

## ARTICLES

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### **POSSIBILITIES OF USING CLUSTER SOLUTIONS IN THE POLICY OF REVITALISATION OF DEGRADED MUNICIPAL INFRASTRUCTURE IN UKRAINE**

**Summary:** *This paper discusses the issues concerning the policy of revitalisation as the basis for planning and carrying out the social and economic reconstruction of Ukraine. It is crucial to consider the scale of destruction and degradation of urban tissue, as well as the migration which occurred in the wake of the military operations. As a result, it is necessary to devise a specific programme of revitalisation which would use innovative organisational and guarantee instruments on a macro-, meso-, and microeconomic levels.*

*The paper considers the factors which determine the aims of the municipal revitalisation policies, as well as their models, which include an analysis of degradation of urban areas as a step in the development of cities. The paper includes an examination of demographic factors, as well as those, which are associated with depopulation. In addition, the importance of urban infrastructure was highlighted in the process of revitalisation. Furthermore, the paper covers the analysis of literature regarding experiences in terms of using revitalisation clusters in degraded areas. The development of chosen clusters in cities in Western Europe was examined, having identified and evaluated basic conditioning factors of their use in revitalisation processes. Moreover, the importance of clusters was discussed, together with their possible use by establishing 'Key National Cluster' and, within its confines, 'Regional Key Clusters' in chosen*

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*oblasts in Ukraine according to their division into international areas of reconstruction. The scale of destruction and degradation of given areas of Ukraine was evaluated in terms of particular elements of revitalisation, together with the costs associated with reconstruction. This analysis covers the losses Ukraine experienced between July and December 2022.*

**Keywords:** revitalisation policy, urban revitalisation, cluster, systems analysis, modelling, degradation of Ukraine

**JEL Classification:** E000, H300

### **Introduction**

The aim of this paper is to introduce the roles of cluster structures in the development and revitalisation of cities, and to evaluate the possibility of using them to increase the efficiency and innovativeness of socioeconomic processes in Ukraine, drawing on the experiences of using “development clusters”. The analysis resulted in the identification of the factors which allow an effective cooperation within clusters on the international level in Ukraine. In the paper the assumption was made that because of the extreme extent of the damages to the municipal structures and the resulting migration, it is crucial that a dedicated systematic policy of revitalisation be followed, which would be based on organisational instruments taking the form of revitalisation clusters consisting of international entities. The main thesis presented in the paper was made under the assumption that the experience gained through the implementation of revitalisation and development clusters in cities in Western Europe in the period 2001-2022 can be used in the process of degraded urban units in Ukraine, which would result in an increased effectiveness of the above entities in terms of the socioeconomic development. The paper discusses the role of cities in stimulating economic growth and development as part of cluster initiatives and the importance of the idea of smart cities based on cluster infrastructures. The paper also contains the evaluation of the effectiveness of growth clusters in several European cities, as described in the literature, as well as, a given case of an innovative revitalisation cluster. On the other hand, the paper discusses the main problems associated with degradation of urban areas, including depopulation. Subsequently, the extent of destruction of urban areas in Ukraine was evaluated, together with the estimation of the costs of socioeconomic reconstruction. Taking into account the influence of innovative urban clusters which facilitate development, the paper includes the discussion of the possibility of using such clusters to improve the effectiveness of the revitalisation of the degraded oblasts and cities in Ukraine.

## **1. Importance of cities in initiating development and economic growth as part of cluster initiatives**

In the theory of economics, the term economic growth coincides with economic development. The latter encompasses, apart from quantitative changes, changes that are qualitative in nature (Ziębicki, 2013). These primarily concern the socio-economic systems and the societal organisation. Since there are reciprocal dependencies between growth and development, it is assumed that growth is the fundamental condition that economic development occurs, consequences of which shape the standard and conditions of living for the inhabitants of a given region or country. Bigger cities are particularly important in initiating economic growth. Urbanised areas foster the development of knowledge, science, technology, and show potential for clustering. This is because of a substantial accumulation of ideas in a relatively small area. Therefore, the development of cities encourages development of highly valuable human capital (Dyr & Ziółkowska, 2017).

Among numerous theories and models of economic development, those that pertain to manufacturing locations are the most important. Their originator is [Marshall, 1890], who formulated the idea of industrial districts, which are designated areas in which manufacturing plants are concentrated. The analysis of spatial placement of economic entities revealed that there are preferred areas which are especially advantageous. This is explained by the concept formulated by [Perroux, 1964], who coined the term 'growth poles'. The role of growth pole of the so-called driving unit which provides the stimuli for other regions is occupied by an innovative enterprise or a group of such enterprises, with varying manufacturing potential, and which represent a dynamically developing economic sector. Such entities can be thought of as a driving factor or force as long as their size is sufficient to directly or indirectly influence the economy of a given region, they represent an innovative and dynamically evolving economic sector, and have multiple connections with other types of economic and social activity.

Entrepreneurial mobilisation, which is a result of the impulses generated by a growth pole, is realised through the so-called spread effects, the most important of which concerns knowledge and innovation. They are essential, but not sufficient on their own, in transforming a metropolitan area into a territorial growth pole. According to [Lasuen, 1969], their presence in a leading sector influences not only that sector, but also other branches of industry in a region. At the same time, it is noticeable that the inability to benefit from innovation in the entire region at a similar rate causes a concentration of the activities in selected cities, which become the growth poles. From these areas, which [Hirschman, 1958] called geographical growth centres, development is propagated into surrounding areas. As per

this idea, there are more opportunities for development in bigger cities. This is due to the fact that a concentration of consumers, employees and business entities in one place, together with formal and informal institutions which make a metropolitan area 'dense' and cohesive, encourages the production of external effects and magnification of scale effect. On the other hand, opportunities for development in small urban areas are scarce, and these areas primarily provide factors of production in relation to economic policy, which highlights the importance of developing large cities.

The theory of location production was developed by [Krugman, 1991], who is the author of new economic geography. Its premise is the necessity to treat several factors which influence regional development, for instance, spillover effect, economies of scale, effect of demand brought about by the external market, and business costs related mainly to transport. The consideration of the above causes the businesses to choose their location in close proximity to other entities. At the same time, they prefer to be located near sizable sales markets. The above conditions are found in big cities, in which or in close proximity to which numerous businesses operate. This positively influences the competitiveness of these areas and the standard of living therein.

In the models of new economic geography, spatially diverse distribution of employees (consumers) and businesses depends on the intensity of centripetal forces, which are advantageous for geographical concentration of activity, and centrifugal forces, which disperse the said activity. In the regions where centripetal forces dominate, the businesses are located unequally in space, and there are urban areas with particularly high concentration of business activity. In the remaining areas there are few businesses or there are no industrial entities. The primary factors which determine the occurrence of centripetal forces are a regional market which is characterised by a high demand, which greatly influences the size of businesses' income. On the other hand, centrifugal forces result from a lack of non-mobile factors of production and so-called non-exchangeable goods, such as, habitable structures, as well as numerous negative scale effects, which occur simultaneously [Niebuhr & Stiller 2002].

While presenting the idea of regional development, an emphasis was put on the theories which highlight the importance of cities. Apart from the ones included, there are numerous theories which indicate additional factors related to cities, which are beneficial for economic growth and development of countries and regions.

## **2. Degradation of urban areas as a step towards development of cities**

Revitalisation is applicable in areas degraded to various extents, including those destroyed as a result of military activities. While assessing the degree of degradation, both the past and the future can be used as a point of reference. This assessment is done in relation to the potential of land, which is determined by the functional and spatial structure of a city. Additionally, the assessment of the potential of the land is carried out individually for each case. Degradation can be narrowed down to: physical degradation which concerns technical condition of buildings, functional degradation which concerns the process of functional transition occurring in an area, moral degradation which concerns the appearance of an area and the acceptance towards its function, compositional degradation of space which takes into account the extent of developing a compositional structure [Kaczmarek, 2011].

In a broad sense, municipal infrastructure is characterised by defined technical, economic and institutional features [Dziembowski, 1966]. The importance of infrastructural items' value in the total value of national assets (asset intensity) makes it necessary to incur financial outlays (capital intensity), which are related to the necessity of their development, refurbishment, replenishing and reconstruction. A lack of sufficient outlay leads to decapitalisation and progressive technical degradation. When it comes to material damage resulting from, for instance, warfare it can lead to a situation in which revitalisation of a city becomes very challenging or impossible. Degradation of urban areas leads to a loss of their socio-economic functions, which in turn results in a decrease in entrepreneurship, increase in unemployment, decreased quality of technical and social infrastructure, decreased accessibility of public services, and depopulation. Likewise, the said loss of socio-economic functions can be attributed to crisis situations, such as warfare and the destruction resulting from it.

## **3. Depopulation factor and demographic aspects of revitalisation**

The term depopulation [Śleszyński, 2016] describes a decrease in population of a given area as a result of negative natural increase, caused by migration intertwined with natural factors. Human migration reduces the number of people in reproductive age, which results in a decrease in the number of births, while the death rate stays at the same level. The rate of migration depends on the internal factors in a given country. In a crisis or during a war it can be very high. In the wake of the conflict in Ukraine, it is estimated that the scale of internal and external migration in the period between February and December 2022 was 6-8 million people, according to the data gathered by the border authorities which registered the numbers of refugees.

Depopulation of an area has a negative impact, which encompasses various aspects. The demographic ones include a decrease in the number of inhabitants, an imbalance in the age and gender structure, and increased population ageing. The economic ones include decreased employment opportunities and a decrease in the number of skilled employees. The social ones include the fact that in Ukraine the majority of people aged 18-60 emigrated or were conscribed. The above aspects constitute the main reasons behind the halted development of cities [Szukalski, 2015].

The problems associated with the demographic situation in contemporary cities cause their economic, social and spatial degradation [Ciesiołka, & Jaroszewska, 2010]. A large population decline in cities and the associated phenomenon of shrinking cities constitutes a grave problem. When examining the causes of depopulation the most important aspects to consider are the demographic, economic, social and spatial ones. In addition, it is crucial to take into account those, which are conditioned by crisis situations, natural disasters or ongoing warfare. The negative impact of city degradation consists of an increase in the number of degraded areas, which are the properties whose technical condition does not allow for their inhabitation, an increased presence of degraded and dilapidated industrial areas whose function was lost and are no longer used, and the arisen necessity to demolish degraded and dilapidated buildings which are unsuitable for refurbishment.

#### **4. Main problems of revitalisation programmes**

The identification of the problem of degradation and the specification of the area affected by it is the initial step in the process of revitalisation [Mironowicz, & Ossowicz, 2005]. In this step, financial and legal considerations are identified, as well as areas for revitalisation are designated, together with the entity responsible for revitalisation. Financing the majority of revitalisation processes is done using external funding and in this stage the preparation of appropriate documents needed to secure such funding is prepared. The economic aspects of revitalisation concern primarily its financing and effectiveness. In the processes of revitalisation the primary sources of funding are subsidies, debt, equity, fiscal and surety instruments, and public-private partnerships. The condition necessary to ensure the success of revitalisation is securing funding based on financial guarantees, without which financial institutions refuse to grant funding, making it crucial for investment realisation.

As far as the revitalisation of degraded cities and oblast areas in Ukraine is concerned, essential are international revitalisation clusters, in which funding is guaranteed by the involved countries and international institutions. The studies conducted in the countries in Western Europe demonstrate the importance of revitalisation clusters on a local, regional

and international level in enhancing the effectiveness of each respective entity in a cluster. This is because formalised structures of a cluster aid the entities, which increases the acceleration of effectiveness, when compared to the entities that are not part of a cluster.

### **5. Smart cities and cluster structures**

The term 'smart cities' appeared in the 1990s as one of the ideas of regional development. It describes development of cities based on the technology of processing, gathering and transmitting information digitally using growth clusters. According to [Albino, 2015], smart cities are those in which information technology is intertwined with infrastructure, architecture, everyday objects and inhabitants with the aim to use them to tackle social, economic and environmental problems. On the other hand, [Chourabi, 2012] defines it as a city which combines physical and information technology infrastructure with business infrastructure, to use the collective intellectual potential of a city's population, as a result of which the city becomes efficient, sustainable and well-adjusted. Additionally, the city uses technology together with city planning on the organisational level. The main reason for establishing smart cities is to digitise administrative, economic and mobility processes and create an environment which efficiently uses its resources and inhabitants' abilities. The analysis of the development process of smart cities conducted by [Caragliu, 2009] confirms that the efficiency of cities depends not only on the availability of physical infrastructure and human resources, but also on the availability of information and communications technologies, which enhance the quality and accessibility of the said infrastructure.

[Russo, 2014] defined smart cities as those which try to address the civic challenges in terms of, for example, transport, sewage and waste management, energy, healthcare, safety and security. The above challenges are tackled using information and communication technologies, whilst relying on a partnership between multiple municipalities, which ensures a greater availability of services. As a consequence, smart cities constitute a paracluster vector for innovation in products, processes and services. [Porter, 1998] presented a novel idea of business localisation within clusters, which alludes to the theory of business districts. According to him, business location is a key factor of success. Businesses linked to each other, specialised suppliers, services providers, entities operating in related sectors and associated institutions (e.g., scientific, standards, business associations, etc.) operate within industry clusters. A crucial element of these clusters are urban areas, because they provide the means for business entities to connect, exchange experiences and cooperate. As a result, this leads to an increased productivity and competitiveness of these entities, as well as, the development of the areas in which these

entities operate. According to [Richter, 2015], smart cities are rudimentary in the development of clusters and stimulate this development. Knowledge creation and its consolidation, together with innovation management lie at the heart of smart cities. This is the reason why the introduction of smart initiatives increases the social and economic attractiveness and competitiveness of a city, which are supported by its technological infrastructure [Hajduk, 2016].

In a similar way, [Khatoun & Zeadally, 2016] highlight the fact that a smart city sets a goal to improve the standard of living of its inhabitants and optimise territorial, economic and environmental resources. According to [Kraus, 2015], an important aspect of smart cities is the geographical proximity of people who think alike. In these cities, clusters constitute a place where creative inhabitants can operate, which increases the competitiveness of these cities. In addition, through the cluster effect the pace of innovation implementation increases.

Smart cities support the emergence of clusters through the enhanced agglomeration effects and strengthen the clusters themselves. Furthermore, integrated urban strategies aim at associating the physical space in cities with the economic and social sphere. [Angelidou, 2015] identified the main factors which promote development. These are urban planning, public-private partnership, sustainable social development and education. A comparative analysis of relationships between smart cities and clusters indicates that they function at various geographical levels, such as, local, regional, national and European [Alaverdyan, 2018]. According to the analyses, smart cities constitute an organic system of subsystems [Harrison, Abbott & Donnelly, 2011]. In other words, they are an ecosystem, where products, services, businesses, people and societies cooperate to support the innovative ideas towards urban development [Cosgrave, 2017]. According to [Wang, 2015], [Corrigan & Joyce, 1997], and [Nalbadian, 2013], efforts to improve the interaction between cities and their inhabitants are key in the development of smart cities.

## **6. Research and analysis of the effectiveness of growth clusters in selected European cities.**

On the European level, the idea of smart cities exists within cluster partnerships in some countries. The main clusters identified are Smart Cities Mediterranean Cluster and Smart City Tech. The former is a partnership between research groups, industries, innovative small and medium-sized businesses and civil society from 26 countries. The latter is a partnership between clusters with a defined aim of stimulating cooperation between cities and smart systems stakeholders. When focusing on the type of stakeholders involved, the Smart City Clusters involved are represented by scientific institutions (universities, research centres, institutions propagating science



etc.), industry (enterprises) and governmental organisations (regional and local governance).

The role of clusters in urban development was researched by [van den Berg, 2001], who carried out an analysis of growth clusters in European cities in 9 regions of the EU and compared their growth dynamics. They based their analysis on economic activity and demonstrated organisational solutions deployed in cities. Their aim was to examine urban regions in a comprehensive way and embed the functioning clusters in the economic, cultural, administrative and political structure of a given urban area. This is indicated by the tendencies in the urban policy in terms of investing in development and cooperation with industry, especially in innovative sectors [Nijkamp, 1999]. The literature contains studies devoted to compiling experiences concerning growth clusters and results of international comparative studies. [de Graff & Boekema, 2002] illustrated how large urban areas can benefit from quickly developing sectors, for example, biotechnology, medical services, tourism, information technology, media industry, as well as, construction industry. To conduct the study one cluster from each city was selected. The studies sought to explain the processes behind the emergence of clusters in cities. The clusters analysed were located in the following cities: Amsterdam (The Netherlands), Eindhoven (The Netherlands), Helsinki (Finland), Leipzig (Germany), Lyon (France), Manchester (The United Kingdom), Munich (Germany), Rotterdam (The Netherlands) and Vienna (Austria). [van den Berg, Braun & van der Meer, 2001] analysed various types of clusters. The above frame of reference allowed an analysis of clusters in an urban context and a systematic overview of clusters of different sizes and structures. For each city, the available reports and studies were carefully examined, and in-depth interviews with key representatives were conducted to establish strategic links with other organisations. Evidence was collected which pointed to the presence of formal and informal structures, joint facilities or projects in a growth cluster in an urban area. Included in the analysis was the influence of general conditions (accessibility, quality of life and cultural aspects) on the functioning of a cluster. Interviews with the politicians were held which pertained to identification and evaluation of clusters and urban strategies. The empirical analysis included an examination of aspects of several clusters: the importance of scale, the role of large companies as stimuli for cluster development, the level of strategic interaction among cluster participants and the state of creating new networks. It was claimed that an important aspect is the size of a cluster and its association with the geographic market in its area. The bigger the cluster, the higher the level of specialisation ('uniqueness') in the cluster and the greater the cluster's market reach. It was confirmed that all the developed clusters operated

on an international market. To sum up, large clusters are more important and have more advantages than small ones, for example, a large cluster entails a division of labour and specialisation, as well as, a large, specialised labour market. Furthermore, a large cluster generates a transfer of knowledge, which allows an improvement of 'cluster products', which in turn may stimulate demand and accelerate the pace at which this demand grows, allowing the city to develop. Clusters can provide many advantages thanks to the presence of the so-called 'cluster drivers', which are large organisations with a dominant position which act as knowledge sources as well as providers of all types of spin-offs. The results of the studies of the factors of city development confirm that the functioning and the dynamics of cluster development are dependent on the general economic situation and spatial conditions found in a city, as well as, cultural variables.

At the same time, relations between strategic participants of clusters in the development of cities and European regions are on the level of the international economy, in which the participants operate on a competitive market, where they use new opportunities for growth. The study attempted to analyse and compare the development of different types of growth clusters, which are located within a network of specialised organisations in urban areas. The notion of a cluster promoting local interactions and innovation demonstrates its usefulness and the inclinations towards abandoning traditional economics. Based on the conducted analysis, [van der Berg, 2001] confirmed that despite the appearance of global networks, many networks have a strong local dimension.

### **7. Case study: innovative revitalization cluster**

An innovative revitalization cluster called "Lublin Region Culture Cluster – strengthening socio-economic potential of culture-forming and tourist environments of the Region" operated in the Lublin Voivodeship in 2006-2012. It has been described in the article "Good examples of implementing Regional Innovation Strategies in Poland" by the Polish Agency for Enterprise Development (PARP, 2009). The main goal of this project was to create a cooperation network between organisational units of the local governments, research and development institutions, non-governmental organisations and entrepreneurs in urban areas. This cooperation occurred in the Local Programmes of Revitalization of historic urban complexes. The research on the above cluster was conducted by [Gumieniczek, 2018], who focused on the 196 enterprises operating in the above-mentioned cluster (the study group) and 79 enterprises operating outside its structure (the control group). The participating entities were described as micro and macro enterprises with 5-50 employees, that were economically active in the areas of culture, construction and tourism. The statistical analysis showed that the percentage

of enterprises in which efficiency increased was higher among those which were part of a cluster than those that remained outside the cluster. Additionally, it was shown that the percentage of enterprises implementing innovations was higher among enterprises that were part of a cluster than those that were not. On top of that, the percentage of enterprises in which efficiency increased as a result of implementation of these innovations was higher inside the cluster than among enterprises remaining outside it. The enterprises concentrated in the cluster implemented process, product, organisational and marketing innovations, achieving higher efficiency. Thus, it was confirmed that formal cluster structures allowed a greater acceleration of efficiency when compared to the enterprises outside the cluster structure.

Growing urban competition in Europe has become a big challenge for cities. In order to use their potential optimally, however, the idea of cluster structures could be implemented. For example, networking could be used to optimally distribute resources among market participants. This could be done by supporting cluster institutions, investing in cluster-specific infrastructure or supporting informal networks. In addition, the cluster-oriented policy is a way of binding the active structures to the particular region, which promotes its stabilisation.

The use of the cluster approach is the most effective mechanism for a holistic development of economies in countries as well as for developing their regions [Kowalski & Marcinkowski, 2012]. The cluster structures support the development of countries by mobilising the network resources of territorial organisations and ensuring the competitiveness of countries within the global economy. The European Commission determines that 24% of the existing clusters are global leaders, 37% are national leaders, and 24% are the economic entities with a strong competitiveness. Clusters in Europe support regional development and stimulate innovation. Countries which participate in clusters benefit from an increased potential of their regions and a diversification of regional economy [European Commission, 2021]

Effective cooperation within international clusters should be preceded by an analysis of the conditions, assumptions and prospective directions of the said cooperation between participating countries and regions. Economic development is especially accelerated by innovative clusters. An innovative cluster highly increases competitiveness, by bringing together the research centres, industrial enterprises, state administration bodies, public organisations and universities which initiate the transfer of knowledge, technology and innovation. [Solvell, 2003] defines the cluster initiatives and activity as an organised effort to intensify development and competitiveness in the region where the cluster companies, government and the scientific communities are involved.

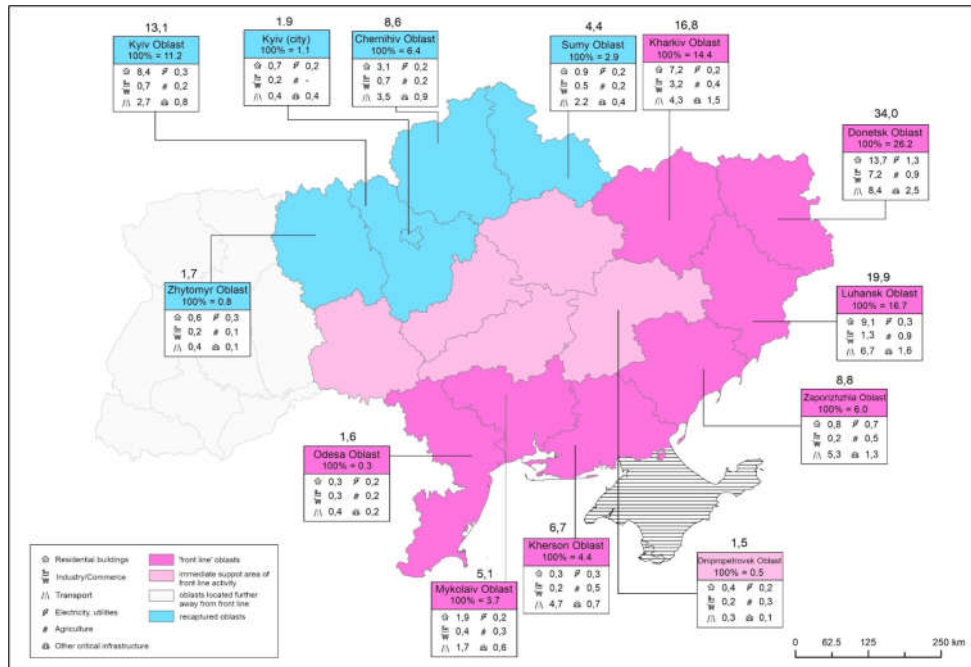
The [European Commission, 2021] defines the innovation clusters as concentration of independent enterprises, newly established innovative companies, small, medium and large enterprises and research organisations operating in a specific sector, region, which were created to stimulate innovative activity through promoting relations between entities, exchange of knowledge and experience, as well as through transfer of technology, networking and information sharing. [Chesbrough, 2014] indicates that the role of the external partners of the company is constantly becoming more important in the innovation process.

Internationally competitive clusters are called world-class. In a given country, such clusters should be nominated as the key national clusters. The development of these national and key regional clusters should be stimulated by supporting them, including a dedicated support for internationalisation, promotion, research and development, production infrastructure and development of human capital. At the same time, particular regions should specify priorities within their own development policy by identifying the key regional clusters that would define their specialisation.

#### **8. Synthetic assessment of the scale of damage, degradation and costs of social and economic restoration of Ukraine**

The analysis was based on the report by the Kyiv School of Economics from August 2022 included in the special report by Bank Pekao S.A. from October 2022 [Bank Pekao S.A., 2022] as well as on the European Commission data published at the end of August 2022 [European Commission, 2022]. The summarized data from these reports are presented in Figure 1 and Figure 2. In particular, the infrastructure of urban areas in Ukraine was damaged and degraded, with the losses amounting to \$115 billion. The report indicated that the highest level of degradation concerned urban infrastructure and buildings, and these losses were estimated at \$47.8 billion. The second biggest damage concerns the transport infrastructure, where losses were estimated at \$35.1 billion. This was followed by the damage to the industry and business services which amounted to \$9.7 billion, education - \$4.4 billion USD, agriculture - \$4.3 billion, vehicles - \$2.7 billion, trade - \$2.1 billion, culture, religion, sport and tourism - \$2 billion, energy sector - \$1.8 billion, health services - \$1.6 billion, media - \$1.3 billion, administrative buildings - \$0.9 billion, digital infrastructure - \$0.6 billion, social services - \$0.2 billion, and financial sector - \$0.02 billion. In addition, the cost of restoring the damaged buildings and infrastructure outside main urban areas is estimated at \$198 billion. These reports set the costs of rebuilding and modernising the economy of Ukraine at \$480 billion and the costs of socio-economic reconstruction at \$750 billion.

**Figure 1. The costs of revitalising the particular sectors of the economy in the oblasts and cities in Ukraine expressed in USD billions.**



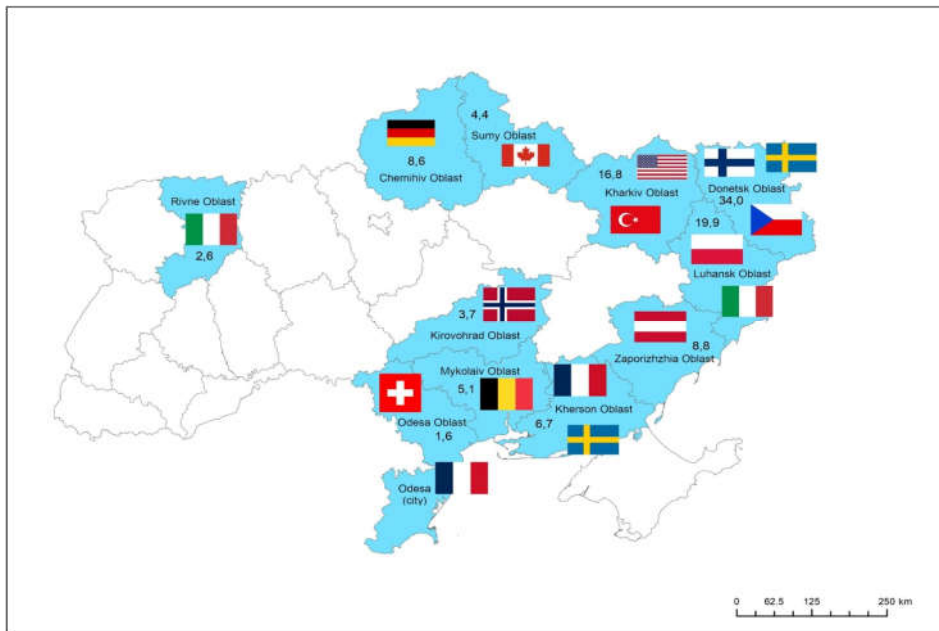
Source: author, based on the report entitled 'Reconstruction of destroyed or damaged buildings along with the necessary modernisation and the provision of funding needed to resume the activity of the entities from different sectors' by the Kyiv School of Economics from August 2022 included in the special reports by [Bank Pekao S.A., 2022] and by [European Commission, 2022].

## 9. The use of clusters in improving the effectiveness of revitalization of the degraded oblasts and cities of Ukraine

The reconstruction of Ukraine encompasses the entire territory, with the greatest damage being caused by the warfare in the so-called front oblasts and the neighbouring ones, while the oblasts far from the war front have a lower scale of degradation. The proposed revitalization policy, which includes the reconstruction of urban infrastructure in the oblasts in Ukraine assumes the creation of international clusters. According to the concept from (Figure 2) individual oblasts were assigned to respective countries, whose role is to supervise and support the reconstruction processes. It is an innovative proposal from the organisational perspective, as it assumes the creation of a "National Key Cluster" and "Regional Key Clusters" with a participation of international entities to guarantee funding for reconstruction, which would enable and accelerate the implementation of socio-economic recovery of oblasts (regions) and cities of Ukraine. Adopting such an

assumption will enable the development and the restructuring of the economy at regional level, as well developing a new level of international relations.

**Figure 2. The International project encompassing the National Key Cluster and the Regional Key Clusters shown on a map with the Oblasts, along with the estimated costs of reconstruction expressed in USD billions: Rivne – (Italy), Chernihiv – (Germany), Sumy – (Canada), Kharkiv – (USA, Turkey), Donetsk – (Czech Republik, Finland, Sweden), Luhansk – (Poland, Italy), Zaporizhzhia – (Austria), Kherson – (France, Sweden), Kirovohrad (Norway), Mykolaiv – (Germany), Odesa – (Switzerland), Odesa (city) – (France).**



Source: author based on the Reports by the European Bank for Reconstruction and Development, the European Investment Bank and the Organisation for Economic Cooperation and Development, included in ["Lugano Declaration", 2022] and by [European Commission, 2022].

The Lugansk oblast was selected for a detailed analysis of the estimated reconstruction costs. It will be managed by a consortium of countries, i.e. Italy and Poland, as a part of the planned "Regional Key Cluster". This region was chosen for the analysis, because the Polish economy is planned to be involved in the process of reconstruction and the resulting benefits are estimated at 3.6-3.8 GDP, which is the equivalent of obtaining PLN 170 billion over the period of 10 years, based on the special report by [Bank Pekao S.A., 2022]. A detailed analysis showed that the reconstruction

of the Lugansk oblast requires an expenditure of \$19.9 billion and is the second-highest reconstruction cost after the Donetsk oblast which amounts to \$34 billion. The costs associated with the reconstruction rose from \$15.9 billion to \$19.9 billion between June and December 2022 (an increase of 25.15%). The damage to the housing infrastructure was estimated at \$7.9 billion and increased to \$13.7 billion (73.41%). Damage to the industrial and commercial structures increased from \$0.8 billion to \$1.2 billion (50%). As for the transport infrastructure, the costs were estimated at \$5.5 billion and saw an increase to \$8.4 billion (52.72%). The damage to the energy sector and utilities amounted to \$0.1 billion and increased to \$0.3 billion (200%). In agriculture the change was from \$0.6 billion to \$0.9 billion (50%). Finally, in the remaining services these costs rose from \$1.0 billion to \$1.3 billion (30%).

Additional problems which hinder the creation of international cluster structures are some internal conditions in Ukraine, which have been described shortly in Table 1.

**Table 1. The internal problems of Ukraine impacting the implementation of international clusters.**

Problem area	Description
Political	The political situation in Ukraine is currently very unstable, due to the military conflict with Russia. In this situation, the government is not taking the necessary action towards the preparation and adoption of normative legal acts concerning stimulating the development of cluster structures.
Economic	The economic conditions for the implementation of a cluster policy are currently exceptionally unfavourable due to the ongoing crisis and war in Ukraine. However, there is no alternative policy for effective restoration of the economy. In other words, the development of cluster structures in oblasts and regions of the country seems to be the only way to ensure effective refurbishment of the economy of Ukraine.
Financial	High level of monopolisation of the Ukrainian economy and the political influence of the oligarchs on the governmental institutions make the financial policy and economy unfit for a cooperation between science and industry, mainly due to the lack of interest in such activities.
Social	The level of social capital in Ukraine is low, as is the level of transparency and trust between potential cluster participants and local, regional and national authorities.
International	A national policy of establishing international cooperation between clusters in Ukraine and foreign partners is unsatisfactory and is currently conducted mainly on a personal level.

## Summary

The adoption of a comprehensive revitalisation policy including innovative organisational instruments and guarantees is necessary for an effective revitalisation of destroyed urban infrastructure in Ukraine. An identification of specific issues in each region is necessary to specify areas where particular problems occur. While doing so, social issues, such as depopulation, must be identified and taken into account not only to tackle them, but also allow for social participation in the process of revitalisation. Based on the analysis of the effects of cluster implementation in the urban areas of Western and Central European countries and their impact on socioeconomic development of the said areas, the implementation of clusters for the revitalisation of the degraded regions of Ukraine was proposed.

Despite the limitations and problems indicated in this paper, it can be assumed that the hypothesis and the thesis have been positively verified.

The main thesis presented in the paper was made under the assumption that the experience gained through the implementation of revitalisation and development clusters in cities in Western Europe in the period 2001-2022 can be used in the process of degraded urban units in Ukraine, which would result in an increased effectiveness of the above entities in terms of the socioeconomic development.

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