

Від редакції

У липні 2022 р. за підтримки Польської академії наук та Національної академії наук України відбувся міжнародний семінар «Територіальний вимір політики розвитку в умовах кризи та відбудови. Досвід України». Це була одна з перших спроб наукової спільноти оцінити наслідки російської агресії в Україні з точки зору економіки та суспільства країн ЄС. Безпосередньо територіальному виміру російської агресії проти України у польській та європейській перспективі були присвячені дві доповіді, виголошені професором Т. Коморницьким та доктором К. Чапівським

(Інститут географії та просторової організації Польської академії наук ім. С. Лещицького). Відповідно до задуму організаторів семінару, матеріали цих (як і інших) ключових доповідей мали побачити світ в Українському географічному журналі ще у 2022 р. Під час підготовки статей очевидною стала потреба їх об'єднання, обумовлена спільними методологічними підходами, апробованими в рамках кількох міжнародних проєктів, а також цінністю комплексного бачення подій та їх наслідків та соціуму, економіки, інфраструктури. Реалізація ідеї була відтермінована передчасним уходом з життя доктора К. Чапівського.

У 2023 р. авторський колектив представив оновлене бачення власних розробок, які, сподіваємось, становитимуть чималий інтерес для читачів. Стаття дозволяє зрозуміти основні просторові патерни розподілу українських біженців у країнах ЄС, вразливі складові зовнішньої торгівлі європейських країн з Україною, усвідомити перспективи сучасного та повоєнного розвитку транспортних мереж.

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Територіальний вимір російської агресії проти України — польська та європейська перспектива

Російська агресія проти України та пов'язані з нею санкції з боку США та Євросоюзу призвели до поступової зміни попередніх напрямів соціально-економічних зв'язків. Окрім цього, війна в Україні також вплинула на зв'язки та просторові структури на регіональному чи локальному рівнях. Метою цієї статті є початкове визначення розвитку нової територіальної диференціації в трьох вимірах: соціально-демографічному (міграція), економічному (насамперед офіційний торговий обмін), а також інфраструктурному (розширення та використання транспортних мереж). Основна увага була зосереджена на потенційних наслідках, які можуть мати місце в Європі та Польщі (як державі, що межує з Україною та відіграє дуже особливу роль як у соціальних відносинах — приплив біженців, так і в економічних — посередництво у взаємодії між Європейським Союзом та Україною). Ідентифікацію просторової диференціації проводили на основі аналізу різноманітних статистичних даних, зокрема, даних транскордонного руху, зовнішньої торгівлі Польщі на рівні LAU1, потоку біженців (офіційні дані уряду Польщі) або вторинних даних, що є результатом проєктної роботи (зокрема, ESPON IRiE). Остаточних масштабів впливу війни в Україні ні на суспільство, ні на економіку на даному етапі конфлікту встановити неможливо. Проте проведені дослідження підтверджують, що наслідки (у кожному з проаналізованих вимірів) дуже територіально диверсифіковані. Однак ця диверсифікація не стосується лише країн чи навіть регіонів. Він також має локальний вимір і як такий повинен бути адекватно сприйнятий органами державної влади різних рівнів.

Ключові слова: біженці, війна, Україна, територіальні наслідки, територіальна політика.

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Territorial Dimension of Russian Aggression Against Ukraine: Polish and European Perspectives

Russian aggression against Ukraine and the associated sanctions from the side of the United States and the European Union resulted in gradual changes in the previous directions of the socio-economic linkages. Besides this global scale, the war in Ukraine has also influenced the linkages and the spatial structures on the regional or local levels. The purpose of the present article is to provide an initial identification of the development of new territorial differentiation in three dimensions: socio-demographic (migrations), economic (first of all the official trade exchange), as well as infrastructural (extension and use of transport networks). The focus here was on the potential consequences that can take place in Europe and in Poland (as a country bordering Ukraine and playing a very special role in both the social relations—the inflow of refugees, and in the economic ones—intermediation in the interactions between the European Union and Ukraine). Identification of spatial differentiation was performed on the basis of analysis of various statistical data, including, in particular, cross-border traffic data, Polish foreign trade at LAU1 level, inflow of refugees (official data of the Polish government), or the secondary data, resulting from project work (in particular, ESPON IRiE). The ultimate scale of the influence of war in Ukraine, neither on the society nor on the economy, cannot be established at this stage of the conflict. The studies performed confirm, however, that the consequences (in each of the dimensions analyzed) are highly territorially diversified. This diversification, though, does not concern only countries or even regions. It has also a local dimension and as such should be adequately perceived by the public authorities of different levels.

Keywords: *refugees, war, Ukraine, territorial consequences, territorial policy.*

1. Introduction

On February 24, 2022, the Russian army attacked the territory of Ukraine. This has brought huge geopolitical, macroeconomic as well as humanitarian consequences. Over the past year, numerous Ukrainian citizens have been forced to give up their previous life, leave their homes, jobs and schools, and seek safe places for themselves and their families in other parts of Ukraine and beyond. Trade and political relations have undergone significant changes in the effect of sanctions against Russia, with the search for alternative suppliers and changes in the directions of transport movements. Side by side with the global perspective, this war has an huge impact on the socio-economic spatial structures, as well as on regional and local scales. This applies not only spatial structures within Ukraine, but also to neighboring countries and the whole of Europe. Such a proposal is supported by the first research findings concerning issues such as refugee movements or potential changes in supply chains and in foreign trade. Studies of this kind were carried out spontaneously, in particular, in the framework of the already ongoing ESPON, HORIZON 2020 projects (IMAJINE project). In addition, special social studies were conduct-

ed ad hoc among the refugees in countries such as Poland or Romania (Institute of Geography and Spatial Organization Polish Academy of Sciences, Institute of Geography Romanian Academy).

Polish-Ukrainian relations over the past decades have been the subject of numerous geographical studies. Such studies have already been conducted during the 1990s, both in Poland [56, 51, 43, 44] and in Ukraine [8, 14, 41, 42], as well as in other countries, especially in Germany (e.g. [53]). These studies concerned, in particular, border areas [43, 28, 30, 39]. Studies have also been conducted of transport relations between the two countries [29], and in recent years also of the geographical dimension of Ukrainian economic immigration [23]. The territorial dimension of economic relations was analyzed primarily within the framework of broader reports, both on the basis of economics [67] and of socio-economic geography [35, 62]. All of these studies can still provide important benchmarks for modern spatial analyses. In the terms of facts, however, they have suffered quite significant overreach due to the Russian aggression of 2022. At the same time, paradoxically, some old concepts formulated from the

geographical point of view perspective (e.g. in the view of the need to develop certain Polish-Ukrainian infrastructure ties) have acquired new significance.

The article is aimed at ensuring the initial identification of new territorial differentiations (“new geographies”), which are a consequence of the war in Ukraine. Attention is focused on the potential consequences that may occur in Europe and Poland (as a country that borders Ukraine and plays a special role both in social relations—the influx of refugees, and in economic—mediation in the EU’s interactions with Ukraine). An attempt was made to identify the consequences of the socio-economic nature (migration), economic (trade exchange), as well as infrastructure (development and intensity of use of transport networks).

2. Theoretical and historical background

Globalization has had and still has an uneven impact on different territories [5, p. 1]. Already in the period “before the war,” literature on this topic spoke of the crisis of territorial policy and the ineffectiveness of the cohesion policy, not leading to a decrease in inequality, but to conflicts between the core and the periphery [38]. Böhme et al. [7, p. 158] spoke of increasing differentiation (“European Geography of Future Prospects”). On the other hand, Faludi [19, p. 166] argued that territorial cohesion requires the identification and use of territories adapted to specific needs. Today, all these doubts, challenges and “reproaches” have acquired their significance, while the territorial dimension of European politics is becoming a tool necessary for effective change management. Moreover, in the face of the military crisis and in the context of European integration, the relevant issues further strengthen the observance of thinking in supranational terms [20], taking into account the pronounced local differentiations that provoke various processes as a result of the Russian-Ukrainian war.

The assessment of the territorial influence, exerted by the Russian aggression against Ukraine, belongs in a natural manner to the studies from socio-economic geography, concerning the resilience of regions. Resilience is understood in this context as a concept that links (a) adaptive capacities, and (b) the sensitivity of a given system to external shocks, such as sectoral, financial, or energy crises [15]. The respective definitions vary. The subject taken up here is the closest to the understanding of resilience not as the capacity of fast return to the previous development path, but rather as the ability of fast re-orienting of this path [15]. It can namely be supposed that changes in socio-economic space, caused by war, shall be persistent.

The article is structured as follows: after the current implementation, the consequences of military activity are outlined in three dimensions: socio-demographic, economic and infrastructural. Then methods and datasets are presented, thanks to which it was possible to conduct a spatial analysis of the impact of the war in Ukraine. The fourth part contains the results of the investigations. First, the results on the distribution and potential socio-demographic consequences of the influx of refugees to Poland and the European Union are presented. Attention is then focused on potential economic and infrastructural effects. The summary presents a synthetic view of the possible spatial consequences on the scale of (a) Europe, (b) the EU member state neighboring Ukraine and (c) areas bordering Ukraine.

Hence, regions must adapt to the new social structure (inflow of immigrants), to new directions of economic cooperation (sales markets, competition), as well as to new distributions of traffic in transport.

Russia is nowadays a country, against which the biggest number of sanctions has been implemented on a global scale, these sanctions have limited the access of Russia to the world markets [47]. Russian aggression against Ukraine and the associated sanctions, introduced by the United States and the European Union, changed also the previous networks of the socio-economic linkages. Russian aggression destabilized world markets, first of all, those of energy and agricultural products. The respective transformations have been appearing already earlier, that is—after the annexation of Crimea and the outbreak of war in eastern Ukraine, but they have not gained such a scale. With time, along with the influence upon economic ties, the consequences of social character appeared, and, in an indirect manner, also of infrastructural character.

In the social dimension military activities lead to intensified movements of the population. The intensity of flows depends upon a number of conditioning factors, including, in particular, the dynamics of conflict, the historical, cultural, economic, or spatial (distance) factors [45, 46, 66]. In the case of Poland, starting from the middle of the 2010s, we dealt with a growing wave of job-related migrations (culminating in 2019 with 330,500 work licenses issued in Poland, in 2021— 325,200, and in 2022— 85,100), followed later, i.e. from the end of February 2022 onwards, with a huge wave of refugee inflow (in the initial phase of war 3.2 million refugees entered Poland from Ukraine—situation as of May 8th, 2022, [68]).

An essential element, which concerns both the job migrants and the war refugees, is constituted by the linkages between the past and future migrants (theory of migration networks, institutional theory, [40, 3]. War in Ukraine (starting with the annexation of Crimea up till the aggression of 2022) entailed the acceleration of definite processes, including, in particular, the change in the main directions of migration movements. In 2013 for the first time, the number of border crossings by Ukrainians into Poland (7.02 million) exceeded the number of the crossings by the Ukrainian citizens to Russia (6.22 million). In the following years, the difference quickly increased (e.g. in 2015— 9.52 million for the Polish-Ukrainian border, 4.16 million for the Russian-Ukrainian border) [26]. Currently, it is Poland that is the main first destiny of the migration flow of citizens of Ukraine. Similar changes are also observed in the case of Belarus, although the scale of migration inflow is in this case decidedly smaller. Yet, in 2022 Poland overtook Russia as the country most frequently chosen by Belarusians for job migration abroad [63].

The economic dimension finds its reflection at two levels—the individual one (migrants/refugees) and the international one. The individual level (which is, of course, also reflected at various spatial scales) is associated with the functioning of the labor market (including the so-called grey zone) [49, 2]. The international level is a multi-aspect one. It concerns strictly saying the macroeconomic policy and the consequences for the stock market (strong fluctuations on the stock market depending upon the geographical vicinity of the zone of military activities and the effectiveness of the market [1, 59, 37]), the housing market (an increase of prices due to increased demand [64]), the energy market (strong movements of prices due to limited supply of fuels in the effect of the introduction of sanctions against Russia; acceleration of decarbonization of the EU countries; [48]), business and labor market (source of uncertainty, refugee influx vs. labor shortages; [36]), or food security (the question of resilience of the national and global food systems in view of the loss of Ukrainian farming assets [6, 9]. The international level encompasses, naturally, also trade exchange. Economic sanctions are a frequent instrument of foreign policy, and their consequences often affect, as well, the countries enforcing sanctions [11]. While political relations motivate trade [12], economic relations are to a definite extent resistant to political tensions and it is only the influence exerted by the governments on firms that make trade flows more responsive to foreign (political) relations [13, p. 406], while at the

level of individual consumers, we may also deal with economic patriotism, shaping the trade relations in the circumstances of conflict (consumer boycotts; see [10]). The study by Steinbach (2023) [57] indicates that the Ukrainian-Russian war will have significant trade implications primarily for Ukraine and Russia (trade adjustments and diversion), while limiting ones for other countries, contributing to the reallocation of global trade linkages. The first relevant reports forecast the short-term decline in both global trade and the GDP by 1% (this decline being bigger for the countries with lower GDPs), and in longer-term they indicate an important role of politics and the governmental undertakings regarding the limitation of the negative consequences for trade and investments [55]. The outbreak of war meant re-directing the existing supply chains of various kinds of products, from oil to food products [22]. A negative consequence of war for Ukraine in terms of trade is the necessity, faced by the former trade partners, of finding new trade chains (meaning the loss of trade relations to date), especially with respect to these goods, which brought significant revenues to the Ukrainian economy from exports (like, e.g., cereals, sunflower oil, etc.).

The infrastructural dimension of the consequences may be considered according to three main aspects, encompassing: (1) the functioning connections, mainly road and railway ones, as well as seaborne (sea routes over the Black Sea), and also air connections (closing of the air space); (2) the priorities in the investment policies in the countries not affected by the conflict; and (3) the issues of development of the border infrastructure. Until the aggression Russia had been not only the country of destination of trade with the EU, but also the transit country for the interconnections EU-China. It had occurred already earlier that the transit routes in Asia were made use of for exerting political pressures, for instance—by limiting the access to the seas for the inland countries [21]. Nowadays, for safety reasons, this is a bottleneck for the continuation of connections. The exclusion of this area from the cargo traffic (but from the passenger traffic as well) constitutes a serious challenge to the capacity and throughput of the existing transport corridors [47, 55]. The changes in the intensity and in the structure of flows (of both cargo and passenger traffic) result in the transformations to the loads on definite transport corridors, and even of the local infrastructure (particularly in the vicinity of political boundaries). The significance of some routes and corridors abruptly drops, while that of some other ones grows. The investment and organizational pro-

cesses in transport are not as swift as to adequately respond to these changes. The question emerges, though, as to the sense (in the current geopolitical conditions) of the realization of some road projects and regarding the wear of the border infrastructure, especially on the segments featuring distinct drops in cross-border traffic, including cargo transport. In the case of the Polish-Russian boundary, the abrupt decrease in the magnitude of the cross-border traffic resulted from the unilateral suspension of the agreement on local cross-border traffic by Poland in 2016. The previously existing transboundary relations were broken and the development of the border-adjacent

areas was slowed down [58]. In any case, the magnitude of the traffic across that border had decreased already earlier, in effect of the introduction of sanctions against Russia after the annexation of Crimea in 2014. Russian aggression in Ukraine in 2022 again curbed the magnitude of cross-border traffic across the Polish-Russian border segment, which has natural consequences for the degree of use of the existing road infrastructure. In the following months, a similar situation appeared at the border with Belarus. On the other hand, the intensity of traffic of persons and goods across the Ukrainian border was increasing very quickly.

3. Data and methods

The study here reported used the data from the period of war (inflow of refugees) and from the preceding years (strength of economic ties with Eastern Europe), as well as the results of modeling of migrations and the economic consequences at the European level, performed in 2022. For this purpose, the results from ESPON IRiE project (Interregional Relations in Europe; [16]) were used along with those of the Polish project PL-Flows (financed by the National Science Centre). In addition, the available data sets were used, concerning:

(a) movements across the Polish-Ukrainian border (Polish Border Guards); this is a detailed database, containing the numbers of border crossing events (inward and outward) at the particular border crossing points for each day with the distinction of Poles and foreigners, along with their citizenships; it should be noted that this database contains the number of border crossing events, and does not distinguish persons; the second part of the database contains data on cross-border traffic according to transport means (coaches, cars, trains, ships, planes, etc.); alas, the two parts of the database are not connected, that is—one cannot obtain from it the numbers of persons crossing the border with an own means of transport;

(b) Polish foreign trade (Polish Ministry of Finance; this database contains the information, concerning the values of exports and imports (in USD and in EUR) according to counties (LAU 1), activity classification, as well as the country of origin and destination of respective goods;

(c) inflow of refugees (UNHCR, data on the citizen codes PESEL, published by Polish government); these are the continuously gathered data on persons, who decided to acquire the Polish citizen code PESEL; this database encompasses the basic data on the citizens of Ukraine, i.e. the place of registering

in Poland (16 provinces, NUTS 2, and 380 counties, LAU 1), sex and age group.

The data thus characterized are not complete in view of the period of preparation of the present paper, which took place during the first year of military activities.

One of the methods, used in the study here reported is the secondary quantitative analysis of data (i.e. data collected during a different study are used to investigate new hypotheses, to deepen the already performed analyses, or to apply alternative analytic strategies, cf. Ruggiano and Perry, 2019). The data in the setting of European regions (NUTS 2) originate from ESPON IRiE project. At this level two questions are presented, namely:

(1) the influence of war on the magnitude and distribution of refugees—modelling of inflow as dependent on the intensity of military activities and the duration of conflict; within the project, the inflow of refugees was analyzed according to four scenarios, but in the present article only one of them is actually used, that is—scenario D—that of large war destruction and prolonged conflict;

(2) negative economic consequences of the war in Ukraine; in this case, Input-Output analysis was applied; the totality of the analyzed material (the three-dimensional matrix) encompassed 32 countries of the so-called ESPON space (EU member countries, United Kingdom, Norway, Iceland, Switzerland, and Liechtenstein) in the regional setting (297 NUTS 2 units) and 64 branches of economy; the data represented the situation in 2017; for the purposes of simulation of the effects of war it was assumed that:

- trade with Russia and Ukraine is reduced to zero;
- an inflation effect takes place regarding prices; the price effect refers to the one performing through additional raises in prices after the increase in prices of energy and agricultural products [18].

4. Results

4.1. The socio-demographic consequences

Regarding the countries that neighbor upon each other the measure of social relations is constituted by international mobility. It is possible to observe this mobility at the borders (crossing of the border by people and vehicles), and also in other locations of possible registering (acquisition of a definite status, labor market, hospitality facilities, educational facilities). During 2021 the average number of border crossings in a day by the citizens of Ukraine (both ways) was at 21,200 (in January 2022 — 26,500). Before the Russian invasion the inflow of the citizens of Ukraine had been at the level of 16,300 persons per day (*Fig. 1, p. 47*). After the start of invasion a jump-like increase in the inflow occurred, up to almost 63,900 persons a day (maximum of 139,300 on March 6th, 2022). At the same time, high difference between the inflow and outflow of citizens of Ukraine was observed. Smaller differences of the same nature had been observed already in the preceding years. Yet, in this earlier period this was treated as an indirect evidence for the unregistered emigration of Ukrainians to Poland and to other European countries [31].

The earlier studies described also the distribution of Ukrainians on the Polish labor market before the year 2022. Conform to the results from the work [23] the places of concentration of job-related migration were constituted then by the biggest metropolises, their surroundings, some of the farming areas (seasonal work, especially in horticulture), as well as some of industrial towns. Detailed studies, undertaken in the framework of ESPON IMAJINE project indicated a specific character of some of the centres, where the inflow of Ukrainian migrants was preceded by the outflow of the Polish employees to the countries of Western Europe (e.g. Nysa), or where foreign migrations overlapped with the internal ones (e.g. Piaseczno by Warsaw). These studies demonstrated also that already before the war of 2022 a part of economic migrations was also motivated by political aspects (especially after the annexation of Crimea in 2014) [32].

This territorial setting was then subject to potential modifications due to the mass inflow of refugees in Spring of 2022. Observation of this inflow was possible owing to the material, showing the locations of registering of the citizens of Ukraine in the Polish PESEL system. The image of distribution obtained reflects the situation immediately after having entered Poland (the first location of stay). The tempo-

ral sequence of the outbreak of war, mass inflow and then starting of assignment of PESEL codes means that the location mentioned cannot be identified with the location of a later longer stay. It is known that many persons, having registered in PESEL system, moved to other regions of Poland or abroad. Others, after several weeks or months returned to Ukraine. Despite these reservations the respective indicator preserves its cognitive value. It can be interpreted as reflecting the territorial distribution of refugees a couple of weeks after the beginning of war, and hence as the location of first stabilization of their stay [33].

The studies of the distribution of registrations (*Fig. 2, p. 47*) demonstrated that concentration took place first of all in the biggest metropolises and in some other centres, to which job-related migrations from Ukraine had been directed already before. The scale of inflow was most often proportional to the magnitude of the centre. Thus, in the biggest of them (Warsaw, Poznan, Wroclaw) roughly 40–50 registered Ukrainians per 1,000 inhabitants were noted. Almost all of the large and medium metropolises (within the administrative boundaries of the core cities) increased their population due to the inflow of the refugees by approximately 4–5%. There were differences, though, concerning the surroundings of these cities. Thus, a large zone of units, featuring similarly high inflow of refugees formed around Warsaw. The analogous zones around other towns were territorially smaller. For Poznan and Rzeszow they were not observed at all. PESEL registering in the outer zones of the metropolises can be explained by the locations of residence of the refugees (families, receiving them in the suburban areas of family housing), but also by the easier access to the very registration procedure (shorter lines). This, however, does not change the fact that migration decisions were associated there most probably with the attractiveness of the labor market of the metropolitan area itself.

Among the highest relative magnitudes of the refugee inflows are those that have been observed in the tourist counties (Carpathian Mts., Baltic Sea coast, Mazurian Lakeland). This should be associated with the accommodation of the refugees in the available hospitality facilities, numerous in such areas. Tourist areas may also constitute relatively attractive locations of job search. Of higher importance, though, appears to be the concentration of the registering of Ukrainian citizens in these units,

where a bigger number of persons from Ukraine had been living and working yet before. This concerns the suburban areas of many metropolises, as well as the horticultural areas (traditional destinations of seasonal migrations), such as the county of Grójec or the southern part of Lublin region, and also the western part of Poland (industrial centres).

When analyzing the phenomenon in question from the point of view of the long-term territorial effects, it should be admitted that the unexpected wave of immigration shall rather strengthen the demographic and settlement processes that are anyway observed in Poland. This concerns both the general concentration in main metropolitan areas and the process of suburbanization. The areas featuring the highest depopulation in Poland (in eastern Poland) note also low numbers of incoming refugees. This provides no basis for expecting that immigration might have compensational character and shall be helpful in filling the structural gaps in the respective populations of these areas. Concentration of immigrants within the suburban zones means potential increase in the problems, associated with the servicing of the metropolitan areas. A more advantageous image is observed in some cities, which have been noting population decrease in the recent years. Immigration may to a certain extent stop this process. This concerns, in particular, Łódź (along with its functional area) and a certain number of medium-sized towns. On the other hand—lower attractiveness of the medium sized towns in terms of labor markets may cause the secondary outflow of immigrants to other areas.

Comparison of the distribution of the locations of registering (PESEL) of refugees with the spatial differentiation of the demographic structure indicates that on the local scale a challenge may be constituted not so much by the situation on the labor market, but rather as to the adequate supply of general purpose services. This is implied by the share of refugees in the age up to 18 years, which is higher than on the average in the entire population. In some provinces this share for the refugees exceeds even 8% (Mazowieckie, Dolnośląskie). This is of importance, since in the absolute terms in the years 2010–2020 the population number in this age group in Poland decreased, on the average, by roughly 5.7%, which means that the inflow of close to 470,000 young Ukrainians exceeded this decrease on the national scale. In the absolute terms the decidedly highest number of persons of less than 18 years of age came to Mazowieckie province (90,100), followed by Śląskie, Dolnośląskie, Małopolskie and Wielkopolskie. The disturbance of the shape of age pyramid of the Polish society causes that the

ratios of the number of children among the refugees to the number of Polish children at the level of counties tend to assume very high values. In some counties (especially in tourist areas, where many refugee families were accommodated) these ratios exceed 15%. This shows the scale of challenges, which the local education systems must face. It can be expected that the particular burden on the local authorities, responsible for the care for children and education, shall appear in large agglomerations, in tourist counties, in the areas close to the border with Germany (especially in Lubuskie province), and in these units outside of the metropolitan areas, which accommodated high numbers of refugees (probably due to the earlier migration networks, like in the horticultural county of Grójec). In the case of agglomerations a challenge shall be constituted by the high absolute number of minors. In the two remaining unit types of key importance may be the high percentage share of new pupils in respective facilities. In some of them (like in the medium sized towns) the very absolute number of them may turn out to be a significant issue.

The scale of migrations depends upon the intensity and the territorial reach of the military crisis. For different respective assumptions the expected inflow of refugees to the particular units in Poland and in Europe will be different. In the worst of the scenarios considered, scenario D (large-scale war destruction and long-lasting conflict) the number of refugees per 1,000 inhabitants may exceed 100 (10%) in many NUTS 2 units in Central-Eastern Europe and in the Baltic countries (*Fig. 3, p. 48*). The level of 2–3% of the population to date may then also be exceeded in many more distant countries of Western and Southern Europe (including, in particular, Denmark and Portugal). Irrespective of the analyzed variant the highest shares of refugees with respect to the number of population in particular regions will occur in countries of Central Europe. Side by side with Poland these will be Czechia, Lithuania, Hungary and Slovakia. Within Poland the highest values of this ratio shall be attained in the capital region of Warsaw and the provinces of Dolnośląskie and Lubelskie. The following months, after the modelling exercise had been performed, only partly confirmed the assumptions adopted. The data from UNHCR demonstrated that further concentration of Ukrainian refugees, along with the prolonged military conflict, continues in Poland, Czechia and in Western Europe (especially in Germany). At the same time some other countries of “first contact” are characterized by a much higher share of subsequent outflow to the third countries than observed for Poland.

4.2. Economic consequences

In spatial perspective the study of economic effects, resulting from conflicts like the Russian aggression against Ukraine is exceptionally complex. A complete identification of the consequences shall most probably be possible in several years from now or even in several decades and shall become the subject of economic history. It is only possible nowadays to perform model-based forecasting of the negative effects, or the assessment of the previous differentiations with respect to the sensitivity of the spatial units vis a vis the external shocks.

The earlier territorial analyses of the Polish-Ukrainian economic cooperation indicated the dependence upon the setting of the main transport corridors (East-West from Germany through Cracow to L'viv and the oblique one from the region of Kujawy and Warsaw through Lublin to Kiev and L'viv [32]). The area of eastern borderland was in Poland since the beginning of the 1990s the location of very strong concentration of exports to the direct neighbours. The significance of the Ukrainian market in eastern provinces of Poland (especially for the provinces of Lubelskie and Podkarpackie) decreased somewhat, however, after the year 2003. At the same time a very pronounced increase in the exports to Ukraine appeared in the remaining areas, including, first of all, western and also partly northern Poland. The spatial image of the trade exchange with Ukraine changed further in the consecutive years. The concentration of exports to Ukraine in Warsaw increased, but this occurred, as well, in Łódź, Cracow and Gorzów Wielkopolski. At the same time, the concentration of trade contacts persisted distinctly along the parallel corridor of the motorway A4, especially in Podkarpackie province. Development of export centres in some of the smaller cities of western Poland (e.g. in Gorzów Wielkopolski), where international companies are located, was considered as constituting the effect of incorporation of the Polish-Ukrainian trade in the intra-branch flows, and even in the intra-corporate ones. Within the borderland some of the centres (especially Przemyśl, but also Tomaszów Lubelski) became the locations of exports, realized not by the production entities, but by the trade companies (active functioning of the intermediaries in foreign trade, separated from the production base, situated in other regions of the country; see [35]).

Even though, in general, for many years the markets of the former Soviet republics have been losing their significance in Polish foreign trade, and trade

relations with these countries are subject to strong fluctuations due to political factors (e.g. introduction of sanctions, consumer attitudes with respect to the origin of products) or the earlier gradual abandonment of the trade with the East to the advantage of increasing trade with the countries of the EU, as the effect of a shift in trade relations, strengthened by the accession to the EU, it was exactly so that the intermediaries in foreign trade specialized in dealing with the more demanding partners, more frequently in import (including that from Ukraine). Besides, while already earlier conducting trade with the eastern markets (post-Soviet republics) meant significantly increased risk of fast elimination from trade [61], the Russian-Ukrainian conflict clearly augmented vulnerability of the respective companies. Consequently, trade within the border areas may get limited even further, contributing to the increase in differences between the main economic centres and the peripheries.

An instance of a study, based on the earlier data, is provided by the assessments of dependence of the local economies on the concrete sales markets. Such studies had been conducted in Poland before in the context of the local consequences due to the economic crisis of 2008–2009 [35]. At present, some of the investigations were repeated in order to perform simulations of the negative effects of war in Ukraine. In this case the measure of negative influence on the local economy is associated with the scale of its economic ties with Russia. It is namely the trade with Russia that got most severely limited in the effect of sanctions and of breaking of majority of the economic connections. With the instant of stopping of exports definite local economies faced significant problems with maintenance of employment. Hence, *Fig. 4 (p. 48)* shows the distribution and the shares of trade with Russia in Poland at the level of counties. It can be seen that economic problems may appear in the areas bordering upon the Kaliningrad district, but also in individual other units all over Poland. Although geographical diversification enhances the chances of survival on foreign markets, in Polish conditions, trade on eastern markets significantly increases the risk of fast exit (the median of survival time of the intermediaries featuring high share of the CIS countries and Ukraine is only at half of the average; [60]). Then, on the other hand, fast reorientation of trade towards other directions is not always possible, in particular—due to intensive internal competition.

Limitation of the cross-border connections is also visible with respect to the shopping tourism. As this can be concluded from the cyclic study of the Central Statistical Office, GUS [24, 25], the rate of growth of both the cross-border traffic and the average expenses of foreigners in Poland at the Polish-Russian border significantly slowed down (second quarter of 2022, comparison of the second quarter of 2022 with analogous period in 2021), or even slightly decreased in terms of the magnitude of expenses (fourth quarter of 2022). It should be emphasized, at the same time, that in absolute quantities the traffic across the Polish-Russian border is incomparably smaller than across other segments of the state boundary.

On the other hand, the input-output analysis showed high degree of economic threat, appearing in Central-Eastern Europe, especially in Baltic countries, in Hungary and Slovakia, followed by Czechia, Bulgaria, Poland and Romania (see Fig. 5, p. 49). Of the other countries of Europe higher levels of vulnerability to war were observed for Ireland and Cy-

prus (most probably due to capital connections), but also by Slovenia, Portugal, and Finland. For Germany and France situation turned out to be strongly differentiated among regions. More sensitive appeared to be rather the western lands of Germany (Bavaria, Rhineland), while in France—Paris. The countries, in which the influence of war would most probably be relatively small, are Norway, United Kingdom, Spain and Italy (especially the southern part of the country). The study demonstrated that the role of distance from Ukraine and Russia (as a factor influencing the vulnerability of the respective economies) is perceived at the level of countries, but rather not at the level of regions. Polish economy seems to be more vulnerable than the French one, but still the negative impact appears to occur more in the western regions of Poland than in the provinces directly bordering upon Ukraine. These results support the thesis that geography matters to European space when it comes to external threats. And any potential ‘recovery’ measures implemented at the EU level should take into account this territorial perspective.

4.3. Consequences concerning the development of infrastructure

Since the 1990s in Poland and in other countries of Central Europe transport infrastructure was being developed, especially the road network, linking respective countries with the territory of the former Soviet Union. This was indispensable, given the previously existing gaps, intensification of traffic (initially largely associated with the local cross-border trade), as well as heavy transit, first of all between Russia and the countries of Western Europe. This process accelerated after the accession of Poland, Slovakia, Hungary and Romania to the European Union. Thereby the means (disbursed in the framework of the cohesion policy) were secured for the TEN-T network (trans-European corridors, encompassing also Eastern Europe) and for supporting the lagging regions (oftentimes peripheral and border-adjacent, as this was with the special dedicated operational program Eastern Poland). In the latter cases the investments had a regional character. They supported internal connections, but, at the same time, also short segments of infrastructure in the vicinity of border crossing points. In many instances this was the response to the increased road traffic, resulting from the cross-border travels.

During the entire period of socialist Poland (1945–1989) the whole boundary with the Soviet Union was characterized by a very low degree of permeability. It constituted, in fact, a kind of „second Iron Curtain,” separating the socialist coun-

tries of Central Europe from their “Big Brother” [30]. In the place of as many as 63 railway and road routes, crossing in 1939 the later established boundary with the USSR, at the beginning of the 1980s, the socialist Peoples’ Poland was connected with the Soviet Union (total length of this boundary being equal 1,310 km) by just two border crossing points and three generally accessible railway crossings. At the Polish-Ukrainian border all railway lines were then closed, except for the route Rzeszów–L’viv. Regarding the road connections until the very end of 1980s only one border crossing point was functioning, in Medyka.

A development as to the border crossing points between Poland and Ukraine took place only in the 1990s. In these years, successively, larger facilities were opened on the direction from Warsaw through Lublin to Kiev (Dorohusk) and to L’viv. Later on also consecutive smaller facilities appeared, along with one of bigger dimensions, in Korczowa, to which the motorway A4 was constructed from the Polish side. This motorway became the first route of that rank, linking the western and the eastern boundaries of Poland. The scale of projects, realized along other routes leading up to the border, remained smaller. Several of the previously planned projects (in particular—connection to L’viv with the European gauge railroad) were not carried out. At the same time, projects were realized (or are still

under construction), directed towards the boundary with Belarus. At the instant the war broke out in 2022 contracts were signed for the majority of segments of A2 motorway to the East of Warsaw (road route E30 toward Moscow), and also for the border-adjacent segment of the expressway S19 between Białystok and Grodno. At the border with Russia the most important project (expressway S22 from Elbląg to Kaliningrad) had been executed already before. In the subsequent years, though, a number of modernization undertakings were carried out with respect to the roads of Warmińsko-Mazurskie province, in the direct neighbourhood of the boundary with Kaliningrad district. These roads were used for the indirect servicing of the cross-border traffic. When assessing the infrastructure directed towards the Eastern Europe one should emphasise the role of the most important transit route from Russia to Germany and other countries of Western Europe, leading through the Baltic countries (Latvia, Lithuania) and then through Poland along Via Baltica route. This entire route, realised as expressway, is in the final stage of execution.

Thus, the Russian aggression against Ukraine occurred at the moment, when the transport infrastructure in eastern Poland was in an advanced stage of development. This development took place until then in accordance with the paradigm of continued increase of the cross-border traffic on all the border segments. A smaller scale of the investment outlays and projects could be observed only in the case of the boundary with Kaliningrad district. This was connected, though, rather with the limited demographic potential of that area, lack of transit possibility, and only following the year 2016 with the decrease in demand. The influence, exerted by the limitation of the cross-border mobility on the transport system load was reflected in the results of the General Traffic Measurement (GTM), carried out in the years 2020/21. In comparison with the year 2015 (previous GTM) a drop in car traffic was noted in the entire border zone, adjacent to the Kaliningrad district (*Fig. 6, p. 49*). This concerned not only the roads, leading to the border crossing points, but also the segments of roads, located farther off, possibly used before by the citizens of Russia in their shopping travels to Poland.

5. Conclusions

War in Ukraine has certainly an enormous influence on the societies and economies of the European Union, and in a particular manner on the countries

Russian aggression against Ukraine caused acceleration of implementation of some projects, especially the road construction projects. The realization of these projects was envisaged in the perspective of the year 2030, but they were not included before in the financial planning. Financing of the biggest activities was ensured in the framework of Connecting Europe (CEF) instrument in the military pool. The key projects that were sped up are:

- Expressway S12 on the segment Piaski-Dorohusk/Jahodyn (Warsaw-Kyiv route);
- Expressway S17 on the segment Piaski-Zamość-Hrebenne/Rawa Ruska (Warsaw-Lviv route);
- Fragments of the expressway S19, having the character of behind-the-front-lines road along the Polish eastern border;
- Bypasses along the national road DK74, leading to the Polish-Ukrainian border crossing point Zosin/Ustilug.

In the subsequent stage railroad projects are envisaged to be realized on the Ukrainian direction.

Summing up, the influence of the new geopolitical situation on transport infrastructure (in territorial perspective) may be reflected through:

(a) Appearance of a new demand for transport, which entails bigger load on the present network, but usually not leading to overloading; this concerns the routes, over which goods are transported in the Ukrainian foreign trade and the routes of the pendulum traffic of a part of refugees and economic migrants from Ukraine; of key importance became the eastern segment of the motorway A4, ensuring connection with Ukraine through Przemyśl (railway node) to the airport of Rzeszów-Jasionka, which provides service in assistance to Ukraine, as well as the air travels to and from Ukraine (including official delegations);

(b) development of new transport hubs, compensating for the gaps, caused by war, as well as blockade of some other routes (Rzeszów ranked first);

(c) undertaking or acceleration of the new transport-related projects in south-eastern Poland, frequently on the areas featuring worse spatial accessibility (see [52]);

(d) threat of overestimation regarding some of the projects, especially on the direction towards the border crossing points with Belarus.

bordering upon Ukraine, but also upon Russia, Belarus and Moldavia. The ultimate scale of this influence cannot yet be estimated. The studies, carried out,

confirm, however, that the respective consequences (in each of the dimensions considered) are highly territorially differentiated. The differentiation concerns, though, not only countries, or even regions. It has a local dimension and as such ought to be perceived by the public authorities of various levels. In this particular context some of the earlier theoretical concepts got also confirmed again (like, for instance, the theory of migration networks). Threats appeared in somewhat different places than initially expected (e.g. on the market of general purpose services more than on the labor market). The role and significance of some of the transport projects underwent modification. It appears that on the European scale the direction from the South-East towards the North-West became a new priority. Rzeszów, Lublin and other towns of the region turned into cities-gates (hubs) for Ukraine. **Table 1** puts together the possible territorial consequences of war in Ukraine in the short- and long-term perspectives.

At the instant the war broke out Ukraine was in the course of the self-governmental reform. In a natural way this reform meant increased territorialisation of the public policies. Yet, realization of such an approach turned out to be a challenge not only for Ukraine, but also for the neighbouring countries, and even for the whole of Europe. The geopolitical processes incline to solving the respective problems at the level of member countries, the European Union, and NATO. The here presented introductory survey demonstrates, though, that a local perspective is necessary, or perhaps a regional one, since the differences at these scales, resulting from war, increase, and not decrease.

The considerations here forwarded indicate, in particular, that the policies of the EU member countries, and especially of the bordering countries, such as Poland, and of the self-governmental authorities, regarding the inflow of migrants and refugees from Ukraine ought to be territorially differentiated.

Table 1. Territorial dimension of war in Ukraine— consequences on the area of Europe and Poland on various geographical scales

Character	Dimension	Short-term consequences	Long-term consequences
Social	European	Humanitarian assistance	Refugee assimilation challenges in European societies
	National (Poland)	Humanitarian assistance	Strengthening of population concentration processes. Long-term social assistance and the associated burden on various systems (e.g. health care)
	Local (Poland)	Problems of the education and health care systems (aggravation of system ineffectiveness)	Problems with supply of various general purpose services on definite areas; budgetary burden
	Borderland (Poland)	Humanitarian assistance; slight impact on social structure (transit)	Deepening depopulation (the image of threatened areas)
Economic	European	Increase of trade between Ukraine and Europe	Economic integration of Ukraine with EU
	National (Poland)	Loss of trade connections (depending upon duration of conflict and its territorial reach)	Abolition of formal and infrastructural barriers in trade with Ukraine. In the case of some essential export products decrease of trade volumes and loss of trade connections (depending upon the duration of conflict and its territorial reach)
	Local (Poland)	Threat for the units, whose economy was based on trade with Belarus and Russia	Increase of the role of Ukraine in local economic ties; Ukrainian firms in Poland
	Borderland (Poland)	Strengthening of the role of firms intermediating in trade with Ukraine; bankruptcy of small companies, trading with Russia	Use of the competition advantage of borderlands in strengthening of their position in trade with Ukraine
Infrastructural	European	Change in the directions of transit (Black Sea ports, railway and road routes)	New priorities in the direction of Ukraine; problems with some projects, like, e.g., "The New Silk Road"
	National (Poland)	Increased load on routes linking Poland and Ukraine; appearance of hubs servicing the citizens of Ukraine	Excess scale of some projects directed towards Belarus and Russia; financing of road and railway transit routes
	Local (Poland)	Decreased load on regional and local roads close to the borders with Belarus and Russia	Revision of the local investment priorities at the borders with Russia, Belarus (limitation) and Ukraine (increase)
	Borderland (Poland)	Projects connected with military objectives	Development of the border-related infrastructure along the border with Ukraine

Source: own elaboration

The most important objective thereof is to help the newcomers and to secure for them the possibility of work and education, as well as the use of other kinds of service. Yet, it is essential to coordinate these policies with the internal regional policies and with the cohesion policy of the European Union. This may directly or indirectly contribute to support for the demographic resources and to the improvement of life quality on the depopulating areas and in some medium-sized towns, threatened with the loss of their socio-economic functions.

The territorial distribution of economic threats indicates clearly the existence of local economies (e.g. Polish counties), where dependence upon the Russian and/or Belarusian partners had been significant. Assistance for the businesses, which suffered due to embargo, must therefore be differentiated

among the units. It may then take the form of assistance to concrete businesses in finding alternative sales markets (including those in Ukraine).

When relating the investigations carried out to the here quoted notion of resilience it can be admitted that Polish regions and local units proved in a short time horizon to feature high level of resilience with respect to shocks of social and economic character. They have shown their strength by displaying capacity of absorbing the refugees into their labor markets, and the capacity of the local economies of re-orienting the sales markets. At the same time, though, symptoms of lower resilience may appear within a longer time horizon, in particular—in the form of problems on the market of general purpose services as well as through inadequate adaptation of the infrastructural systems.

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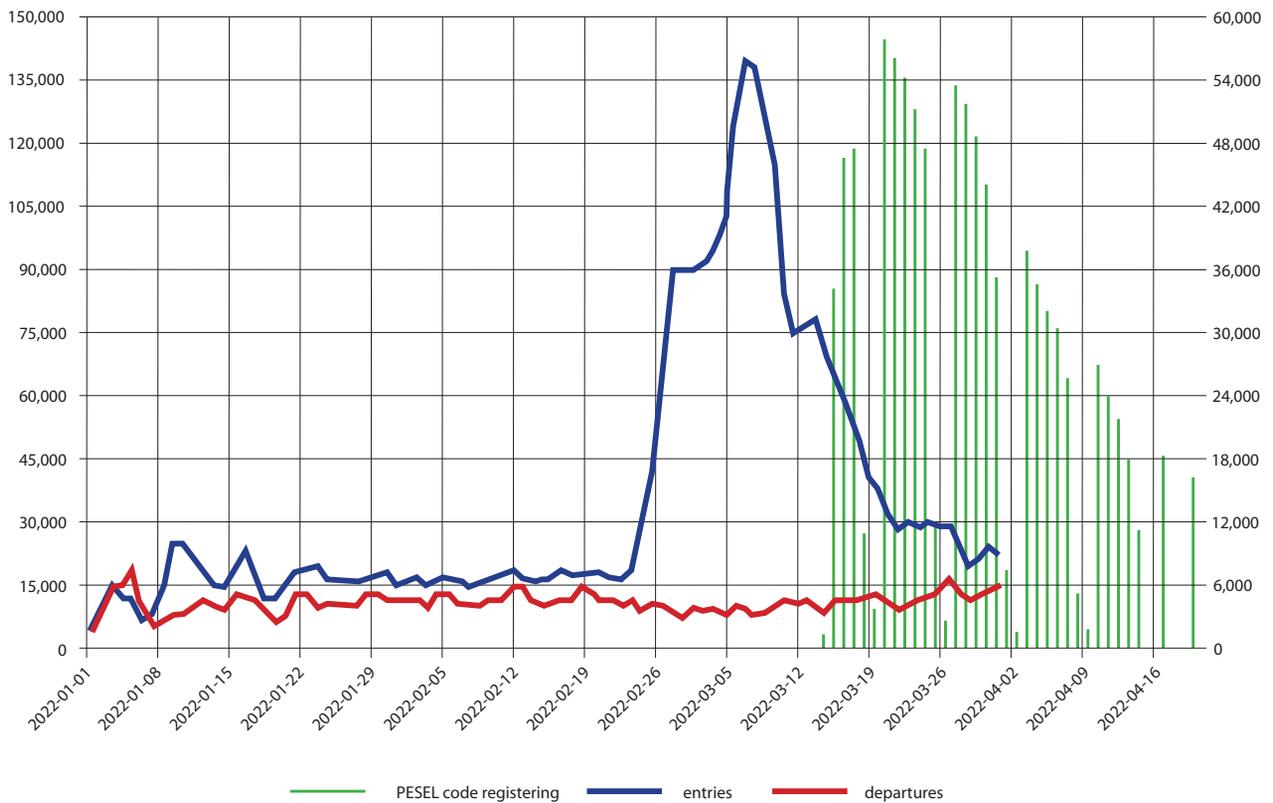


Fig. 1. Magnitude of cross-border traffic of Ukrainians at the Polish-Ukrainian border in 2022 (until March 31st, 2022), and registering of the PESEL codes assigned to Ukrainians on the daily basis (until April 20th, 2022).

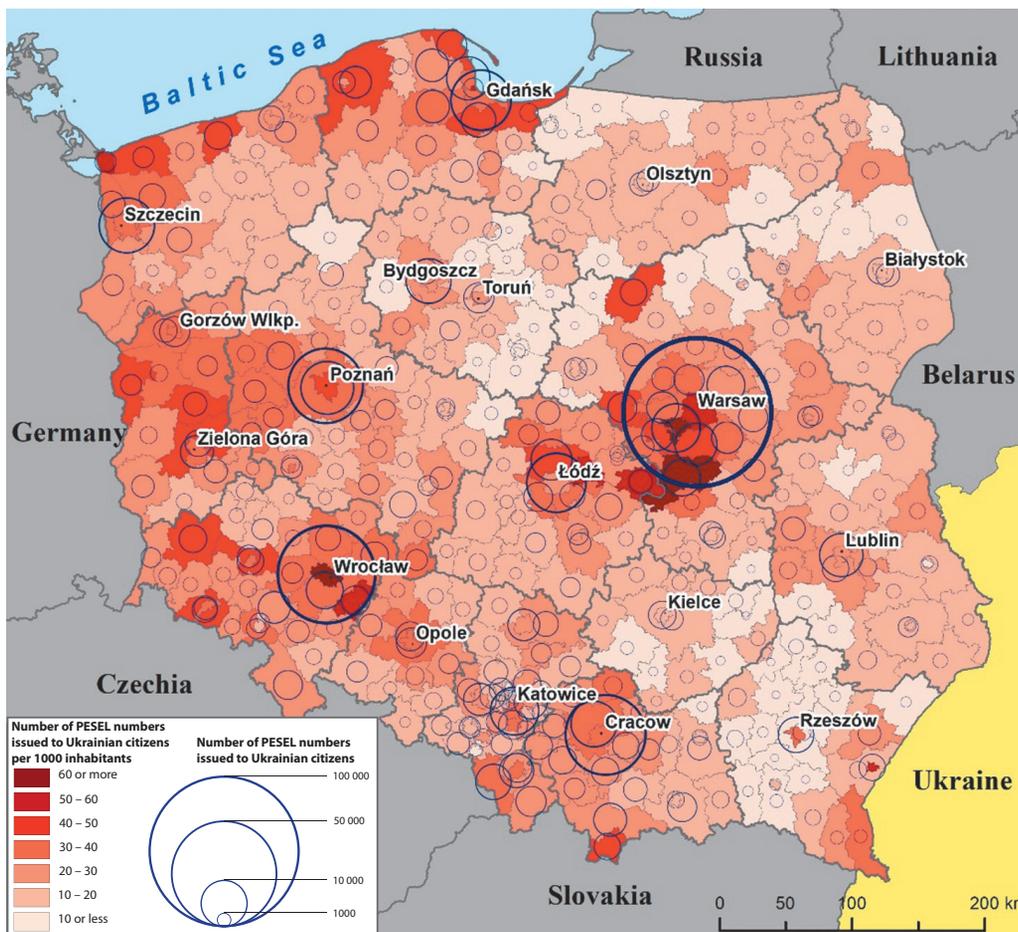


Fig. 2. Distribution of citizens of Ukraine registered in the PESEL system according to counties (as of December 31st, 2022). Source: own elaboration

Ukrainians—inflow to regions per 1000 inhabitants, scenario D

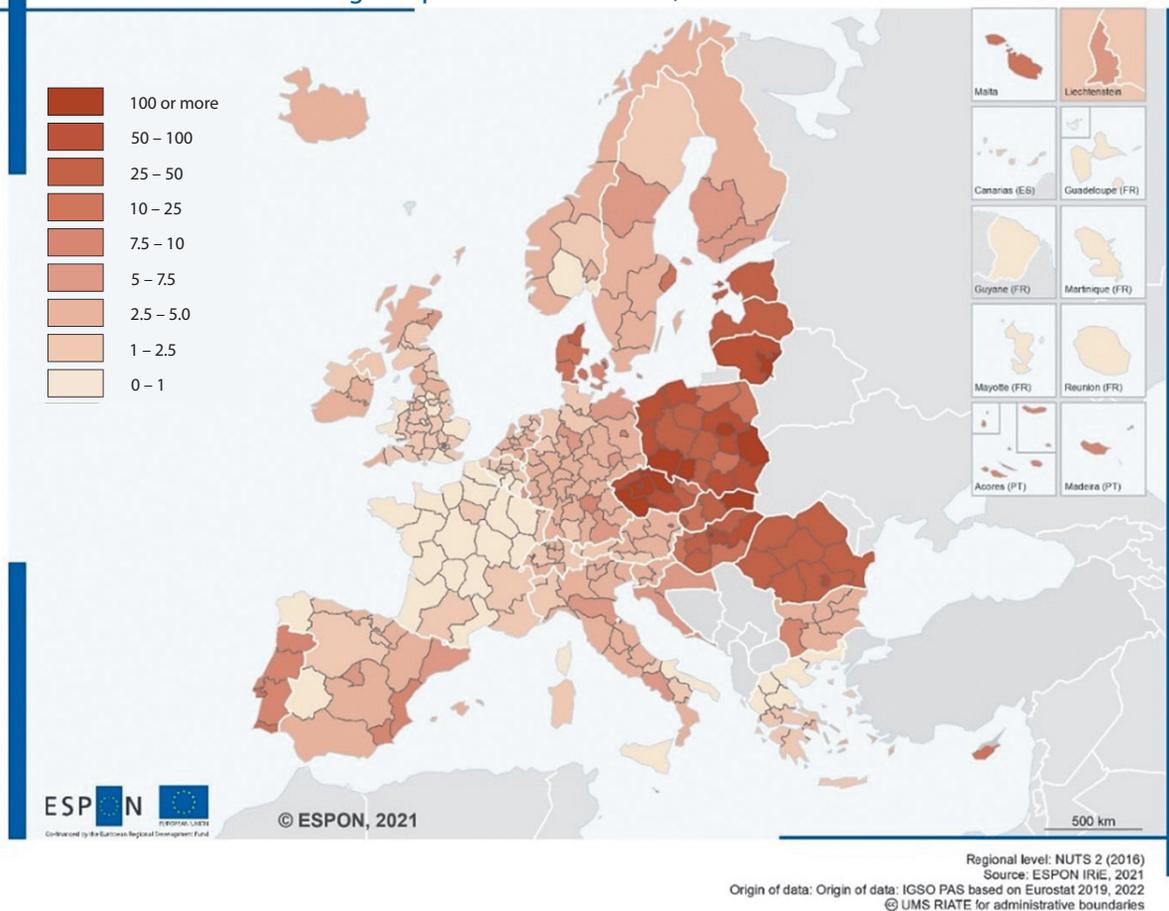


Fig. 3. Inflow of refugees from Ukraine to European regions. Source: [17, p. 27]

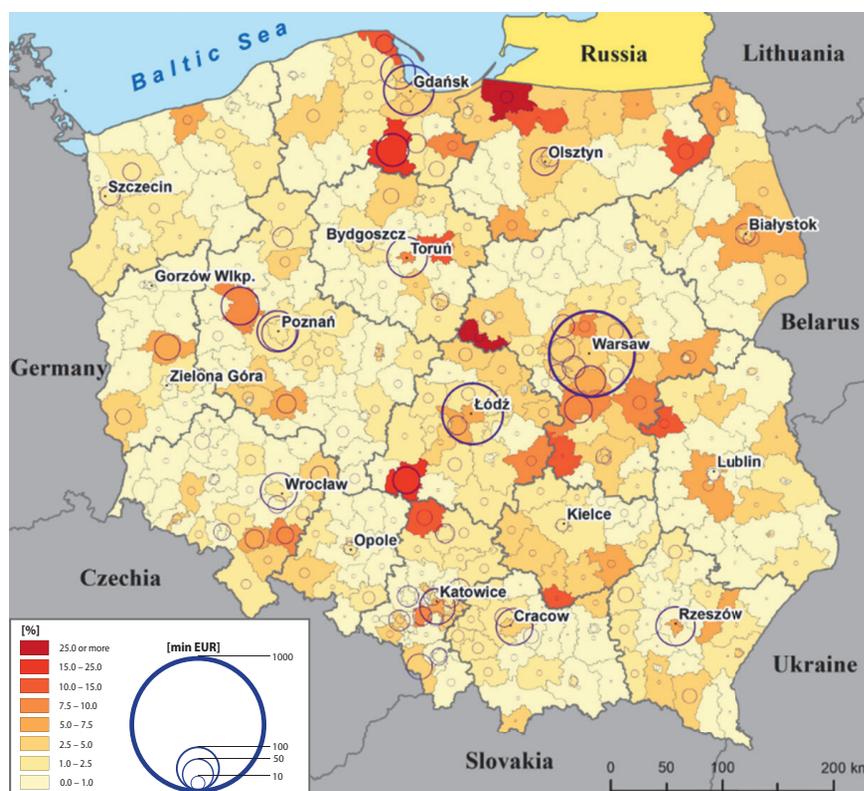


Fig. 4. Shares of values of export to Russia according to counties Source: own elaboration

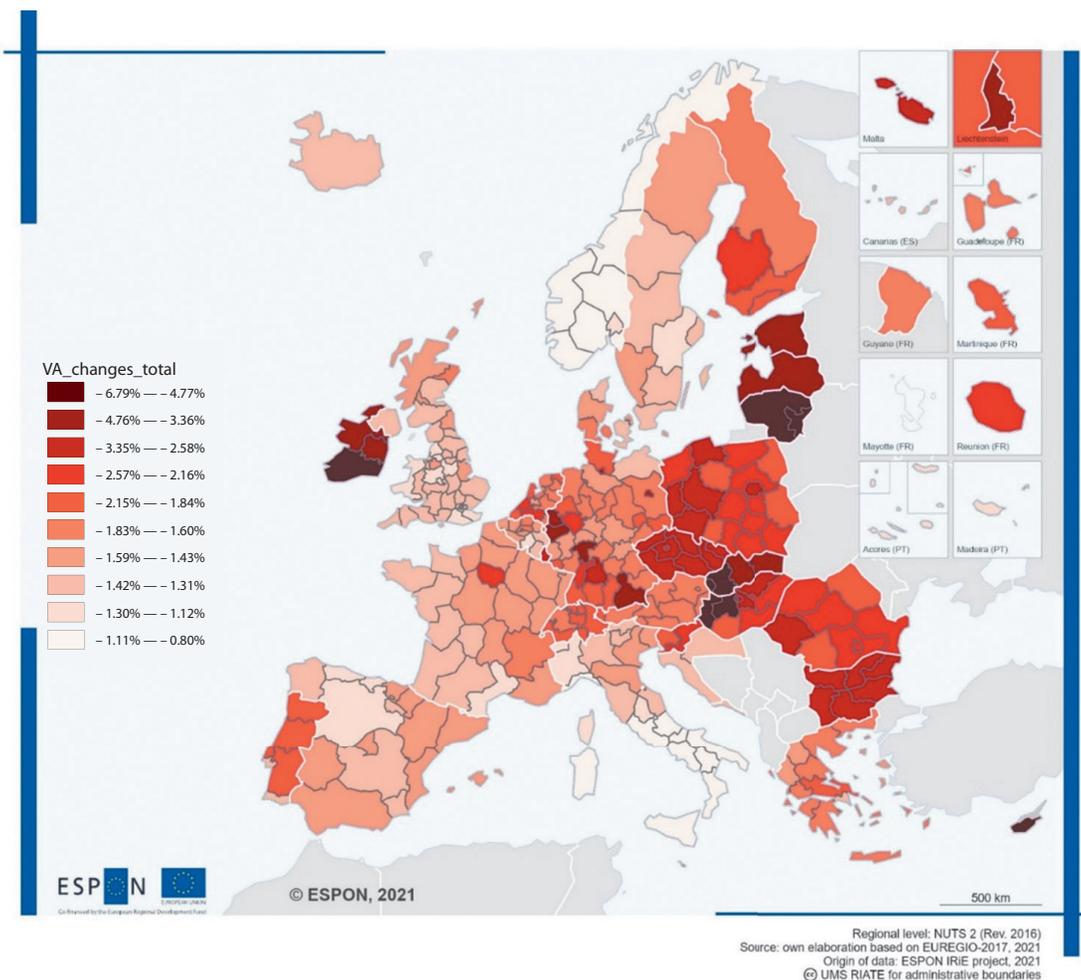


Fig. 5. Reduction of the gross value added in the ESPON Space regions due to war in Ukraine. Source: [18, p. 40].

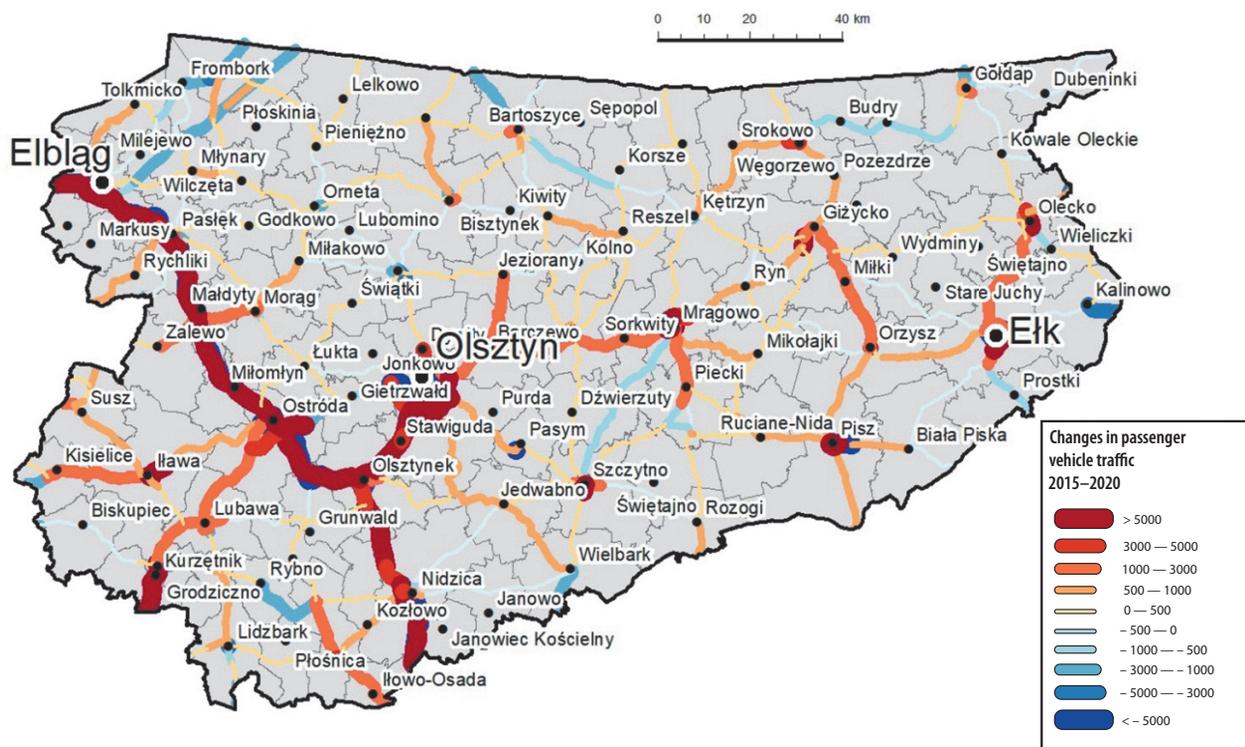


Fig. 6. Changes in the passenger traffic in Warmińsko-Mazurskie province (2015–2020) Source: own elaboration

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