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SCENARIOS AND VIABILITY OF RURAL AREAS BASED OF SOCIO-DEMOGRAPHIC INDICATORS IN BULGARIA THROUGH THE GREEN DEAL

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Abstract

The purpose of this study is to analyze and assess the viability in rural areas in Bulgaria. The focus is on demographic and social indicators. On this basis, three scenarios for the development of rural areas by 2030 are proposed, with reference to the main priorities of the Green Deal. The working-age population was chosen as an indicator for evaluation. In a methodological aspect, an extrapolation method of proportions based on the Territorial Share Shift Analysis (TSSA) proposed by Ivanov (2024) is approved. The model is proportional and extrapolated, which means that trends are more reliable than exact figures. The results present a positive trend in rural areas by 2030, expressed in an increase in the number of working-age population based on statistical data for the period 2010 - 2020. Naturally, under the hypothesis of preserving the socio-economic characteristics of these regions. The most likely scenario to happen is the realistic one. According to the results, favorable changes in demographic aspect are expected, which will affect the economically active population in rural areas of Bulgaria. At the local level, cross-border cooperation and investment in infrastructure projects should be strengthened.

Key words**:** *scenarios, viability, rural areas, socio-demographic indicators, Green Deal*

INTRODUCTION

Bulgaria is looking forward to launching new infrastructure projects in rural areas. The new Strategic Plan for the Development of Agriculture and Rural Areas (2023-2027) envisages encouraging policies and supporting activities to strengthen the viability of rural areas in Bulgaria [14]. This would increase employment opportunities, increase incomes and make municipalities attractive centers for living. Despite the ongoing demographic crisis in the country (permanent depopulation, constant reduction and deterioration of the age structure of the rural population, incessant internal migration processes from villages to large urbanized areas, etc.), policies to strengthen the socio-demographic sustainability of rural areas are increasingly being promote.

The attractiveness of rural areas includes various indicators that are decisive for viability. These include income levels, employment opportunities, investment activity, development and availability of cultural, social and transport infrastructure, public works, improvement of the living environment, solving environmental challenges, etc. [2], [11], [12], [13], [15]. In this case, one of the demographic factors with a direct bearing on income and employment in rural areas is the working-age population.

The purpose of this document is to examine and assess the viability of rural areas through a selected demographic indicator, such as the working-age population, as well as to develop scenarios and outline the prospects in the considered aspects for 2030 through the expected impact of the Green Deal.

To achieve the goal, the following tasks are set:

(1) Calculating the influence of factors at the local, national and regional levels on the change in the working-age population in 2020 compared to 2010.

(2) Calculating scenario estimates for the viability indices of rural areas

(3) Summarizing the probabilities of the emergence and occurrence of the developed scenarios for changing the viability indices of rural areas.

(4) Deriving relevant recommendations and conclusions from the developed scenarios, as well as assessing the significance and impact of each of the developed scenarios in rural areas through the Green Deal.

MATERIALS AND METHODS

The number of working-age population was chosen as a demographic and social indicator. The choice is justified by the available statistical information. According to the methodology National Statistical Institute of Bulgaria (NSI methodology): "These limits for the working-age population are up to the age of 61 years and 10 months for women and 64 years and 5 months for men per 100 persons of the population in the "independent" ages (from 15 to 64 years)" [10]. "For 2023, these limits are from 16 to the age of 62 years for women and 64 years and 6 months for men." "The age limits for the distribution of the population by categories below, at and above working age are determined according to the current retirement age in the respective year, adopted by a Decree of the Council of Ministers." (NSI methodology) [10].

On this basis, scenarios are developed for the prospects in the considered aspects for 2030. They are proposed with a view to finding the optimal opportunity provided by the data for their inclusion in the established econometric model and calculation of demographic forecasts (prospective population projections). These assumptions are made on the condition that certain assumptions are made about the natural increase, the future development of the birth rate and mortality in rural areas in the perspective of 2030. The influence of factors at the local, national and regional levels is taken into account. Data from the National Statistical Institute (2010-2020) are used. The unit of measurement of the selected indicator is expressed in percentage.

Three scenarios for the projections of the working-age population are envisaged. The main research tool is the Regional Factor Analysis (RFSA), designed to assess the demographic, socio-economic changes between rural and non-rural areas, at the level of planning regions and at the local level. Based on Shift Share Analysis (SSA), a subcategory RFSA is built. It is an analytical approach and is applied to find the value of individual components to certain changes in the study of regional development of regions at the level of NUT2 [9]. The classical SSA is applied at the level of economic sectors, following the basic principles and logic of this analysis, a regional shift analysis has been developed and proposed, adapting the RFSA computational algorithm [9]. The methodology is based on an extrapolation method of proportions, based on the Territorial Shift Share Analysis (TSSA) [7], [8], [9]. SSA analysis itself is based on a methodology for studying "local shifts" in production [6], and the technique was developed and used for the first time as an analytical tool in the early 1960s. [1], [3]. An "extrapolation method of proportions based on the Territorial Share Shift Analysis (TSSA)" [9]. In which two periods are selected in this case - 2010 and 2020. The positive attitudes among the public regarding the proposals by the Ministry of Health and the Strategic Plan adopted by the EC for the new Programming period 2023-2027 are taken into account as a reference point. The scenarios illustrate the final year 2030 of the period and are constructed based on criteria [10], as follows:

• First scenario – is assumed to be realistic. It covers the regulations of the European Union, which are related to the demography and socio-economic development of the member states;
• Second Scenario – optimistic. According to it, upward demographic processes are expected in the member states;
• The third scenario is pessimistic: It assumes a negative trend in terms of socio-demographic indicators in the analysed member state.

The last group of coefficients (Scenario Likelihood) in the matrix provides information about the probability of the scenarios (not) occurring.

RESULTS AND DISCUSSIONS

Influence of factors at local, national and regional levels for positive change in the working-age population in 2020 compared to 2010

According to the results (Fig. 1), in the municipality of Chuprene, local factors have a dominant role in the favorable change in the rural population of active economic age, a positive change for the period 2020-2010 - 43.9%. Factors at the regional level occupy second place with 10.8%, and the influence of national factors has a minimal participation with 0.38%. In the municipality of Sarnitsa, local factors again prevail in the change in the number of the working-age population - 35.9%, followed by factors at the regional level with 9.1%, and in last place - national level - 0.74%. Madzharovo municipality reports the highest influence of national factors, with a positive effect on the relative share of the working-age population - by 0.78%. Except for the municipality of Kuklen, all other municipalities with a positive trend during the ten-year period under review are located in the border regions of Bulgaria: these are the municipalities of Nevestino, Treklyano, Godech, Sarnitsa, Lyubimets, Madzharovo, Svilengrad. As a reason for this trend, it can be assumed that it is due to the opportunities for diversity of tourist services and cross-border cooperation in the implementation of territorial strategies under the INTEREG program aimed at tourism development, soft training and business cooperation. The main objectives of the measures, also set out in the Operational Program "Regions in Growth" 2014-2020, are precisely the creation of conditions for the development of tourism. This is also one of the activities aimed at improving the business climate in the municipality, building infrastructure, protecting natural resources, and collaborating on business relations with regional and international effect**.**

In this regard, it is the municipality of Madzharovo that has implemented many national programs with grant funding, such as: Human Resources Development Program of the Ministry of Labor and Social Policy; beneficiary under sub-measure 7.2. "Investments in the creation, improvement or expansion of all types of small-scale infrastructure" of the Rural Development Rrogramme of the Common Agricultural Policy2014-2020; project under Operational program "Environment“ 2014-2020; participation in the National Program "Provision of Care in a Home Environment"; project "Economic Development through the Creation of Social Infrastructure for Educational Purposes" with a partner from the Republic of Turkey - Specialized Regional Directorate of Kırklareli, etc. Evidence of coordination of policies at local, municipal and national levels with public importance and visibly positive results. According to data from the Institute of Market Economy (2024) the coefficient of mechanical population growth for 2023 ranks the municipality fourth among all municipalities in Bulgaria with 16.7%. According to the methodology of the NSI, "Mechanical population growth in a territorial aspect represents the difference between the number of settled and the number of displaced persons in and from each settlement. The migration balance from external migration is the difference between the displaced and the settled in the country."

Madzharovo Municipality is located in the Eastern Rhodopes, with the unique meanders of the Arda River and sandy beaches near the Ivaylovgrad Dam.

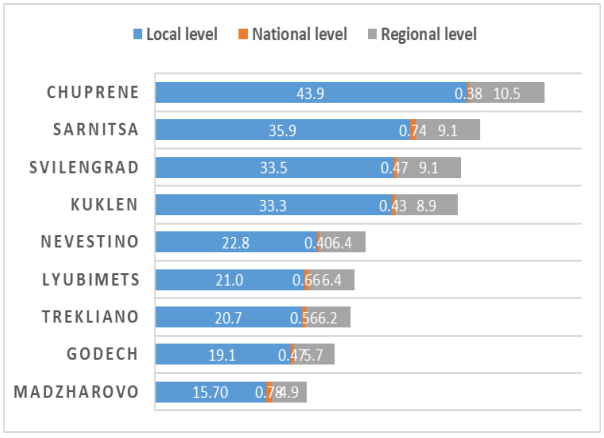

Fig. 1. Influence of factors at local, national and regional levels for positive change in the working-age population in 2020 compared to 2010.
Source: own figure based on Ivanov's calculations (2024).

The built road infrastructure allows the southeast to reach the regional center Haskovo in minimal time or in the direction of Svilengrad to the Kapitan Andreevo border checkpoint or the Kapitan Petko Voyvoda border checkpoint for access to Turkey and

Greece - attractive tourist destinations and high consumption.

Attractive for tourism are the relief forms of the Thracian cult-funerary complex "Deaf Stones", the Medieval Fortress "Efrem", the Roman road connecting Edirne with the interior of the Rhodopes [16] the Church "St. Athanasius" - an artistic monument of culture located in the village of Efrem, an opportunity to observe the symbol of the Eastern Rhodopes and Madzharovo - the Griffon Vulture).

Influence of factors at the local, national and regional levels for a negative change for the period 2020-2010 on the labor force of the population in rural areas.

Regional factors in the municipality of Novo Selo have contributed negatively to the number of the working-age population for 2020 compared to 2010 - 18%, followed by those at the local level - 11.9% and at the national level - by 1.1% (Fig. 2).

Next is the municipality of Makresh. Regional factors also contribute to the negative trend for the ten-year period, respectively close to those of the municipality of Novo Selo - 18%. Local factors have influenced the economically active population by over 11%, and factors at the national level by about one percent. The most significant share of the negative trend in the working-age population (-1.12%) is reported by the municipality of Svishtov. Excluding Hisarya Municipality, the remaining municipalities with a negative trend over the ten-year period are also located in the border regions of Bulgaria: Nedelino Municipality, Djebel, Ardino.

Novo Selo Municipality is located in Northwestern Bulgaria and is a constituent municipality of Vidin District. As the results show, district-level factors project a negative trend on the labor force. Therefore, the root cause of the negative trends for 2020 compared to 2010 is the leading role of the district administration.

Through the Danube River, the municipality borders the Republic Romania and is 15 km from the border with the Republic Serbia. In this regard, cross-border projects and cooperation should be developed. The processing industry, which remains as a legacy of the past and the old material base before 1990, mainly grapes and grain, plays a huge role in the economy of the Novo Selo municipality. Although tourism is among the priority areas of development, the municipality cannot boast of any particular achievements. Among the main challenges in the municipality are the poorly built transport infrastructure, water supply, educational centers, business, and tourist unattractiveness. During the period under review 2010-2020, the population decreased by a quarter. [5], [10]. At the end of the period, almost half of the population in the municipality of Novo Selo was economically active, and only 10% was under working age.

For the period 2020-2010, statistics report an over 30% decrease in the working age population. If we refer to the exact figures, in 2010 the economically active population was 85%, in 2020 it reached 54%.

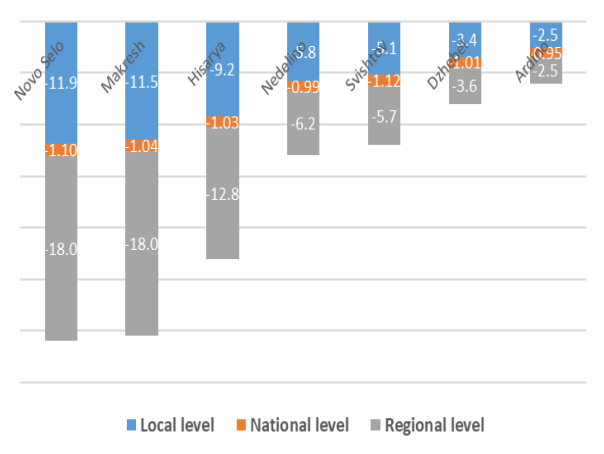

Fig. 2. Local, regional and national factors that negatively impacted the working-age population in 2020 versus 2010.

Source: own figure based on Ivanov's calculations (2024).

Calculation of scenario estimates for the viability indices of rural areas for 2030.

According to the calculations, Chuprene municipality has the highest index of scenario estimates for 2030 based on the change in 2020 compared to 2010 in terms of the working-age population (Fig. 3). The scenarios assume an anticipatory increase in the active population by 2030. According to the approved calculation methodology, an internal migration wave of economically active population to the municipality from other settlements in the country should be expected.

Chuprene municipality is located in Northwestern Bulgaria in the southern part of Vidin district. According to data from the [4] in Chuprene municipality the economically active population for 2020 is 1,049 people, respectively 591 men and 458 women. The economic and social profile of the municipality shows that it ranks one of the last places according to the researched indicators: value added at factor costs (2022) - 3.6 million BGN; share of own revenues from the total revenues of the municipality (2023) - 4.9%. It has more satisfactory indicators in terms of municipal capital expenditures per capita (2023) - 533 BGN/person and according to the coefficient of mechanical population growth (2023) - 2.2% [17].

Sarnitsa Municipality was separated as an independent municipality on January 1, 2015 by Decree of the President of Bulgaria. According to calculations, all three scenarios for the development of the economically active population are possible in the municipality of Chuprene.

The Municipality of Sarnitsa is located in the southern part of the Pazardzhik district. The strategically important territory of Sarnitsa is included in the road infrastructure of the Republican Road network of Bulgaria. One of the leading industries in the municipality is tourism. With its unique landscape, it has favorable conditions for summer and winter tourism. Guest houses are among the attractive businesses. The population is also engaged in logging, livestock breeding, potato production, herbalism, fishing. The working-age population is increasing its interest in opportunities for internal labor migration to the municipality. This indicates optimistic forecasts for an increase in the number of the population with active labor employment by 2030. The remaining municipalities with the highest expected absolute % growth of the economically active population for all three scenarios. In the municipalities of Svilengrad, Kuklen, Garmen, Dolna Banya, Gurkovo, Nikolaevo, Yablanitsa, Dolni Chiflik and Vulchedrum, the scenarios assume an increase in the active labor population.

The remaining municipalities with the highest expected absolute % growth of the economically active population for all three scenarios are Svilengrad, Kuklen, Garmen, Dolna Banya, Gurkovo, Nikolaevo, Yablanitsa, Dolni Chiflik and Vulchedrum. The listed municipalities, with minor exceptions, have certain similar characteristics, such as the presence of natural and historical landmarks, tourist attractiveness, located in semi-mountainous to mountainous and hilly terrain and access to the Republican Road network.

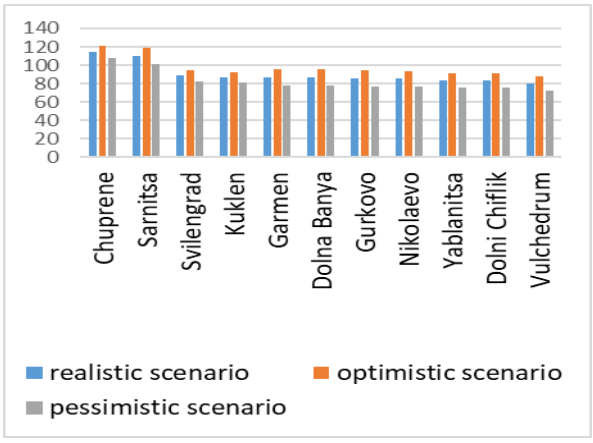

Fig. 3. Optimistic, realistic and pessimistic scenario for viability of municipalities located in rural areas with the largest increase in the economically active population for 2030.

Source: author's figure based on Ivanov's methodology (2024)

According to the amendment for 2020 - 2010, the municipality with the lowest scenario assessment index for 2030 is Makresh municipality (Fig. 4). The scenarios assume a significant decrease in absolute % of the active population by 2030. The municipality of Makresh is located in Northwestern Bulgaria and is a constituent municipality of the Vidin district. Agriculture, and in particular crop production, is the main livelihood for the population in the municipality. The largest share in crop production is occupied by grain production and technical crops.

To a large extent, this also determines the unattractiveness of the municipality of Makresh for the economically active population. Although the location of the municipality falls within a zone of three roads of the Republican Road network of Bulgaria with a total length of 43.5 km between the borders with Serbia and Romania, the potential

for development is blocked. According to the scenarios for 2030, the economically active population of the Makresh municipality will be over thirty-eight percent of the total population. In the pessimistic scenario, it will be ten percent less. The Institute of Market Economics in Bulgaria (2024) [17] reported that it occupies one of the last places in terms of added value at factor costs (2022) - 4.5 million BGN; number of employees under employment and service contracts (2022) - 173 people; population according to censuses (2021) - 1,079 people; natural population growth rate (2023) - minus 36.3 ‰. It has higher indicators in terms of municipal capital expenditures per capita (2023) - 3,788 BGN/person and according to the coefficient of mechanical population growth (2023) - 16.8%, which ranks it in 3rd place among all municipalities in the country.

According to socio-economic indicators, the border region of Vidin is not among the most attractive municipalities in Bulgaria. Naturally, this finding does not apply to the Chuprene municipality. Calculations show that, other things being equal, by 2030, the municipalities of Makresh, Novo Selo, Boynitsa and Kula located in Vidin district will have the lowest absolute % of the working-age population. Out of 10 municipalities in the district, 4 of them are expected to be unviable by 2030.

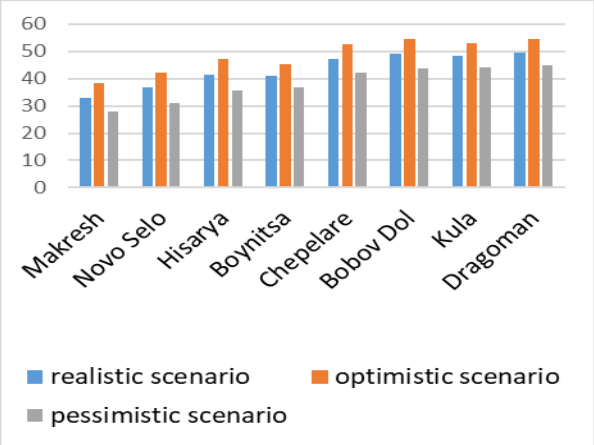

Fig. 4. Optimistic, realistic and pessimistic scenarios for the viability of municipalities located in rural areas with the lowest share of the economically active population for 2030.

Source: author's figure based on the methodology of Ivanov (2024).

The challenges are many and the local authorities in the district will have to collaborate at the national level to restore Vidin to its pre-1990 appearance.

Summary of the probabilities of the emergence and occurrence of the developed scenarios for changes in the viability indices of rural areas for 2030

According to the calculations, all other things being equal and the environment being repeated, in the realistic scenario the absolute percentage of the economically active population in rural areas in 2030 is expected to be 69 percent, and in non-rural areas - seventy percent.

Optimistic scenario - the working-age population by 2030 will be 76 percent, five more than in non-rural municipalities.

In the pessimistic scenario, the economically active population by 2030 will have a parity of 62 percent in rural versus non-rural municipalities (Fig. 5).

With the closest indicators to those of the average in the realistic scenario are the municipalities of Roman, Hayredin (Vratsa district); Ugyrchin municipality (Lovech district); Dolni Dabnik, Iskar and Knezha municipality (Pleven district); Zlataritsa and Polski Trambesh municipality (Veliko Tarnovo region); Kubrat and Loznitsa municipality (Razgrad region); Glavinitsa, Sitovo and Tutrakan municipality (Silistra region); Kavarna municipality in Dobrich region; Veliki Preslav, Novi Pazar and Smyadovo municipality in Shumen region; Primorsko municipality (Burgas); Kazanlak and Radnevo municipality (Stara Zagora); Elhovo and Straldzha (Yambol region); Razlog municipality in Blagoevgrad region; Svoge, Samokov, Mirkovo, Kostenets and Slivnitsa municipality (Sofia region); Chernoochene and Bratsigovo municipality (Pazardzhik); Brezovo and Saedinenie (Plovdiv region).

With levels closest to those of the average in the optimistic scenario are the municipality of Hayredin (Vratsa region); Brusartsi (Montana); Knezha (Pleven); Zlataritsa municipality (Veliko Tarnovo region); Glavinitsa and Sitovo municipality (Silistra region); Novi Pazar and Smyadovo in Shumen district; Razlog municipality and Sandanski in

Blagoevgrad district; Treklyano municipality (Kyustendil district); Kostenets and Svoge (Sofia district); Chernoochene municipality (Pazardzhik).The municipalities with the closest percentages to the average in the pessimistic scenario are Roman, Hayredin (Vratsa district); Ugarchin municipality (Lovech district); Knezha (Pleven); Zlataritsa and Polski Trambesh municipality (Veliko Tarnovo district); Zavet municipality (Razgrad district); Aksakovo (Varna); Kavarna municipality (Dobrich district), etc.

The most likely scenario to occur is the base realistic scenario – 33%. The probability of the optimistic and pessimistic scenarios is equal – 25%. The guarantee factor, through which the confidence probability is expressed, is z = 2.58 in the interval

$$\bar{x} \pm 2.58\sigma_{\bar{x}},$$

which means that 99% of the area is covered.

For the realistic scenario, the variation of the working-age population in rural areas in 2030 compared to 2010 will have increased by 105 percent, and in non-rural areas by eighty-three percent. Compared to 2020, the population in this category is expected to decrease to 103% in rural municipalities and to reach 93% in non-rural ones.

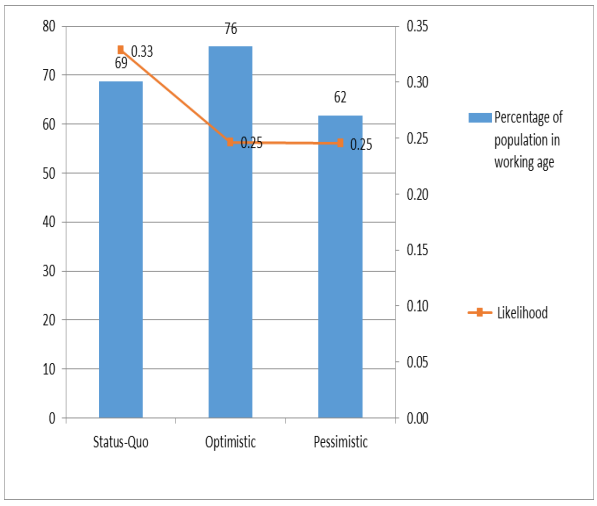

Fig. 5. Probabilities of the emergence and occurrence of the developed scenarios for changing the rural viability indices for 2030.
Source: Ivanov calculations (2024).

For the optimistic scenario for 2030 compared to 2010, the percentage change for non-rural municipalities is expected to be 96 percent and 116% in rural ones. A much lower percentage of change is observed in the pessimistic scenario. According to it, the change in the working-age population for 2030 compared to 2010 in non-rural compared to rural municipalities will be 74% to 95%. The change for 2030 compared to 2020 non-rural/rural will be 95 vs. 93%.

CONCLUSIONS

Based on the model and the three scenarios developed for 2030, favorable development and an increase in the economically active population in rural municipalities based on the situation in 2020 and 2010 are assumed. This trend would be maintained if the repeatability of the environment is maintained and the goals set out in the Green Deal are met. The proposed realistic scenario has the highest probability of occurrence, which means that faster favorable changes in demographic and socio-economic aspects should be expected. In addition, the expected changes will affect the economically active population in rural than in non-rural municipalities more due to the restrictions set out in the Green Deal. It should not be forgotten that the model is proportional and extrapolated, which means that the trends are more reliable than the exact figures.

This trend has proven to be sustainable over time, especially after the crisis during the Covid-19 pandemic. Many young people have permanently left the large urban settlements and moved to ancestral houses in quiet and ecologically clean areas in the villages. If this business model continues to develop, it can be expected to increase the attractiveness and maintain the viability of rural areas, which is a positive sign for the implementation of the priority areas targeted in the Green Deal. The attraction of young married couples will influence the local administration to focus its efforts on policies and actions to improve infrastructure, employment opportunities and increase incomes. Naturally, this will be a good sign for the full absorption of EU structural funds. The question remains unresolved as to what is happening with the North-West region of Bulgaria, especially for the municipalities falling into Vidin region. The problems for the

population there are deepening, despite their favorable territorial location between two neighboring countries. At the local level, cross-border cooperation, investments in infrastructure projects, tourist attractiveness and the livelihood of the population must be strengthened. Naturally, the state must also take on the task of attracting more foreign investment and directing it to this region.

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