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Small Towns' Functions as a Determinant of the Standard of Living in Rural Areas—An Example from Poland

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Abstract: Rural areas, due to their importance for the economy and society, have always been a subject of efforts to understand and model the growth drivers in these areas as well as to improve the standard of living (SoL) of rural populations. One of the most important factors shaping the functioning of rural areas is the presence of small towns and the number of functions they provide for surrounding areas. The significance of this factor is especially high in peripheral regions, such as the Warmińsko-Mazurskie Voivodship in Poland. Therefore, the aim of this paper was to analyze how the number and structure of functions performed by small towns in the Warmińsko-Mazurskie region affected the standard of living of rural residents in the years 2008–2020. The first part of the analysis was concerned with calculating the number and structure of functions performed by small towns in the region, using methods developed in the framework of urban economic base theory. The TOPSIS method was then used to quantify living standards in rural areas. Finally, the results of the two analyses were compared against each other. The results of the studies show that the standard of living in rural areas usually improved with an increase in the number of functions performed by the small towns. Additionally, the structure of these functions influenced the living conditions of the rural population. However, considering the relative rigidity of the urban network within the regional socio-economic system, it leads to the conclusion that existing disparities in the standard of living will be difficult to reduce in the near future.

Keywords: small towns; rural areas; standard of living; regional and local development



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1. Introduction

Economic growth and development do not progress uniformly across geography. Inequalities are particularly pronounced with regard to urban vs. rural development. Such imbalances may emerge in many aspects, including production structure; employment structure; added value generated; the quality and availability of technical, social and economic infrastructure; accessibility of various services, etc. [1]. This ultimately results in disparities between living standards. If too great, they can lead to negative outcomes, such as population outflow from rural areas, brain drain, and decreased competitiveness—which, in turn, widens the gap even further. Therefore, given the strategic importance of rural areas—especially with regard to their supporting role for the rest of the economy and society—there have been extensive efforts to understand and model the growth drivers in these areas and the determinants of the standard of living (SoL) for rural populations. The importance of the issue is further underscored by the fact that rural areas tend to form the majority of a country's land area and are inhabited by a significant segment of the population. Rural areas make up 93% of Poland's total area and are inhabited by almost 40% of the country's population [2].

Economic analyses point to various determinants of growth, development, and the quality of life for citizens. Improvements in these areas are considered an important sign of

positive economic change. However, it should be stressed that formulating a universal set of drivers—whether of local/regional growth or of living standards—is as inadvisable as it is impossible. After all, factors that serve as economic stimuli can change depending on the level of economic development, the dominant economic paradigm (economic growth and development is spurred by different factors in agrarian, industrial, or service economies), and specific geographical, social, or cultural considerations. Nevertheless, analyses of major growth drivers across different scales—from the micro to the macro—have traditionally pointed at the presence of cities/towns and the number of the functions they provide for surrounding rural areas (and how well they perform them) as a major factor.

Urban centers perform a wide variety of functions for their surrounding areas. At their most general, they consist of relaying demand for goods produced in the surrounding area and ensuring an adequate supply of goods and services (including public ones). Thus, cities/towns influence the incomes and living standards of their population and that of the interlinked rural areas. Large cities have the most pronounced effect due to their socio-economic capacity. However, in low-growth, remote regions with underdeveloped urban networks, it is smaller towns that take on the central role.

This paper is an attempt to analyze how the number and structure of functions performed by small cities in the Warmińsko-Mazurskie Voivodeship in Poland affects the standard of living of rural residents. The voivodship belongs to the one of the least developed regions of Poland with a poorly developed network of large and medium cities so it will be a relatively interesting study area, considering the research goal. We drew on the available literature to put forward the hypothesis that an increase in the number of functions performed by the analyzed towns should be accompanied by an improved standard of living in the surrounding rural areas. We further posited that a function structure dominated by market services would also serve to improve the living conditions of the rural population.

According to the rules adopted by the Polish Central Statistical Office, small towns are urban centers with no more than 20,000 inhabitants. This criterion was also adopted by the authors of this work.

To the best of our knowledge, there has been no other research on this particular subject. Although there is a fairly developed literature on determining the standard of living or quality of life in rural areas, see inter alia [1–11], as well as analyzing urban functions and economic bases, see inter alia [12–18], no such studies have considered the existence of a possible functional relationship between these variables. Determining how the number/structure of urban functions affects the standard of living in the surrounding rural areas may therefore be seen as a novel and a contribution adding value to economics and economic geography. It will also extend our understanding of the mechanisms and drivers of economic growth and development on a local and regional scale, thus helping establish better economic policy.

The paper is structured as follows. After the introductory chapter, we discuss the theoretical aspects of measuring and shaping the standard of living in rural areas, as well as the functions of cities/towns with regard to rural areas. In the following section, we present the methodology for our analyses—i.e., research hypotheses, a methodology breakdown, the timeframe of the study, and data sources. The subsequent subchapters are empirical in nature. First, we report our findings on the number and structure of the functions performed by small towns in the Warmińsko-Mazurskie Voivodeship, then we describe how the standard of living in rural areas of the region varies geographically, and finally, present the relationships between them and discuss the results vis à vis other authors' works. A summary and conclusions are given in the final section.

2. Functions of Cities/Towns with Regard to Economic Growth and Living Standards

Cities and towns play a vital role in socio-economic systems. Their presence and spatial distribution determine the location of many types of economic activities, integrates the effects of the other subsystems in the area, and shapes the living standards of the

population [15,19]. It is also thought that a polycentric layout of urban centers promotes economic performance, social equality, and sustainable management of natural/energy resources [20]. As posited by Belkina et al., the socio-economic status, characteristics, and problems of regions are a function of the economic trends and processes in their constituent cities/towns, as well as of the scale and scope of their functions [21]. It therefore follows that any attempt to quantify the drivers of local and regional developments must be accompanied by an analysis of the socio-economic functions of cities/towns—as in which roles they fulfill and how well they do so.

Economics and economic geography offer varying definitions of urban functions. They are usually defined in terms of the activities that form the bulk of a city's or town's economic potential and its relations with the surrounding area—in other words, the activities that generate the most labor demand and that which shape the life and development of the city and its area [22]. However, urban areas are also systems of interconnected elements and the relationships between them. They vary in complexity, depending on the population, and there is a prevalence of other economic and institutional operators. Moreover, a city/town is an open system in that it forms various relationships with its socio-economic environment [12]. Hence, any analysis of the functional structure of urban centers and their impact on their surroundings must follow a systemic approach. Such an analysis must determine what role the selected elements—in this case, cities and towns—play in the system against a functional whole, and how this whole is structured. In other words, as noted by Suliborski, urban functions can be defined as any type of activity carried out in a city/town that produces an evident surplus in employment compared to the employment structure of the region [23].

This method of identifying and quantifying urban functions relates to the notion of the urban economic base, which is popular in geographic and economic sciences [23,24]. This theory holds that all types of economic activity within an urban area can be separated into two groups (sectors). The first consists of activities that generate finished goods and services sold to markets beyond the city limits. This sector (referred to as the exogenous, economic base, or basic sector) thus serves as a source of income for those involved in this type of production. The second sector (endogenous or servicing sector) is composed of activities aimed at fueling the needs of the city's/town's own citizens. Its effects are thus inward-oriented [12,25]. According to the urban economic base theory, as various exogenous-sector activities increase in number and scale, so too does the revenue of city-based enterprises. This boosts investment and consumption, and the corresponding rise in demand has a knock-on effect of increasing production in the endogenous sector. In the long term, this bolsters the economic growth of a city as a whole [26]. By studying changes in the number and structure of functions performed by cities/towns, it is possible to determine their hierarchy in the settlement network structure and the broader socio-economic structures, as well as their changes over time [27,28].

For the purposes of this study, it is particularly important to identify the functions performed by cities/towns for their regional and local surroundings. The simplest scheme for classifying urban functions for this purpose is to divide them into economic and social functions [21]. Social functions provide a supply of goods and services that enable households to meet their essential needs, satisfy their basic well-being, and improve their standard of living. Economic functions, on the other hand, are further subdivided into [ibid.]:

- production functions, i.e., the production of various physical goods;
- the creation and maintenance of an infrastructure network to allow businesses to enjoy the benefits of their metropolitan siting, and to create an environment for manufacturing products in quantities sufficient for the needs of other entities in the city/town and its surrounding area;
- provision of services that support the operations of physical goods producers.

These functions are intrinsic to all urban centers, regardless of their size and the size of their functionally linked areas. However, it should be noted that large cities do tend to perform more functions. In addition, they can also fulfill specialized functions (referred

to in the nomenclature proposed by W. Christaller as ‘higher-order functions’), enhancing the scale and scope of their spatial impact on their own environment. With their specific endogenous capacity, large urban centers create a particularly fertile ground for economic growth and development in today’s knowledge economy.

Nevertheless, the literature does not provide conclusive evidence as to whether the presence of large urban centers should be considered a driver of regional development. Some studies have shown that selected regions of the USA and China, adjacent to large cities (especially those that could be classified as metropolitan), developed significantly faster than other regions [29,30]. Similar development trends have also been noted in the Polish economic landscape [31]. However, other studies have found otherwise. For example, European Union regions with settlement structures dominated by small and medium towns were the fastest-growing from 2001 to 2008 [29,30]. This begs the question as to what role small urban centers play in shaping the direction and pace of growth, especially in regard to the surrounding rural areas.

Vaishar et al. and Stoica et al. [14,15] have suggested two ways of looking at the function of small towns in socio-economic systems. The first focuses on large cities and highly urbanized (metropolitan) regions. This view reduces small and medium-sized cities into a minor contributor to socio-economic potential, often relegated to a place for economic activities undesirable in large cities due to their nuisance-generating or non-competitive nature [12]. This is partly due to the fact that large cities receive more support from policymakers for public (education, medical, or cultural) infrastructure [32].

However, from the standpoint of rural areas, towns become an important factor influencing economic processes and the living conditions of the population. This is primarily due to the functions that towns provide in settlement systems. Some of these functions are listed in Table 1 [33].

Table 1. Selected functions of small towns.

Function	Description
Supply	Relates to selling products and providing services to surrounding communities. Geographically, this function is usually limited to the nearest rural areas. Agriculture around small and medium-sized cities is particularly reliant on the ability of these units to supply sufficient factors, means, and the tools necessary for this sector [34].
Housing	Ensuring adequate buildings, accommodation, and commercial premises for residents and users of the town. In this regard, small cities represent a continuum of sorts between highly urbanized and rural areas. This makes them a “best of both worlds” option, as they can provide the benefits of living in an urbanized area (agglomeration benefits, better access to public services, etc.) and advantages of living in rural areas, while simultaneously avoiding the “barriers to entry” typical of large cities [32].
Support for the local labor market	Enterprises located in small and medium-sized cities increase demand for labor, not only in the cities themselves, but also in their immediate area. Thus, they provide a source of additional income and a catalyst for greater diversification of production in rural areas. It also stimulates the demand and supply effects generated by small towns.
Cultural	Satisfying the non-physical needs of the population through culture, recreation, and tourism.

This set neglects to include another “obvious” function of small towns—relaying demand for agricultural goods produced in their surroundings. This, importantly, is not just the demand reported by the urban residents themselves. After all, these centers

form one link in the distribution chain of agricultural products (from producer to final user/processor) [35]. The economic links forged in the broader regional and national context between rural areas and small towns, and between towns and large cities, create conditions for diversified economic development and better redistribution of agriculture-generated income [36–39].

In short, small urban centers are a vital component of regional and local socio-economic systems. They shape the living conditions of not only the urban population, but of the surrounding rural areas as well. Towns are a source of labor demand and income for the rural population, as well as health, education, social welfare, administration, and transportation services, among others. The greater the scale and scope of their functions, the greater their capacity as drivers of growth and economic development in rural areas [32]. Small urban centers play a greater role in shaping local and regional development in areas with less developed city networks and lower urbanization. Studies conducted by the ESPON (European Observation Network for Territorial Development and Cohesion) stress that small and medium-sized cities should guarantee access to the full array of higher-order services in areas removed from the influence of large urban centers [40,41].

3. Materials and Methods

The aim of this study is to determine how the number and structure of the functions performed by small towns in the Warmińsko-Mazurskie Voivodeship affects the standard of living in the surrounding rural area. This paper tests the hypothesis that an increase in the number of functions performed by towns leads to a higher standard of living for the rural population. We further posited that a function structure with a high share of market services would also lead to similar improvements.

When examining the functions of urban centers in local and regional functional systems, a key issue that needs to be addressed is how to define such functions and, if possible, measure their scale/scope. As mentioned earlier, urban functions should be understood in the context of wider socio-economic and settlement systems. From this standpoint, a city/town mainly serves to satisfy those needs that cannot be met by entities based around it. As an agglomeration's activity structure becomes more unique and divergent compared with its surroundings, more functions can be ascribed to it.

As such, for the purposes of this study, urban functions have been defined as activities with increased employment (overemployment) compared to the voivodeship's employment structure. Urban economic activities were identified based on data from the public statistical database—i.e., the Polish Classification of Economic Activities (PKD). The database provides a hierarchic classification of all economic activities carried out in Poland, which are arranged in homogenous groups called “sections” (the broadest category). These are further subdivided into divisions, groups, classes, and sub-classes. Each section is designated by a letter from A to U. The system is based on the European statistical classification of economic activities—a statistical reporting scheme maintained for the EU.

The number of functions for Warmińsko-Mazurskie towns was calculated from the overemployment indicator. The measure, commonly used for analyzing urban economic bases, makes it possible to identify areas of production (which, in this study, correspond to PKD sections) in a given city/town with employment greater than the voivodeship average. Overemployment (OE) is calculated using the following formula [42]:

$OE = EiT - (ET \times EiR/ER)$, where:

EiT—employment for the *i*-th PKD section in the town;

ET—total employment in the town;

EiR—employment for the *i*-th PKD section in the region;

ER—total employment in the region.

Positive values indicate that the given type of activity is overrepresented in the given town's economy compared to the regional average. These activities therefore feed into the economic base sector and influence the structure of their respective functions. In addition, overemployment in a given section—whether in nominal (as the number of people

employed in the section) or relative terms (as the share of total or working population in the town)—correlates with the importance and scope of the corresponding function in local socioeconomic systems. In effect, the number of PKD sections with above-average employment in a given town can be used to determine the number of functions performed by that town.

The primary urban functions can be singled out by adding up the overemployment values from each PKD section into the corresponding production sector (agriculture, industry, market services, and non-market services). Market service-dominated functional structures are generally considered to be better; this is because service activities generate more added value and are less susceptible to collapse in external demand. In addition, service enterprises form stronger relationships with other entities in local communities, which fosters human capital growth in the long term [43,44]. Therefore, localities where market services are the major sector—whether in nominal or relative terms—are characterized by a higher level and pace of economic growth, which is corroborated by the author's other selected studies on the Polish economy [12,45]. In order to classify small towns in the Warmińsko-Mazurskie Voivodeship according to the primary production sector in their functional structure, we aggregated employment in the different PKD sections and then calculated their share in the total employment in exogenous sectors. The following production sectors were included:

- Agriculture (A)—section A;
- Industry (P)—sections B, C, D, E, F;
- Market services (R)—G, H, I, J, K, L, M, N, R, S, T, U;
- Non-market services (N)—O, P, Q (PKD 2007 names the following sections: A—agriculture, forestry, hunting, and fishing; B—mining and quarrying; C—manufacturing; D—electricity and gas supply; E—water supply and waste management; F—construction; G—trade and repair of motor vehicles; H—transportation and storage; I—accommodation and food service activities; J—information and communication activities; K—financial and insurance activities; L—real estate activities; M—professional, scientific, and technical activities; N—administrative and support service activities; O—public administration and defense, as well as compulsory social security; P—education; Q—human health services and social work activities; R—arts, entertainment, and recreational activities; and S,T,U—other service activities).

Towns were classified by the structure of the economic base and by the direction and degree of change, using the Ossan triangle method [46]. A, P, R, and N type towns are those where one sector dominates over all others in the employment structure. Mixed types (PR, PN, RP, etc.) are those where one sector holds a simple or absolute majority (37.5–75.0%) accompanied by a large (but less than 50%) share of one other. There are also balanced structures, where each sector has a similar share in total employment (within the range of 25.0–50.0%) [ibid.].

These data were then compared against the synthetic SoL measure for the town-adjacent (in the Polish administrative division, the commune (gmina) is the smallest local government unit for a specific territory (NUTS 5); the settlement structure of rural communes is entirely or primarily composed of villages) rural communes.

A synthetic living standard indicator was calculated using TOPSIS [47], a method commonly used in economic research [48–55]. The method weighs decision alternatives by measuring their distance from two reference points—the PIS (positive ideal solution) and the NIS (negative ideal solution). The system identifies the best decision as the one closest to the PIS and furthest from the NIS. The procedure is performed in several steps. First, a decision matrix is built:

$$X = [x_{ij}] \text{ and weight vector } w = [w_1, \dots, w_n], \text{ where } w_1 + \dots + w_n = 1. \quad (1)$$

The next step is to build a normalized decision matrix $N = [z_{ij}]_{m \times n}$, where z_{ij} is the value of the normalized decision alternative assessment, according to the formula:

$$z_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^m (x_{ij}^2)}} \quad (2)$$

where $i = 1, \dots, m, j = 1, \dots, n$.

The next step is to build a normalized weighted decision matrix:

$$W = [v_{ij}]_{m \times n}, \text{ where } v_{ij} = w_j z_{ij}. \quad (3)$$

Then, the positive ideal solution A^+ and negative ideal solution A^- are determined as follows:

$$A^+ = [v_1^+, \dots, v_n^+] \text{ where } v_j^+ = \begin{cases} \max v_{ij}, & v_{ij} \in Z \\ \min v_{ij}, & v_{ij} \in S \end{cases} \quad (4)$$

$$A^- = [v_1^-, \dots, v_n^-] \text{ where } v_j^- = \begin{cases} \min v_{ij}, & v_{ij} \in Z \\ \max v_{ij}, & v_{ij} \in S \end{cases} \quad (5)$$

The next step is to calculate the distance (d_i^+) of the i -th decision alternative from A^+ and the distance (d_i^-) of the i -th decision alternative from A^- ,

$$d_i^+ = \sqrt{(v_{ij} - v_j^+)^2}, d_i^- = \sqrt{(v_{ij} - v_j^-)^2} \quad (6)$$

where $i = 1, \dots, m$.

This allows the value of the synthetic assessment measure (the global score) to be calculated for the i -th decision alternative, according to the formula:

$$T_i = \frac{d_i^-}{d_i^+ + d_i^-} \quad (7)$$

where $i = 1, \dots, m$. The value of $T_i \in [0,1]$.

Finally, the decision alternatives are ranked in a decreasing order of the synthetic assessment score. The higher the score, the higher the alternative was ranked.

As noted earlier, it is impossible to formulate a fully comprehensive set of living standard metrics. Such measures are typically questionable and arbitrary, making it difficult to compare results. Nevertheless, any set of variables intended to be an authentic description of living standards must be grounded in the literature and meet certain statistical criteria [56], particularly measurability and reliability. In addition, the set should draw on spatially diverse and non-overlapping data. The main challenge in selecting the variables was the settlement unit in question. Much of the targeted data is not published at the level of Polish communes (NUTS 5), which inevitably limits the final set. However, we made our best effort in making the scope be as broad as possible. As such, the variables incorporated into the synthetic measure of the standard of living (SoL) relate to various aspects of life, i.e., the labor market, demographics, and housing. Environmental, cultural, infrastructure, and local government finance indicators were also included. The final number of variables was thus a compromise between expectations and the formal/statistical realities. This synthetic SoL indicator drew on the following components (Table 2):

Table 2. Set of variables included in the synthetic indicator of living standards.

No	Variable Name	Variable Type
1	Commune's own income per capita	Stimulant
2	Total communal expenditures per capita	Stimulant
3	Communal expenditures on municipal services and environment protection per capita	Stimulant
4	Communal expenditures on culture and protection of national heritage per capita	Stimulant
5	Entities entered in the REGON business register per 10,000 population	Stimulant
6	Business environment institutions per 10,000 population	Stimulant
7	Share of registered unemployed persons in working-age population (%)	Destimulant
8	Post-working age population per 100 inhabitants of working age	Destimulant
9	Children in pre-school education institutions per 1000 children aged 3–5 years	Stimulant
10	Newly commissioned dwellings per 1000 population	Stimulant
11	Central heating coverage (%)	Stimulant
12	Wastewater treatment coverage (%)	Stimulant
13	Foundations, associations, and social organizations per 10,000 population	Stimulant

This study draws on data from 2008–2020, which is a period that is limited by the availability of comparable statistics. The data were sourced from the public statistical database published by the Local Data Bank of Statistics Poland (Główny Urząd Statystyczny—Bank Danych Lokalnych). We used Statistica software for visualization.

4. Study Area

The Warmińsko-Mazurskie Voivodeship (i.e., province) and its towns—which are the subject of this analysis—are no exception to this rule. The voivodeship still counts among the less developed Polish regions, with a relatively poor and non-competitive production structure. The regional GDP is dominated by low-tech economic activity with little added value and low human capital saturation. The voivodeship's placement near Poland's northern border (in the vicinity of the Kaliningrad Oblast), relatively low transport accessibility, and its social profile are firmly those of a peripheral region [3; 4]. The low economic potential of the region is further limited by the relatively low urbanization. The total number of urban agglomerations is small (49) and mostly dominated by towns (38 during the period considered). As a result, the urban density index (the voivodeship's area per one city/town) is one of the highest in Poland at 493.7 km². Only two urban centers in the region (the regional capital of Olsztyn, and Elbląg) can be classified as large cities with 100,000 or more inhabitants. Furthermore, these two cities are relegated to the western and central parts of the voivodeship, along with most medium-sized cities. This, together with

the relatively underdeveloped transportation network, means that residents of the eastern part of the region have no convenient and quick access to higher-order public services. Given these considerations, small towns become much more important as the local loci of growth.

The urban network of the Warmińsko-Mazurskie Voivodeship consisted of 50 towns and cities in 2020. Of these, only two (Olsztyn and Elbląg) can be classified as large cities according to the criteria used by Statistics Poland (a population of over 100,000). Another nine have populations between 20,000 and 100,000, placing them in the category of medium-sized cities. The remaining agglomerations (39) are small towns, with populations not exceeding 20,000. The 2008 set of agglomerations has since expanded to include one new town, i.e., Wielbark. However, no 2008 statistics were available for Wielbark, as such the town was excluded from analysis. This study thus encompassed 38 urban centers that had town privileges as was at the time of the beginning of the considered period. It should also be noted that none of the towns in the Warmińsko-Mazurskie Voivodeship experienced sufficient changes in population between 2008 to 2020 to change their classification (according to size).

At the end of 2008, the small towns covered by this study had a combined population of 279,391, which accounted for 19.6% of the total voivodeship population and 32.7% of the region's urban population. By 2020, the towns' population had declined to 271,794, accounting for 19.2% of the region's total population and 32.5% of the urban population. Town (population) size averaged 7352 residents in 2008 and 7152 in 2020. Młynary was the smallest town of the group across the entire period considered, with a population of 1815 in 2008 (1763 in 2020). The largest town within the sample was Pisz, with a population of 19,451 in 2008 and 19,029 in 2020. Only 8 of the towns experienced any population growth. The greatest increase—both in nominal and relative terms—was noted for Lubawa, whose population increased by 850 (8.9%) over the period considered. Two of the towns—Zalewo and Biała Piska—saw relatively small increases, by 17 and 20, respectively. The largest nominal decline was observed for Nidzica, whose population shrank by 1056—a 7.2% decrease compared to 2008. In relative terms, depopulation was the most pronounced in Górowo Iławieckie—a 11.8% drop (519 people) between 2008 and 2020. The locations of the Warmińsko-Mazurskie Voivodeship and its rural areas that were studied in the paper are highlighted in Figure 1.

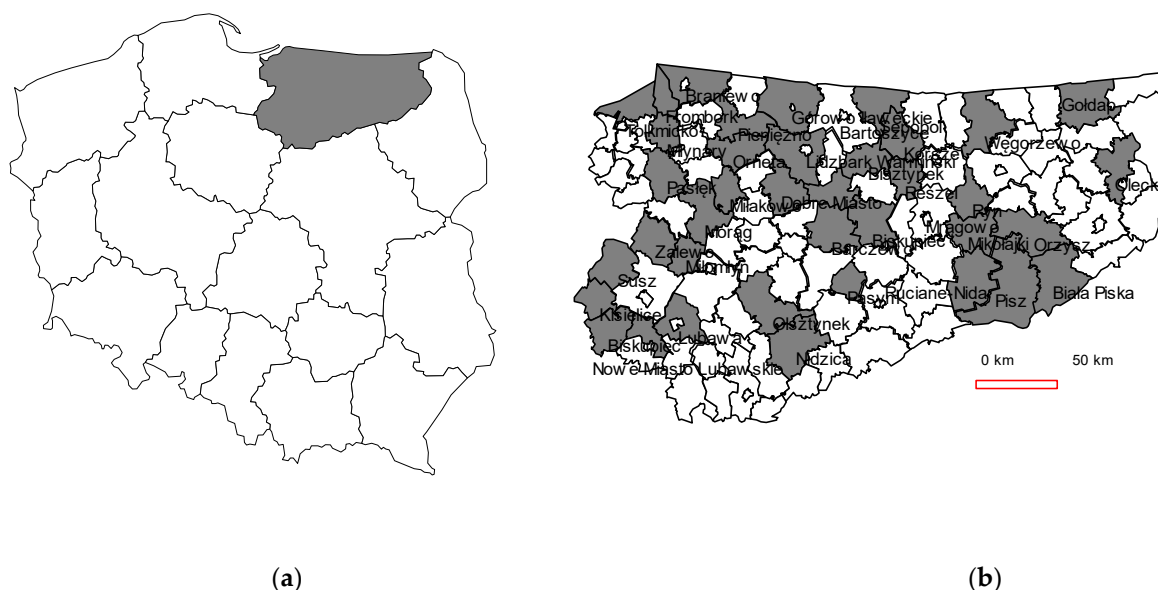


Figure 1. (a) Warmińsko-Mazurskie on the map of Poland and (b) rural areas from the study.

These data show that the sampled towns represent a significant portion of the region's total and urban demographics. Despite this, however, there was a noticeable nominal

and relative decline in the population, which may indicate some structural limitations in their development and functions. This may have contributed to the marginalization of Warmińsko-Mazurskie towns as local loci of growth and catalysts for rural development. However, this hypothesis will have to be validated by further research.

4.1. Small Towns and Their Functions in the Warmińsko-Mazurskie Voivodeship from 2008 to 2020

Table 3 shows the size of the economic-base sector (in both nominal and relative terms) and the number of functions for the analyzed Warmia, Mazury, and Powiśle towns in 2008 and 2020.

Table 3. Number of functions and size of the exogenous sectors for Warmińsko-Mazurskie Voivodeship towns (2008 and 2020).

Town	Size of Economic-Base Sector (in Number of Population)			Size of Economic-Base Sector (as % of City Population)			Number of Functions		
	2008	2020	Change	2008	2020	Change	2008	2020	Change
Barczewo	47	107	61	0.64	1.43	0.79	3	1	−2
Biała Piska	181	151	−30	4.49	3.74	−0.75	4	3	−1
Biskupiec	428	797	369	4.15	7.52	3.36	3	5	2
Bisztynek	30	114	83	1.24	4.81	3.57	2	3	1
Braniewo	697	529	−168	3.93	3.10	−0.83	8	10	2
Dobre Miasto	785	804	19	7.49	7.85	0.36	3	2	−1
Frombork	45	29	−16	1.82	1.21	−0.61	3	1	−2
Gołdap	412	601	189	3.11	4.38	1.27	6	8	2
Górowo Iławeckie	105	175	70	2.38	4.41	2.03	3	4	1
Jeziorany	50	48	−2	1.47	1.49	0.02	2	2	0
Kisielice	87	110	24	3.87	5.24	1.36	1	2	1
Korsze	50	0	−50	1.11	0.00	−1.11	3	0	−3
Lidzbark	379	266	−113	4.64	3.40	−1.24	2	4	2
Lidzbark Warmiński	504	418	−85	3.09	2.64	−0.45	6	7	1
Lubawa	2212	2419	207	23.23	23.31	0.08	2	1	−1
Mikołajki	62	60	−1	1.64	1.57	−0.07	3	3	0
Miłakowo	157	140	−17	5.85	5.48	−0.37	3	2	−1
Miłomłyn	62	29	−34	2.68	1.18	−1.50	3	1	−2
Młynary	86	140	55	4.72	7.88	3.16	2	1	−1
Morąg	744	703	−41	5.26	5.08	−0.18	5	4	−1
Nidzica	380	504	124	2.60	3.65	1.04	6	2	−4
Nowe Miasto Lubawskie	617	631	14	5.58	5.78	0.20	5	2	−3
Olecko	582	905	323	3.61	5.49	1.88	5	4	−1
Olsztynek	75	432	357	0.99	5.70	4.71	3	4	1
Orneta	333	124	−209	3.59	1.40	−2.19	3	5	2

Table 3. Cont.

Town	Size of Economic-Base Sector (in Number of Population)			Size of Economic-Base Sector (as % of City Population)			Number of Functions		
	2008	2020	Change	2008	2020	Change	2008	2020	Change
Orzysz	124	117	−7	2.15	2.10	−0.05	4	2	−2
Pasłęk	340	427	87	2.81	3.50	0.69	7	5	−2
Pasym	66	13	−53	2.59	0.52	−2.06	3	1	−2
Pieniężno	96	116	20	3.36	4.22	0.86	6	5	−1
Pisz	413	320	−93	2.12	1.66	−0.47	5	7	2
Reszel	275	204	−71	5.55	4.47	−1.08	6	6	0
Ruciane-Nida	161	80	−81	3.41	1.79	−1.62	4	2	−2
Ryn	7	58	51	0.24	2.04	1.80	3	2	−1
Sępól	36	30	−6	1.78	1.55	−0.23	1	1	0
Susz	266	151	−114	4.75	2.72	−2.03	4	5	1
Tolkmicko	26	51	25	0.95	1.88	0.93	3	1	−2
Węgorzewo	601	469	−133	5.21	4.13	−1.08	7	8	1
Zalewo	425	441	16	20.11	20.36	0.26	2	1	−1

Taking into account the specifics of the data collection, the presentation methodology of the Polish Classification of Activities, and our own methodology of analyzing urban economic bases, the Polish literature on the subject divides urban centers into three classes, according to the range of functions they perform. If a city/town serves less than six functions (i.e., the number of PKD sections that are overrepresented in terms of employment) then its exogenous sector is defined as undeveloped. At six to eight functions, the exogenous sector is considered average in terms of development. Any more than that, and the agglomeration is considered to have a developed exogenous sector [23].

It follows that the majority of Warmińsko-Mazurskie towns had a poorly developed exogenous sector. Towns that fit this description numbered 25 (66%) in 2008, rising to 32 (84%) by 2020. There was only one town with a developed exogenous sector in 2020, and none such towns in 2008. In the context of our hypothesis, the fact that 21 (55%) of the sampled towns had a decreasing set of functions, whereas 13 (34%) had a growing one, is a negative trend. The decreases mainly affected the smallest agglomerations (with populations averaging 6516 in 2008).

The presented data show that the small towns of the Warmińsko-Mazurskie Voivodeship are a fairly varied group in terms of their functional range and exogenous sector size. The best-case scenario is a town that combines both aspects, i.e., performs a large number of functions and has a large exogenous sector. The rationale is that such a center could offer a wide range of goods and services for local communities, while also generating the strongest impetus for growth in the form of jobs, employment income, and other income generated through the production of goods and services.

The towns that are best developed in this regard are Reszel, Pasłęk, Lidzbark Warmiński, Gołdap, Węgorzewo, and Braniewo. All of these performed at least six functions (both in 2008 and 2020), while also having the largest exogenous employment. There are certain notable trends in this group. In Braniewo, Węgorzewo, and Gołdap, i.e., the most remote of the towns (located near the northern border of the voivodeship and Poland, and situated far from the region's largest cities, with poor transport accessibility), the highest rates of overemployment were in sections O, P, and Q—education and administration. These activities belong to the non-market services sector, publicly funded from local and national budgets. In the case of Węgorzewo and Gołdap, slightly above-average labor engagement

was noted in sections related to tourism, which can be attributed to the natural beauty of their surrounding areas and their siting on the popular Great Mazurian Lakes route. In the other towns, functions centered around sections C (manufacturing); D and E (electricity and water supply); and G and H (trade, transport, and storage).

On the other hand, the smaller towns tended to have less functions across the entire period. These towns also had the poorest average rates of employment in the exogenous sector. Exogenous employment for towns with the largest number of functions averaged 546 people in 2008 and 399 people in 2020, whereas towns with an underdeveloped exogenous sector employed just 252 and 270 people, respectively. Moreover, even these values were heavily inflated by two cities—Lubawa and Dobre Miasto, whose exogenous sectors exceeded 2000 and 700 people, respectively, in both years. The high rates of exogenous employment in these two agglomerations are generated by the furniture factories located on their territory, the largest in the voivodeship (IKEA, BlackRedWhite, and DFM, among others). For the majority of Warmia, Mazury, and Powiśle, i.e., towns with small functional ranges, overemployment was mostly relegated to PKD sections O, P, and Q—in other words, non-market service functions. This suggests that the economic potential and investment attractiveness of these centers is so low that the various public government institutions and their subordinate units are the largest employers. The only exceptions are small towns with larger industrial plants (often legacy facilities established during the centrally planned economy of the communist era), where exogenous employment is dominated by PKD section C (manufacturing); as well as towns neighboring Olsztyn (the largest city in the region and its administrative capital). Some exogenous employment was also noted in sections G (trade) and F (construction).

Table 4 shows a breakdown of the functions performed by small towns in the Warmińsko-Mazurskie Voivodeship in regard to their dominant production sector. A consistent trend throughout the period that was considered is that most towns were centered around industrial functions—20 (53%) in 2008 and 21 (84%) in 2020. Of these, the majority had an underdeveloped exogenous sector, meaning that they performed relatively few functions. Non-market services were also highly prolific in the functional structure of many Warmińsko-Mazurskie towns. Such urban centers numbered 14 (37%) in 2008, dropping to 8 (21%) by 2020. These also followed a distinctive pattern, as most had small populations and a remote location, highly removed from the largest cities in the region. In 2008, four of the towns relied on market services as the chief component of their functional structures, a number which grew to six by 2020. However, one distinguishing feature was that they had good potential for supporting tourism or were situated relatively close to the largest cities in the region.

Table 4. Small towns of the Warmińsko-Mazurskie Voivodeship according to their dominant functions in 2008 and 2020.

Town	2008	2020
Barczewo	N	R
Biała Piska	N	NR
Biskupiec	R	P
Bisztynek	N	P
Braniewo	N	NR
Dobre Miasto	P	P
Frombork	R	R
Gołdap	P	P
Górowo Iławeckie	N	N
Jeziorany	N	R
Kisielice	N	N
Korsze	P	=
Lidzbark	P	P

Table 4. *Cont.*

Town	2008	2020
Lidzbark Warmiński	P	P
Lubawa	P	P
Mikołajki	P	P
Miłakowo	P	P
Miłomłyn	N	P
Młynary	P	P
Morąg	P	P
Nidzica	P	P
Nowe Miasto Lubawskie	P	P
Olecko	P	P
Olsztynek	R	P
Orneta	P	R
Orzysz	N	R
Pasłęk	P	P
Pasym	N	N
Pieniężno	N	R
Pisz	P	N
Reszel	P	P
Ruciane-Nida	N	N
Ryn	R	P
Sępól	N	N
Susz	P	P
Tolkmicko	P	N
Węgorzewo	N	N
Zalewo	P	P

The next stage of the analysis focused on determining the standard of living (SoL) for rural communes that neighbored the sampled towns. Values of the synthetic SoL indicator for the different communes are presented in Table 5.

Table 5. Warmińsko-Mazurskie Voivodeship communes ranked by their respective values of the synthetic standard-of-living indicator in 2008–2020.

Town	Rank in 2020	Rank in 2008	Value in 2020	Value in 2008
Mikołajki	1	3	0.592052	0.563631
Olecko	2	2	0.566287	0.60234
Ryn	3	18	0.53262	0.479593
Gołdap	4	1	0.531843	0.633942
Nidzica	5	8	0.516405	0.512916
Olsztynek	6	7	0.514445	0.514519
Barczewo	7	11	0.512071	0.5055
Biskupiec	8	13	0.504075	0.501132
Ruciane-Nida	9	14	0.504035	0.500242
Pisz	10	10	0.502333	0.509771
Frombork	11	12	0.500734	0.503258
Pasym	12	16	0.499361	0.497987
Węgorzewo	13	4	0.477665	0.552737
Tolkmicko	14	17	0.476644	0.486704
Susz	15	26	0.468203	0.404441

Table 5. Cont.

Town	Rank in 2020	Rank in 2008	Value in 2020	Value in 2008
Miłakowo	16	22	0.466739	0.419536
Orneta	17	5	0.46651	0.518239
Dobre Miasto	18	6	0.455664	0.517317
Nowe Miasto Lubawskie	19	34	0.453031	0.298194
Morağ	20	9	0.439016	0.510335
Orzysz	21	15	0.437124	0.499588
Młynary	22	29	0.436393	0.402074
Kisielice	23	25	0.436093	0.405121
Miłomłyn	24	30	0.431073	0.37043
Lubawa	25	37	0.427349	0.25072
Pasłęk	26	23	0.422599	0.41605
Korsze	27	28	0.41479	0.4032
Biała Piska	28	27	0.411624	0.404089
Jeziorany	29	20	0.410841	0.426266
Reszel	30	19	0.397477	0.438017
Pieniężno	31	24	0.38993	0.40871
Lidzbark	32	31	0.36623	0.324937
Zalewo	33	21	0.360217	0.420948
Bisztyniek	34	33	0.360017	0.308835
Lidzbark Warmiński	35	38	0.354069	0.194952
Braniewo	36	32	0.329823	0.320615
Sępól	37	35	0.325566	0.279977
Górowo Iławeckie	38	36	0.256242	0.250927

The highest SoL values were reserved for tourist destination communes: Miłakowski, Ryn, and Olecko. However, while the towns of this area can be considered leaders, smaller agglomerations can also provide a high standard of living [57,58]. Tourists are attracted to the area primarily by the lakes and remarkable natural environments, unspoiled by industry. Well-developed recreation and accommodation facilities generate revenue for local government budgets, create income for local residents, and drive municipal infrastructure development [59]. That these towns ranked high on the list should come as no surprise, given the region's relatively low endogenous potential [60]. Their success in this regard is long-standing, as evidenced by their equally high placements in the SoL ranking for 2008.

At the other extreme are communes bordering the Kaliningrad Oblast. The difference is particularly striking with regard to Braniewo, Górowo Iławeckie, and Sępól—localities characterized by low population density, depopulation, and low concentration of industrial and service activities. Transport-related social exclusion, the “legacy burden” of communist-era farmland control policies (“PGR” state agricultural farms) [61], combined with reduced labor demand and a progressively ageing population, all act as barriers to local growth. This trend is corroborated by past studies [9,62–65].

The “petrification” of the ranking is telling but expected. The best-scoring communes of 2008 remained at the top in 2020. Conversely, the bottom placements also remained

stable over the years. The year 2020 brought some minor reshuffles in the ranking, although the set of communes included was virtually identical.

Having said that, the gap between the highest measured SoL in 2020 (Mikołajki) and the lowest (Górowo Iławeckie) did narrow when compared with 2008. This may hint at a certain convergence of living standards across Warmińsko-Mazurskie's rural areas. Nevertheless, these areas remain some of the poorest in Poland in terms of their SoL [66].

To validate the results, the authors processed the synthetic SoL indicator using the Hellwig method [67], a popular [68] multivariate comparative analysis method used for linear ordering. The results were essentially the same as those obtained via TOPSIS.

4.2. Standard of Living in Rural Areas of the Warmińsko-Mazurskie Voivodeship versus the Number and Structure of Functions Performed by Small Towns

To test our hypothesis, we had to compare the data on the number and structure of functions performed by Warmińsko-Mazurskie towns with the SoL values for the surrounding rural areas. The results of this comparison are shown in Figure 2. The figure also displays regression functions that model the relationship between the studied variables and the corresponding value of the R^2 coefficient of determination. Four towns with extremely high or extremely low values of the variables were removed from the analysis. These outliers were: Braniewo, Górowo Iławeckie, Korsze, and Lidzbark Warmiński.

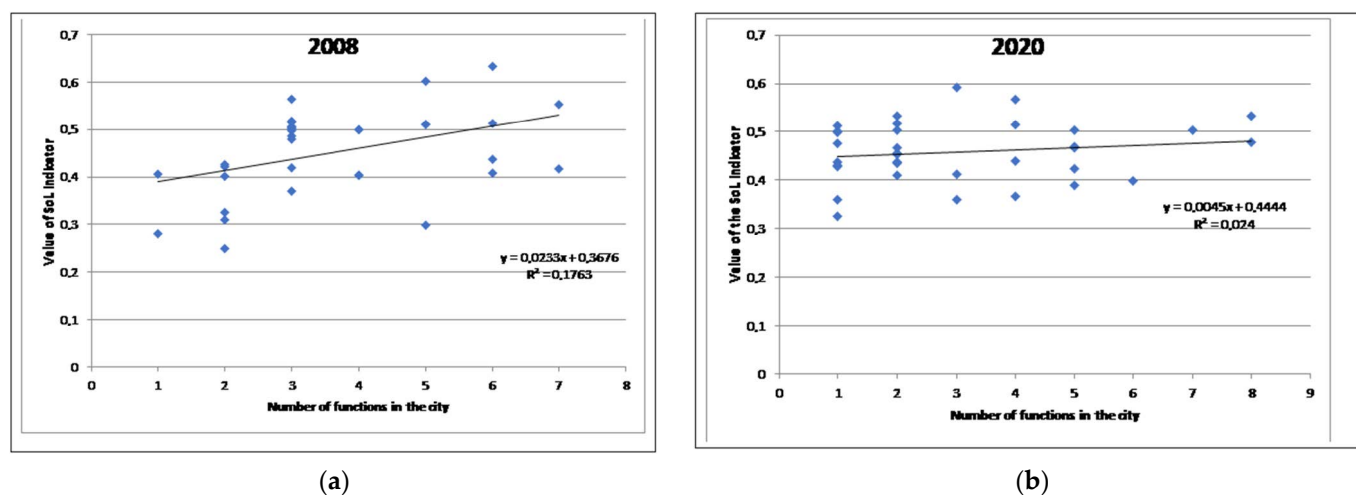


Figure 2. Number of urban functions in Warmińsko-Mazurskie towns versus the TOPSIS-calculated standard of living indicator for their neighboring rural areas 2008 (a) and 2020 (b).

Analysis of the data for the remaining agglomerations hints at several conclusions. Firstly, the number/structure of functions performed by Warmińsko-Mazurskie towns, positively correlated with the SoL in the surrounding rural areas (both in 2008 and 2020), where, notably, the correlation was stronger during the former period.

This means that a broader range of urban functions in Warmińsko-Mazurskie towns led to an improved SoL in their neighboring rural areas. However, the correlation was moderate and varied with time. The correlation coefficient for the 2008 data was 0.42, indicating moderate correlation, and 0.15 for 2020, indicating weak correlation. The positive slopes of the regression lines also indicate a positive relationship between the scope of urban (town) functions and the standard of living in the surrounding rural areas in the voivodeship. However, the low values of the determination coefficient, especially for 2020, preclude a full validation of the hypothesis.

The relationship was notably strongest for towns situated the furthest from the voivodeship's large cities. It mainly includes such agglomerations as Węgorzewo, Olecko, or Pisz, where the relatively high number of functions was coupled with higher levels of development in the associated rural areas. The relationship was less pronounced in towns such as Olsztynek, Nidzica, Dobrze Miasto, and Tolkmicko. These towns are situated near

the voivodeship's largest cities, and the limited number and type of their functions may indicate that their role has been relegated to a residential “base” for the cities' working populations. Nonetheless, the income brought in from large cities (regional loci of growth) still serves to fuel economic growth and economic development—not only for these agglomerations, but for the surrounding areas as well. These conclusions are corroborated by findings of other authors who examined spatial patterns of growth and regional development in post-socialist countries, such as Poland [13–15,69]. The authors have noted that remote, underdeveloped regions showed faster economic growth if they were situated close to and were functionally linked with large cities.

Despite their limited range of urban functions, Zalewo, Lubawa, and Młynary were also surrounded by relatively well-off rural areas. In this case, however, this may be attributed to the large employment in the towns' exogenous sectors, forming a strong—albeit monofunctional—economic base. The towns serve as regional manufacturing hubs, mainly focused on wood and furniture processing, which is the primary industrial sector of the Warmińsko-Mazurskie Voivodeship. However, one should be mindful that production monocultures, especially industrial ones, reduce the ability of such areas to build economic resilience [70,71] and increase the risk of a sudden drop in production and spike in unemployment caused by an external demand collapse [72].

The weaker correlation between the 2020 variables may be the product of the EU Cohesion Policy, including Operational Programme Eastern Poland. The program aims to provide targeted support to the least-developed regions of Poland, including the Warmińsko-Mazurskie Voivodeship. While the various projects implemented under the Community Cohesion Policy did not close the development gap between Eastern Poland and the rest of the country to any appreciable extent, the sampled localities did show significant improvements in intraregional terms [73,74]. While the investments in the least-developed communes of the voivodeship may not have produced visible results in 2008, at least some improvement did become apparent by 2020.

There are also interesting conclusions to be drawn from comparing average values of the synthetic SoL indicator for rural communes against the primary function of the associated towns (Table 6).

Table 6. Average values of the synthetic standard-of-living indicator for rural areas versus the primary function of the associated towns (Warmińsko-Mazurskie Voivodeship).

Type of Town	SoL Indicator	
	2008	2020
Industrial towns	0.44	0.46
Market service-focused towns	0.50	0.45
Non-market service-focused towns	0.41	0.43

The data in the table indicate that the development of rural areas in the Warmińsko-Mazurskie Voivodeship is correlated with the sectoral structure of urban (town) functions. Invariably, areas around towns reliant on non-market services had the poorest quality of life. On the other hand, areas with service-centered towns were typified by the highest quality of life (with the exception of data for 2020). This validates the hypothesis stated above—that the level and pace of economic growth and development is best fostered by a market service-oriented production structure. Conversely, socio-economic systems dominated by non-market services form a significant barrier to development. Considering the unfavorable demographic trends (emigration, population ageing, etc.), as well as the economic fabric of the region and its agglomerations (17), urban centers of this profile can be expected to grow in number, which would be accompanied by a decreased development potential of the region as a whole.

5. Summary and Conclusions

Economic development processes at different levels of spatial aggregation (from the macroeconomic to the local) are determined by a multitude of factors. These factors may change in significance over time and in response to evolving social, economic, and geographical circumstances. Undoubtedly, however, the presence of cities/towns and the functions they serve for the surrounding environment is a permanent and significant determinant of development. A well-developed network of urban centers that effectively carry out their functions is a driver of cohesion and economic growth/development. As cities/towns take on more functions, especially those that fit well with the current economic paradigm, they become more likely to foster a diversified and developed economy—not only for the city/town itself, but for the surrounding rural areas as well.

Based on these considerations, we put forward the hypothesis that the standard of living (SoL) in rural areas of the Warmińsko-Mazurskie Voivodeship is determined by the range and structure of functions performed by small towns of the region. The first part of our analysis was concerned with calculating the number and structure of functions performed by the small cities of Warmia, Mazury, and Powiśle, using methods informed by urban economic base theory. The TOPSIS method was then used to quantify living standards in rural areas. Finally, the results of the two analyses were compared against each other. This analysis led to several key findings.

Firstly, Warmińsko-Mazurskie towns proved to have a relatively weak exogenous sector throughout the period considered. The size of the economic base (measured by overemployment, i.e., the number of surplus employees, and as a percentage of the labor force) was relatively small over the entire period. As a result, the sector failed to provide a significant impetus for growth in the local economy.

Similarly, the sampled towns did not perform a wide variety of functions—six or less in most cases—which provides further indication of an underdeveloped exogenous sector. Moreover, this means that the population of the sampled towns and the surrounding rural areas has limited access to economic activities typical of urban centers. Combined with the small number of large and medium-sized cities in the region and poor transportation accessibility, this may lead to a reduced standard of living, especially for the rural population.

Industrial activity and non-market services form the largest share of the structural structure in the towns were sampled. These types of activity are typified by relatively poor competitiveness, low innovation, and little added value. This limits the potentially positive impact of the exogenous sector on the economy and living standards for these localities.

Our hypothesis has been partially confirmed by a comparison of exogenous sector size data for Warmińsko-Mazurskie towns with the scores of the synthetic SoL indicator for the surrounding rural areas. In most cases, a broader range of urban functions led to an improved standard of living in the associated rural areas. This correlation was the strongest for areas most removed from the region's largest cities.

Our study also shows a clear relationship between the sector structure of urban functions and the rural standard of living. Functional structures with a dominant share of market services and a high share of industrial activity had the strongest positive effect in this regard.

To the best of our knowledge, there has been no other research on this particular subject. In this sense, our study represents a novel approach to understanding and describing the role of urban centers in shaping the rural standard of living. While the rural SoL is a fairly well-explored line of research with robust methodology, to our best knowledge no such studies have considered the number and type of urban functions as factors affecting SoL. In this regard, our study can also expand the potential scope of spatial analyses of economic growth under economic base theory, and thus serve as a valuable contribution to it. Our work can also serve as a springboard for a theoretical discussion on the determinants of local/regional economic growth and development, and a delineation of a theoretical framework for economic policymaking. Our findings indicate that improving the standard

of living in rural areas requires specific action and investment targeted directly at rural areas and their populations, as well as their neighboring cities and especially towns. A well-developed and diversified exogenous sector in urban centers, focused primarily on market services (as defined in our study) can be an important driver of urban-rural cohesion. Hence, bolstering the exogenous potential of cities—especially small towns functionally linked to rural areas—should be a focus of rural development policy.

In terms of supporting territorial cohesion, it has to be stressed that the network of cities/towns and urban production structures are such a rigid component of regional socio-economic potential that rapid improvements are next to impossible. Any measures aimed at evolving the size and structure of the urban exogenous sector will only bear fruit in the long term. In this respect, it is worth mentioning that to our knowledge none of the authorities of the towns included in the study had included the issue of actions aimed at developing the scale and scope of functions performed by these towns. If such problems are being highlighted in local development strategies, it is usually restricted to developing tourist functions. Additionally, this is far from the point of view of building the potential for sustainable growth in the future and improving the economic resilience of these cities.

We are also cognizant of the various limitations of our study. First of all, quantifying urban functions for Polish cities/towns is complicated by the scarcity of statistical data. In particular, this relates to data for lower-level settlements and detailed data (broken down by sub-section) on economic activity in localities. Secondly, the study design did not address the spatial range of the urban functions nor the specifics of how towns extend their growth-promoting effects onto the surrounding areas. Another limitation, stemming from the pilot nature of the study, is its geographically limited scope. In order to derive more universal conclusions, the sample would have to be expanded to include urban centers of other regions and countries. We will address these considerations in our subsequent research.

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