional and socioeconomic factors influencing entrepreneurship. In the context of entrepreneurship, the ecosystem approach is concerned with the network of relationships and interdependencies between actors in the local economy, which can be conceptualised as a closed system.

3. Research Methods

The following steps were used to determine the synthetic measure of entrepreneurship:

1. Selection of variables describing entrepreneurship and demography for municipalities in the Świętokrzyskie region. From the set of variables, those characterised by low spatial variability (wpsol coefficient of variation) and high correlation of variables (according to the inverted matrix method) were removed (Wysocki, Lira, 2005; Malina, 2004).

2. The variables were standardised in accordance with the method of zeroed unitisation, as outlined by Kukula (2000).

3. The determination of weights for selected variables was conducted using the CRITIC (Criteria Importance Through Intercriteria Correlation) method (Wu, Zhen, Zhang, 2020; Yin, Wang, Wang, Wang, Chang, 2023).

4. Determination of the TOPSIS synthetic indicator for individual municipalities using the formula:

$$q_i = \frac{d_i^-}{d_i^- + d_i^+}; i = 1, 2, \dots, n; q_i \in [0; 1]; \quad (1)$$

where: d_i^- denotes the distance of the object from the anti-pattern (from 0), d_i^+ denotes the distance of the object from the benchmark (from 1). Higher values of the q_i measure indicate a more favorable financial

situation of the municipality (Łuczak, Wysocki, 2012; Wysocki, 2010).

5. The results obtained should be evaluated and analysed according to the synthetic measure. Thereafter, the data should be divided into groups according to the value of the mean and standard deviation for the synthetic measure. A map of the spatial diversity of the synthetic measure, a scatter plot, and a correlation value were prepared using the Statistica program.

4. Results and Discussion

As posited by J. Kudelko (2016), the economic potential of regions is shaped as a consequence of historical development. The economic potential of a region is largely contingent upon the economic traditions of the place in question (i.e., the territorial capital) and the production capacity of the enterprises operating within that region. S. Mondal, S. Singh, H. Gupta (2023) point out that the development of enterprises has led to a number of environmental challenges, such as the accumulation of waste, the release of harmful gases and pollution. In addition, Y. Huang, P. Li, L. Chen, J. Wang (2023) emphasise that entrepreneurship drives economic and social development, contributes to job creation and sustainable economic development. In a recent publication, X. Neumeyer, W. S. Ashton and N. Dentchev (2020) highlight the potential for a sustainability orientation to confer a competitive advantage on enterprises.

The synthetic measure of entrepreneurship in the municipalities of the Świętokrzyskie Voivodeship exhibited a range of 0.27 to 0.75 in 2010 and 0.30 to 0.65 in 2020. The variation between municipalities was indicated by measures of variability, specifically the coefficient of variation. The range of values observed was 20.74–16.62 for the striatum, 0.48–0.35 for the standard deviation, and 0.09–0.05 for the concentration. The kurtosis ranged from 1.28 to 0.94, and the Gini coefficient ranged from 0.13 to 0.11 (Figure 1). The municipalities of the Świętokrzyskie Voivodeship are characterized by spatial differentiation in terms of the degree of development of entrepreneurship, labor market, demographic situation, quality of life, natural environment, and natural processes of socio-economic development, as well as the functions of the region – industrial, tourist, agricultural, residential, service, etc.

Table 1 presents a comparison of the values of the synthetic measure of entrepreneurship of municipalities in the Świętokrzyskie Voivodeship in 2010 and 2020, organised into successive groups. The initial group comprises municipalities with the highest value of the synthetic measure of entrepreneurship, while the final group represents those with the lowest. It is evident that minor

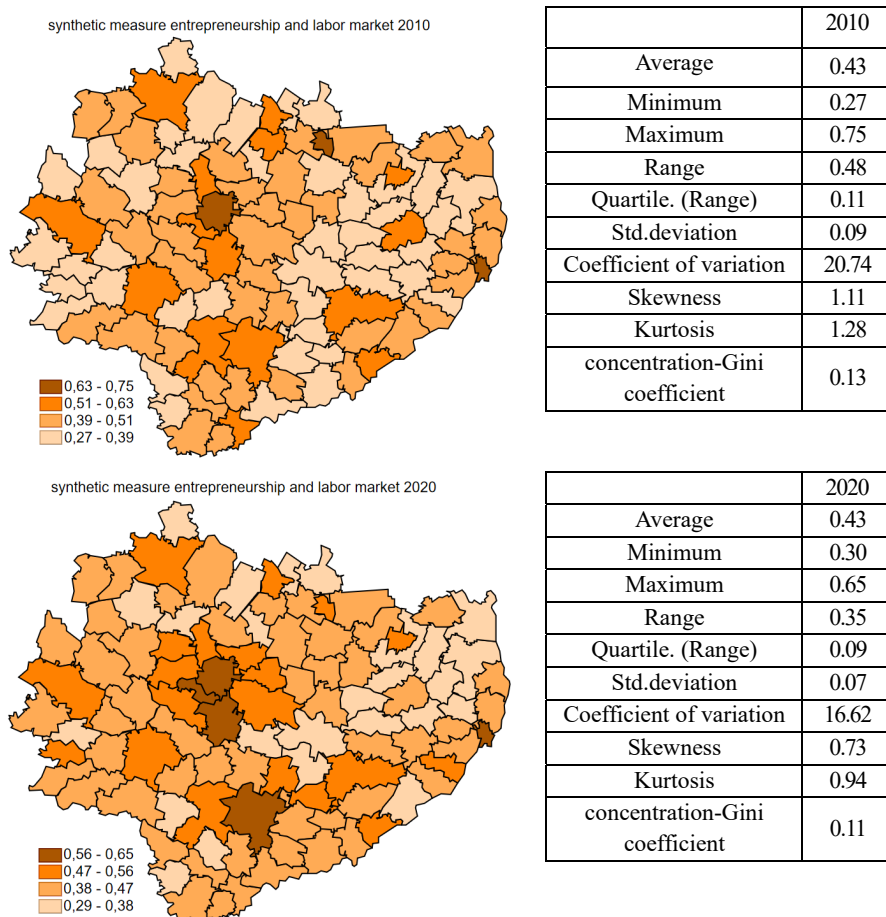


Figure 1. Spatial differentiation of the synthetic indicator of entrepreneurship of municipalities in the Świętokrzyskie Voivodeship in 2010 and 2020
 Source: own research based on data from the Statistics Poland

fluctuations exist between the groups in question. It is evident that there is a distinct advantage associated with the number of municipalities in groups 3 and 4. The municipalities in Group 1, which exhibited the most favourable conditions with regard to entrepreneurship, were also distinguished by a superior situation in terms of the environment and ecology, infrastructure, the number of unemployed and employed individuals, as well as demographic variables (including migration balance and population density).

Figure 2 presents Pearson's correlation coefficient between the value of the synthetic measure of entrepreneurship (year-on-year) and a number of demographic variables, including the number of unemployed and employed individuals, as well as sole proprietors. Furthermore, the figure indicates groups of municipalities that are statistically similar, as well as outliers.

In the context of the development of entrepreneurship in Świętokrzyskie Voivodeship (especially in rural areas), it was assumed that economic activity depends on a number of factors, including natural

conditions (resulting from the resources of the natural environment and landscape values of the region and the system of protected areas), social and demographic structure, the quality of human capital, the level of social, economic and technical infrastructure, financial support for the development of entrepreneurship, the activity of local authorities and the activities of business environment institutions (Gąsiorowska-Mącznik E., 2017).

The value of the correlation between the synthetic measure of entrepreneurship in relation to selected economic elements is presented in Table 2.

The Świętokrzyskie Voivodeship, as presented by Trafiałek E., Jarosiński J. (2014), is characterised by low economic competitiveness. It has formed a structure of economic entities dominated by trade and repair. Manufacturing, construction, real estate and business services, transport, storage and communication were the main elements of the regional economic system. The aforementioned areas of economic activity are gradually extending their influence to other domains, particularly the service sector. However, they remain

Table 1

Selected characteristics of groups of municipalities by synthetic measure of entrepreneurship (entrepreneurship and labor market) in municipalities of Świętokrzyskie province in Poland in 2010 and 2020

Group	2010				2020			
	1	2	3	4	1	2	3	4
Number of units in the group	3	15	42	42	5	20	52	25
q entrepreneurship (entrepreneurship and labor market)	0.68	0.55	0.44	0.35	0.61	0.5	0.42	0.35
Registered entities	126.33	87.53	56.86	51.83	128.4	92.6	73.4	69.28
SME entities (0-249 employees)	1262.33	874.8	568.71	517.88	1281.8	925.05	733.31	692.6
Units newly registered in the REGON register	104.33	88.87	62.6	52.95	83.4	69.7	63.1	57.88
Units deleted from the REGON register	75.33	61.07	34.67	34.12	45.4	34.3	27.88	31.92
Natural persons engaged in business activity	96.67	70.4	46.62	42.31	96.2	73.65	58.92	55.4
Registered unemployed by gender in municipalities in total	58	61.33	60	67.9	27.4	33.25	35.35	49.08
Employed	348	216.2	79.62	67.48	324.8	182.5	90.5	76.68
Migration balance	-5.73	-0.69	0.1	-1.05	0.61	-1	-1.43	-2.31
Population density	1455.37	263.15	77.24	62.07	582.88	270.23	64.59	57.82
q demography	0.51	0.5	0.44	0.41	0.54	0.49	0.44	0.44
q environment and ecology	0.44	0.42	0.41	0.41	0.49	0.45	0.45	0.42
q infrastructure	0.46	0.31	0.33	0.31	0.43	0.38	0.35	0.35

Source: own research based on data from the Statistics Poland

a crucial component of the economic and social landscape.

Nevertheless, in order to fully capitalise on the inherent potential of the Świętokrzyskie region, as postulated by I. Kopacz (2010), the requisite human capital, particularly comprising entrepreneurial individuals, is indispensable. This, in conjunction with land, raw materials and investments, constitutes the economic development of an area. The growth of entrepreneurship has mainly affected centres with long service or industrial traditions (Busko-Zdrój, Staszów, Opatów, Wąchock – small towns in Świętokrzyskie Voivodeship). At the same time, the development of services in towns far from the central centres has increased, due to the need to meet the needs of the local population. In contrast, industry developed in cities situated in close proximity to these centres, where the conditions were conducive to widespread co-operation and the establishment of convenient transport links between them.

Of key importance, as D. Miłek, I. Kantarek (2017) point out, are various forms of support for entrepreneurs at the initial stage of their activity by institutions of the business environment. At the same time, it is necessary to take measures to reduce the barriers that prevent the resilient operation of enterprises, i.e., high taxes that are inappropriate for the initially small turnover of enterprises or complicated legal regulations for opening a business. The activation of society in entrepreneurial activities contributes to the growth of the number of enterprises stimulating the region's economy.

Furthermore, Kasztelan (2015) highlights that the variation in the internal potentials of the local economy can be associated with a range of factors, including issues, demographics, the labour market, the level of entrepreneurship, infrastructure, the environment and numerous other conditions that influence the potential for development. Consequently, a region's distinctive individual characteristics and external conditions shape the opportunities for their development. In his 2009 study, M.S. Cato identifies three fundamental aspects of the green economy: the elimination of environmental hazards and the preservation of natural values, the rational management of natural resources and raw materials, and social inclusion and economic efficiency. R. Hahnel (2010) posits that, in spatial terms, the concept of a green economy can be understood as a process of reducing the environmental burden in local systems, improving living conditions and enhancing local and regional competitiveness.

5. Conclusions

Further support for entrepreneurial growth and development is needed in Świętokrzyskie region. The polarisation of space in terms of entrepreneurship development is correlated with demographic, economic variables.

The municipalities within the range of influence of urban centres, in particular Kielce (the region's capital), were characterised by favourable conditions for the development of entrepreneurship.

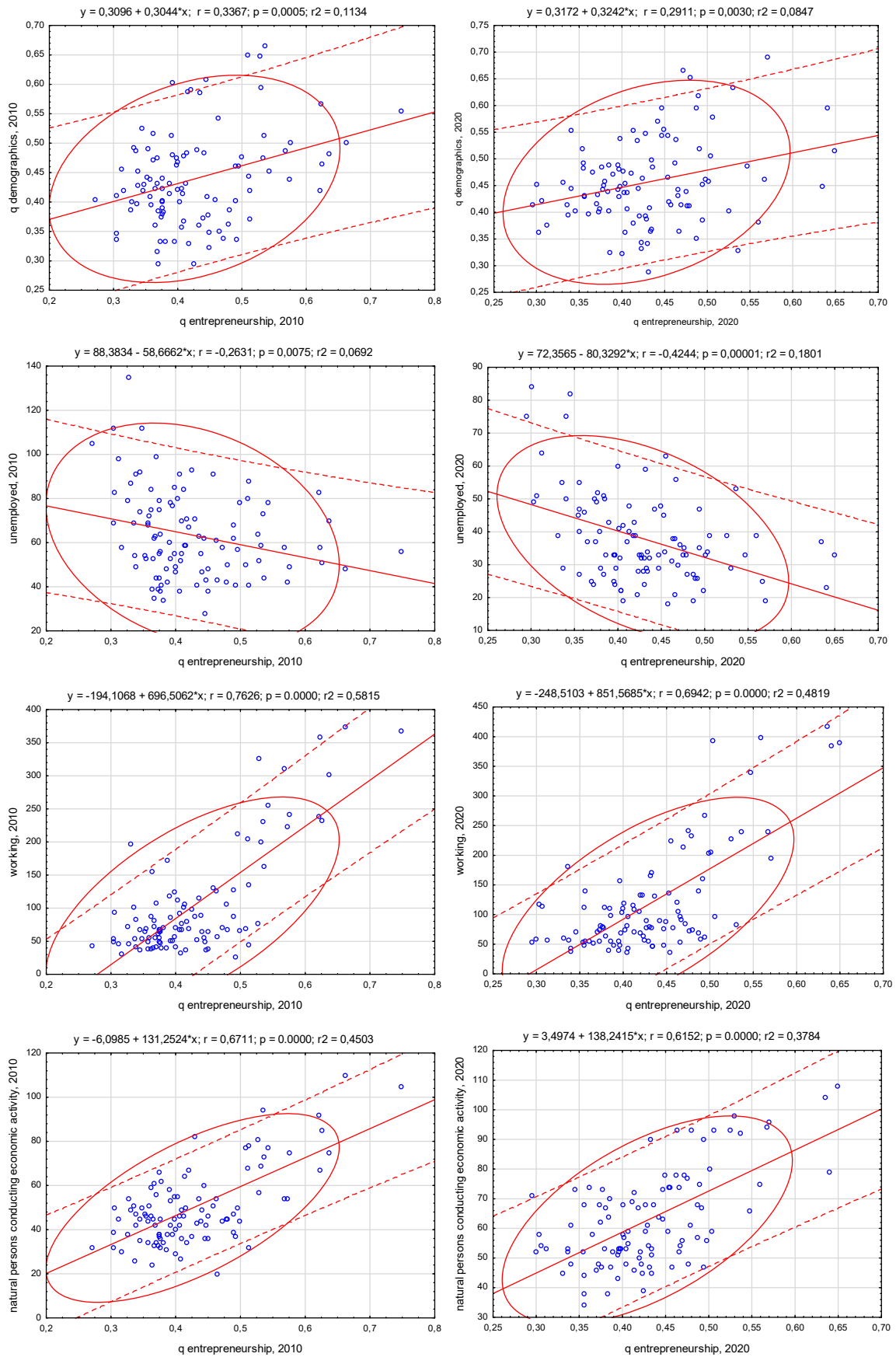


Figure 2. Relationship between the synthetic indicator of entrepreneurship and individual economic elements in 2010 and 2020
 Source: own research based on data from the Statistics Poland

Table 2

Values of the correlation measure between the synthetic indicator of entrepreneurship and individual elements of the economy in 2010 and 2020

	Migration balance	Population density	q demography	Registered entities	SME entities (0-249 employed)	Entities newly registered in the REGON register	Entities deleted from the REGON register	Natural persons conducting economic activity	Registered unemployed by gender in municipalities in total	Employed in the national economy	q entrepreneurship
2010											
Migration balance	1.00	-0.23	0.34	-0.04	-0.04	0.11	0.00	0.03	-0.17	-0.24	-0.03
Population density	-0.23	1.00	0.24	0.66	0.66	0.48	0.56	0.60	0.03	0.58	0.58
q demography	0.34	0.24	1.00	0.51	0.51	0.58	0.46	0.56	0.04	0.37	0.34
Registered entities	-0.04	0.66	0.51	1.00	1.00	0.74	0.76	0.98	0.11	0.75	0.74
SME entities (0-249 employed)	-0.04	0.66	0.51	1.00	1.00	0.74	0.76	0.98	0.11	0.75	0.74
Entities newly registered in the REGON register	0.11	0.48	0.58	0.74	0.74	1.00	0.74	0.76	0.40	0.50	0.53
Entities deleted from the REGON register	0.00	0.56	0.46	0.76	0.76	0.74	1.00	0.77	0.35	0.60	0.45
Natural persons conducting economic activity	0.03	0.60	0.56	0.98	0.98	0.76	0.77	1.00	0.15	0.66	0.67
Registered unemployed by gender in municipalities in total	-0.17	0.03	0.04	0.11	0.11	0.40	0.35	0.15	1.00	-0.04	-0.26
Employed in the national economy	-0.24	0.58	0.37	0.75	0.75	0.50	0.60	0.66	-0.04	1.00	0.76
q entrepreneurship	-0.03	0.58	0.34	0.74	0.74	0.53	0.45	0.67	-0.26	0.76	1.00
2020											
Migration balance	1.00	-0.10	0.45	0.15	0.16	0.16	0.00	0.22	-0.22	-0.18	0.17
Population density	-0.10	1.00	0.00	0.60	0.60	0.14	0.35	0.48	0.00	0.59	0.52
q demography	0.45	0.00	1.00	0.31	0.31	0.45	0.22	0.40	-0.15	0.02	0.29
Registered entities	0.15	0.60	0.31	1.00	1.00	0.58	0.69	0.96	0.06	0.63	0.70
SME entities (0-249 employed)	0.16	0.60	0.31	1.00	1.00	0.58	0.69	0.96	0.06	0.63	0.70
Entities newly registered in the REGON register	0.16	0.14	0.45	0.58	0.58	1.00	0.57	0.65	0.21	0.17	0.38
Entities deleted from the REGON register	0.00	0.35	0.22	0.69	0.69	0.57	1.00	0.72	0.20	0.38	0.25
Natural persons conducting economic activity	0.22	0.48	0.40	0.96	0.96	0.65	0.72	1.00	0.08	0.49	0.62
Registered unemployed by gender in municipalities in total	-0.22	0.00	-0.15	0.06	0.06	0.21	0.20	0.08	1.00	-0.07	-0.42
Employed in the national economy	-0.18	0.59	0.02	0.63	0.63	0.17	0.38	0.49	-0.07	1.00	0.69
q entrepreneurship	0.17	0.52	0.29	0.70	0.70	0.38	0.25	0.62	-0.42	0.69	1.00

Marked correlation coefficients are significant with $p < .05000$; $N=102$

Source: own research based on data from the Statistics Poland

The power plant in Polaniec and the cement plant in Sitkówka-Nowiny constituted sources of growth that were of importance for the entire region and provided employment for the local population. The municipalities with an agricultural character, situated in the periphery of Kielce and other cities in the region, exhibit the least favourable conditions for the development of entrepreneurial activities.

The ongoing study of entrepreneurship and the variables that shape it, such as demographics, should facilitate the assessment and potential modification of policies by the relevant authorities. The fluctuations in synthetic measures serve as a means of evaluating the efficacy of present-day regional governance.

The results obtained can provide local authorities with information on the disparities that exist between units. Furthermore, additional research is recommended to compare the results based on a larger number of variables, to analyse in dynamic terms over an extended time interval in order to identify trends, to examine outliers (including their impact on the main criterion) and to determine their influence on the situation of the studied area, and to construct a synthetic measure based on another method.

The article's contribution lies in its presentation of the findings of a study on entrepreneurship and the factors influencing it, including demographic variables, at the municipal level in the Świętokrzyskie region in 2010 and 2020.

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