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ADAPTING TO CLIMATE CHANGE – LOCAL CHALLENGES AND CONSTRAINTS

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Purpose: The research presented in this article was carried out in order to identify the potentials, challenges and limitations of the local government units (JST) included in the Szczecin Metropolitan Area Association (SSOM) in the area of climate change adaptation
Design/methodology/approach: The realization of the objective of the study was possible thanks to the use of the method of analysis of literature, legal acts and documents of the European Union, as well as information from representatives of JST obtained by the method of in-depth interviews.
Findings: The survey found that the constraints to climate change adaptation processes are the financial limitations of JST, legal and procedural difficulties, as well as the reluctance of local communities, the low level of environmental awareness of residents and insufficient digital competence. High availability of funds for adaptation activities, growing interest of residents in environmental topics, and above all strong EU support were identified as opportunities.
Research limitations/implications: The most significant limitation of the conducted research was the limited time for conducting the interviews, due to the fact that the interviews were conducted during the work of the officials.
Practical implications: The research presented here can be used by representatives of JST to assess their climate change adaptation activities and to raise awareness of the opportunities and risks associated with this process. The results of the survey can provide a voice in the discussion on the creation of good practices in JST cooperation on adaptation concepts.
Social implications: The results of the study provide an overview of JST's climate change adaptation efforts.
Originality/value: This study is an independent analysis of JST's activities in the field of climate change adaptation. The conducted study fills the research gap and complements the body of work on the analyzed topic mainly through the applied research method, thanks to which information was obtained from representatives of JSTs affiliated with SSOM, which can

provide a basis for developing good practices at the local level related to the studied phenomenon.
Keywords: climate change, adaptation, local government units (JST).
Category of the paper: Research paper.

Introduction

As climate change continues, adaptation to new environmental conditions is becoming one of the key challenges for public policy at the local and regional levels. The European Green Deal (European Commission, 2019a) and related initiatives, such as the European Climate Law (European Commission, 2020a), the Fit for 55 Package (European Commission, 2021) and the Biodiversity Strategy 2030 (European Commission, 2020b), set ambitious targets for EU member states. Support in this regard is also provided by the European Funds for Western Pomerania for 2021-2027.

The article hypothesizes that local government units that are members of metropolitan structures show a higher level of adaptation readiness than units that function independently. The purpose of this article was to identify the potentials, challenges and constraints of the local government units (JSTs) included in the Szczecin Metropolitan Area Association (SSOM) in the area of climate change adaptation. The research was conducted using the in-depth interview method, taking into account a broad spectrum of political, economic, social, technological, environmental and legal factors affecting the implementation of adaptation projects.

Literature review

The European Climate Law (European Commission, 2020a) was adopted in 2021 as a key piece of legislation in achieving the goals of the European Green Deal (European Commission, 2019a). It introduces a legally binding goal of achieving climate neutrality in the European Union by 2050 and an intermediate target of reducing greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels. The law requires member states to develop national action plans and to periodically monitor their progress toward meeting climate targets (European Commission, 2020a).

In order to implement these ambitious goals, the “Fit for 55” Package was developed, which includes a set of legislative acts that align the EU's climate and energy policy with the new targets. The package includes, among other things, reform of the emissions trading system (EU ETS), new emission standards for the transport sector, support for the development of

renewable energy sources and measures to improve energy efficiency (European Commission, 2021). It forms the foundation of the EU's energy and economic transition.

Also integral to the European Green Deal is the EU's Biodiversity Strategy 2030, which calls for restoring degraded ecosystems, expanding the network of protected areas and reducing pressure on the environment. The strategy emphasizes that biodiversity protection is integral to successful climate change adaptation and improved quality of life (European Commission, 2020b).

The transformation of the economy toward low-carbon is also indicated in the New European Industrial Strategy, which promotes the decarbonization of industry and accelerates the transition to a closed-loop economy (European Commission, 2020c). Supporting these goals, the Closed Economy Roadmap (European Commission, 2020d) focuses on efficient use of resources, minimizing waste and promoting recycling as a basis for sustainable development.

To ensure social equity in the transition process, the Just Transition Mechanism was introduced to support regions and sectors most affected by the economic changes resulting from decarbonization. The mechanism offers investment funds and financial instruments to create new jobs and retrain workers (European Commission, 2020e).

At the same time, a key element of the EU's energy transition is ensuring access to clean, affordable and secure energy. The 2019 Clean Energy for All Europeans strategy emphasizes the importance of developing renewable energy sources, modernizing energy grids and improving energy efficiency as a basis for achieving climate neutrality (European Commission, 2019b).

In support of these efforts, the European Commission has launched the Renovation Wave, aimed at increasing the number of building renovations in Europe. The initiative aims to improve the energy efficiency of buildings, which will reduce emissions, reduce energy costs for citizens and create new jobs in the construction sector (European Commission, 2020f).

In Poland, activities under the new financial perspective 2021-2027 have been aligned with the goals of the European Green Deal. European funds for Western Pomerania have been allocated to, among other things:

- energy transition,
- investments in green infrastructure,
- environmental protection and climate change adaptation,
- supporting the equitable transformation of regions (Urząd Marszałkowski Województwa Zachodniopomorskiego, 2022).

Regional strategies are closely linked to the environmental and economic transformation goals set at the EU level, particularly under the Fair Transformation Fund.

Climate change adaptation is the process of adjusting natural or human systems to actual or projected climate change in order to reduce damage or take advantage of beneficial opportunities (IPCC, 2014). The UNFCCC (2011) defines adaptation as initiatives and measures to reduce exposure and increase resilience to the impacts of climate change.

In the literature, adaptation is also understood in a broader context as a person's ability to transmit information non-genetically, enabling him to adapt to changing environmental conditions (Strzałko, Ostoja-Zagórski, 1995; Kozłowski, 1986). Smit and Wandel (2006) indicate that adaptation is a process, action or outcome that increases the preparedness of a system (e.g., a household) for new conditions. Adger et al. (2005), on the other hand, emphasize that adaptation includes both building adaptive capacity and implementing specific activities. According to Albin (2023), climate change adaptation activities have not been singled out as a separate and independent public task. However, climate change adaptation includes a set of conscious and purposeful activities that are closely related to the implementation of the municipality's tasks as a basic unit of local government. In doing so, it is important to determine the specific forms of public administration activity in the analyzed area and the most effective way to carry out this task, in accordance with the principle of subsidiarity. Dumieński, Lisowska, Tiukało (2019) assessed the adaptive capacity of Polish flood-prone municipalities, treating them as social-ecological systems. They identified four key categories influencing adaptation: human and social capital, financial potential, ecological potential and organizational potential, distinguishing a total of 15 characteristics describing the current adaptive capacity of municipalities. Cities are particularly intensely affected by climate change due to their population density, infrastructure accumulation and social problems (Siekierska-Rosiak, 2016). Cities face such threats as urban heat island, air pollution, hurricanes, and floods (Wietewska-Rosiak, 2017).

Adaptation at the local level should include spatial planning, integrated development approaches and climate policies in urban development strategies (Carter et al., 2015; Urwin, Jordan, 2008). Legutko-Kobus (2017) points out that local adaptation policies should serve not only to protect the environment, but also to ensure a high quality of life for residents, with full awareness of the risks and uncertainties associated with future changes. The anthropocentric development model based on technocratism and the free market is criticized (Legutko-Kobus et al., 2020). The need to change to a more biocentric approach, in which environmental protection is a value in itself, is pointed out (Piątek, 2008).

Sustainable development should combine economic rationality with social and environmental goals, which can improve the quality of life of the population. International organizations such as the IPCC, UNEP and UNFCCC have played a key role in shaping global adaptation policies.

- The IPCC (2014) defines adaptation as the process of reducing vulnerability to the effects of climate change by adapting natural and social systems.
- UNEP (2009) promotes the development of national adaptation programs and climate education, emphasizing the importance of technology transfer and resilience building.
- The UNFCCC (2011) supports adaptation efforts at the global level, requiring countries to prepare strategies that reduce climate risks and increase the resilience of societies.

The European Union has developed its own adaptation framework: 2009 White Paper. (European Commission, 2009) introduced the European Framework for Action on Adaptation, pointing out the need to integrate adaptation actions with sectoral policies and emphasizing the role of cooperation among member states. The EU Adaptation Strategy, which in Poland is promoted by the Strategic Adaptation Plan for Sectors and Areas Vulnerable to Climate Change to 2020 with an Outlook to 2030, the so-called SPA2020 (Ministerstwo Środowiska, 2013), develops these assumptions, promoting, among other things, increased public awareness of adaptation, integration of adaptation into infrastructure investments, and support for the regions most vulnerable to climate change. It aims to improve the resilience of member states to current and expected climate change, paying particular attention to better preparing for extreme climate and weather events and reducing the socioeconomic costs associated with them.

Methodology

The article uses a qualitative research technique, i.e. an in-depth interview consisting of conducting intensive individual interviews with representatives of local government units included in the SSOM, namely: Kobylanka Municipality, Stare Czarnowo Municipality, Police Municipality, Dobra Szczecin Municipality, Goleniow Municipality, Kolbaskowo Municipality, Gryfino Municipality, City of Szczecin, City of Stargard, Stargard Municipality, Nowe Warpno Municipality, Police District, Stepnica Municipality, City of Świnoujscie. The respondents were mostly coordinators of cooperation of a given JST within the SSOM, specialists for many years involved in obtaining funds from the European Union Funds. During the interview, the respondents consulted on an ongoing basis on issues related to the area of adaptation to climate change with their colleagues, superiors (mayor, president) and, if necessary, with representatives of municipal organizational entities or subordinate JSTs that are responsible for policies on environmental protection, water management, energy supply and adaptation to climate change. The respondents were deliberately recruited on the basis of their involvement in activities within the Szczecin Metropolitan Area (SSOM). They were representatives of local self-government units, mainly people who acted as coordinators of cooperation of a given territorial unit within the SSOM, as well as specialists who dealt with obtaining funds from the European Union on a daily basis. The contact with the interviewees was made directly through the official communication channels of the municipality and with the support of the Association. A total of 14 individual in-depth interviews were conducted in the first half of 2024. The interviews were conducted remotely (online or by telephone), which allowed for efficient data collection despite time and geographical constraints. Each interview lasted between 45 and 90 minutes, depending on the engagement of the interviewee and the complexity of the issues raised.

The survey was conducted in accordance with ethical standards. Participants were informed of the purpose of the study, how the data would be processed and their rights, including the ability to withdraw at any stage of the study. All interviews were anonymous - no identifying information about respondents will be published. Verbal consent to participate in the study was also obtained.

The study used an individual in-depth interview technique. A proprietary interview script with open and semi-open questions was used. The scenario was divided into thematic blocks, including the following issues: general experiences of TSU in adapting to climate change, sources of funding used (with particular emphasis on EU funds), inter-municipal cooperation and the role of SSOM, institutional and technical barriers and needs, future prospects in the context of climate change. The interviews were conducted in a flexible manner - the interviewees were able to consult with other SSOM staff, which made it possible to obtain in-depth information. The data collected was analysed using the method of thematic analysis. The analysis process involved open coding the content of the interviews, identifying recurring categories and patterns and grouping them into overarching themes. The analysis was done manually. Conclusions were drawn on the basis of the identified themes.

The purpose of the survey was to identify the potentials, constraints, challenges and needs of JST representatives related to climate change adaptation. For this purpose, factors affecting the implementation of projects in the area of climate change adaptation were identified. The survey allowed the authors to formulate a list of key adaptation measures, the undertaking of which can contribute to long-term and comprehensive planning for the development of JST, taking into account all climate risks.

Results

Interviews conducted with representatives of local government units included in the SSOM made it possible to create a list of key political, economic, social, technological, environmental, legal factors affecting the implementation of projects in the area of climate change adaptation. The factors listed below were indicated by all respondents:

1. Political:
    - the war in Ukraine,
    - centralization of support procedures and processes,
    - lack of sustained government policy on climate change, including actions taken in parallel at different levels,
2. Economic:
    - increase in inflation,
    - budgetary constraints of local government units,

- large costs associated with the implementation of environmental investments, including the high cost of local governments' own participation and subsequent maintenance of investments,
- accumulation of public procurement in one period resulting from the launch of external funds, generating problems in finding service contractors,
- increase in prices of services or goods due to high demand in the market during a given period,

3. Social:
   - reluctance of local communities to selected environmental investments concerning, for example, waste treatment plants in their immediate vicinity,
   - low level, both of local community knowledge and awareness of climate change and the need for action to minimize the adverse effects of climate change,
   - lack of a sense of identity with the environment,
   - low level of confidence in the sharing economy, low propensity to use a common good/product,
4. Technological:
   - impediments in the form of low level of development of digital infrastructure in rural areas - problem with the provision of digital services to certain social groups, e.g. seniors, low-income individuals and families,
   - incompatibility between modern technological solutions - the need for additional coordination in the introduction of various smart technologies,
   - fear of technological risks,
   - barrier to the use of modern technologies especially ICT, low digital competence of residents,
5. Environmental:
   - negative effects of climate change - occurring e.g. heat wave periods, heat islands pose new challenges for local governments, against which good practices have not yet been developed,
   - extreme weather events,
   - restrictions on the implementation of selected investments due to the presence of protected areas,
6. Legal:
   - instability of the law, constant changes in standards, environmental obligations,
   - bureaucracy,
   - complicated and excessive system of supervision and multi-level control at each stage of project implementation.

Based on the analysis of conditions affecting the possibility of investing in the area of climate change adaptation, it is possible to identify those that have the most significant impact on project implementation, which have the nature of opportunities and threats. Opportunities include the growing interest among the population in climate change issues; the strong emphasis of European policies on caring for the environment and climate; the large allocation of funds for climate change adaptation activities; a taxonomy of terms that provides clarity and a common understanding of what activities can be considered sustainable; increasing access to knowledge, good practices, platforms dedicated to climate change adaptation, and environmental/climate risk assessment data and tools.

On the other hand, among the threats, the state of JST budgets - the lack of sufficient financial resources for financial contributions for climate change adaptation projects and the high cost of green/energy transition - should be mentioned first and foremost.

Based on the interviews, it can also be concluded that:

- the state of knowledge of climate change adaptation issues among respondents varies;
- respondents have no experience in implementing adaptation projects. So far, they have successfully implemented mitigation projects, although not all of them;
- development strategy updates are underway in local governments. Territorial strategies are being developed. The area of climate/adaptation to climate change is not breaking through as one of the strategic areas. Strategies are prepared based on past experience and habits, do not respond to crises (pandemic, war), are not prepared based on scenario modeling. Therefore, it is worth deepening the analysis of climate change phenomena;
- strategies developed for functional areas still do not correspond to the objectives for which they should be developed. The territorial approach, including the understanding of the role of areas of strategic intervention, is not the strongest point of JSTs developing strategies. In most cases, the strategies are developed as a reaction to the provisions of EU regulations to focus interventions on the development of functional areas, particularly urban areas;
- due to financial factors such as the state of JSTs finances, inflation and the high cost of investment implementation, calls for actions that fit into the climate and environmental limits should be launched first. Otherwise, investments related to basic infrastructure will exhaust the capacity of co-financing and for tasks related to adaptation to climate change there will be not only the will, but also financial resources in the budgets of JSTs;
- calls for projects in mitigation and adaptation activities should be synchronized;
- despite the lack of mandatory climate change adaptation plans for all beneficiaries of the measures in question, having such a plan demonstrates an evidence-based approach to adaptation investment planning. Requiring an adaptation plan as an eligibility criterion for support under the FEPZ would be overly burdensome. However, a clear

point bonus should be implemented for beneficiaries with a climate change adaptation plan or document;

- respondents pointed to the legitimacy of educational projects, the implementation of which promotes raising awareness of residents in the area of climate change adaptation. It is worth considering the preparation of model educational projects, in the form of standardized descriptions, completed application forms, which each potential beneficiary could download from the institution managing the FEPZ and adapt to their needs;
- a group of representatives of JSTs specializing in climate change adaptation could in the future constitute a group for exchanging experiences in the field of adaptation. Cooperation among JSTs, exchange of ideas, communication and knowledge sharing, engaging in joint activities, initiatives should reduce the risk of lack of interest in adaptation measures;
- as a good practice in the context of strengthening knowledge and building a team of experts, the use and improvement of remote forms of communication between JSTs, increasing the use of cloud solutions both at the stage of project preparation and implementation should be indicated.

Based on a long list of problems, the authors of the study proposed key investments that are reasonable to implement in individual JSTs in connection with climate change and the need to build greater resilience of JSTs to the effects of climate change:

- inventorying greenery in the municipality and assessing its condition and potential for retention;
- restoration/development of green areas in municipalities;
- an extensive system of small retention - in cooperation with private entities and housing cooperatives, implementation of the city-sponge idea and promotion of rainwater retention at the site of precipitation (instead of discharge into the rainwater or combined sewer system);
- completion of the stormwater drainage system with missing sections in cities/communities;
- renaturalization of river valleys and floodplains with emphasis on maintaining/ rebuilding biodiversity;
- environmental education of residents;
- development of a rapid response system for violent weather events;
- improvement of water resources management through modernization of water treatment plants.

The research revealed that climate change adaptation in local government units affiliated with the Szczecin Metropolitan Area Association (SSOM) is highly differentiated and depends not only on financial resources, but also on the competence of staff and the degree of

cooperation between units. Another new finding is the significant role of so-called "cooperation coordinators" as informal leaders of the adaptation process - their involvement has proved crucial in initiating strategic actions.

Previous studies (e.g., Carter et al., 2015; Legutko-Kobus et al., 2020) have pointed to the general difficulties of local governments in implementing adaptation strategies, highlighting mainly financial and institutional shortcomings. Our research supplements this picture with the perspective of local practitioners and shows that while these shortcomings are important, internal decision-making processes, the possibility of ongoing consultation between departments, and access to informal networks are equally important. In addition, the importance of inter-municipal coordination within structures such as SSOMs is shown as a potential factor in increasing the effectiveness of adaptation efforts. The results of our study coincide with the findings of Siekierska-Rosiak (2016), who emphasized the role of local leadership in climate governance, and the research of Dumenski et al. (2019), showing problems with implementing adaptation strategies in small municipalities. However, unlike previous studies, our analysis shows that some local governments are able to successfully initiate action even with limited resources - as long as there is a clear structure for cooperation and access to expertise, including through participation in cross-border programs or EU projects.

In further stages, comparative studies are planned with other functional areas in Poland - particularly in the context of the implementation of Municipal Adaptation Plans. It is also planned to analyze strategic documents and assess the implementation of EU-funded projects in the context of their actual impact on the climate resilience of local governments. The results of the study partially confirmed the hypothesis that local government units that are members of metropolitan structures show a higher level of adaptation readiness than units operating independently. Nevertheless, it turned out that the decisive influence on the effectiveness of adaptation has human and institutional factors, and not only membership in a cooperation network.

Conclusions

Climate change is a growing challenge for local and regional development, requiring local government units to implement effective adaptation strategies. The results of in-depth interviews conducted with representatives of JSTs included in the SSOM indicate a growing awareness of the need for adaptation, although the level of knowledge and institutional preparedness in this regard still varies.

The survey showed that the main barriers to the implementation of adaptation projects are financial constraints related to the cost of investment and the need to provide a high own contribution, as well as procedural difficulties arising from ambiguous laws and complicated

administrative processes. Additional challenges are the reluctance of local communities to make selected environmental investments, the low level of environmental awareness, and insufficient digital competence of local residents and local government employees.

At the same time, a number of opportunities have been identified that could foster greater regional resilience to the effects of climate change. These include the strong support of EU policies under the European Green Deal, the large availability of funds for adaptation measures, the growing interest of residents in environmental issues, and the development of expert knowledge and platforms for the exchange of good practices.

An important conclusion from the study is the need for better integration of the topic of adaptation to climate change with strategic documents of local government units. Development strategies, currently updated in many units, often do not take into account climate risks or the need for scenario modeling in territorial development planning to a sufficient extent. There is also a lack of an appropriate territorial approach, understanding the role of strategic intervention areas and broad cooperation between neighboring local government units.

Recommended activities include:

- preparation of climate change adaptation plans at the local or regional level,
- development and implementation of investments such as small-scale retention, development of urban greenery, modernization of water and sewage infrastructure, and restoration of natural areas,
- organization of educational projects on climate change and adaptation measures,
- creation of a network for cooperation and exchange of experience among local governments to strengthen competencies and share good practices.

It also stressed the need to synchronize calls for mitigation and adaptation projects and to provide adequate support to JSTs in preparing high-quality project applications. Implementation of these measures would allow the region to adapt more effectively to the effects of climate change, increase social, environmental and economic resilience, and improve the quality of life of West Pomerania's residents.

However, it is worth noting some limitations of the survey conducted. First of all, it was mainly based on in-depth interviews, which may lead to subjectivity in the interpretation of the results and limited representativeness of the research sample. It would be advisable in the future to extend the analysis with additional quantitative methods that would allow a more precise estimation of the scale of problems and challenges.

In spite of these limitations, the study provided valuable information on the actual barriers and opportunities for adaptation of local government units, which can form the basis for further, more comprehensive research. The results obtained can also support the development of local climate strategies and improve the effectiveness of adaptation measures taken.

Furthermore, based on the data obtained, adaptation measures can be more clearly prioritised. For example, investments in retention systems can bring rapid benefits in terms of water resource management, while educational measures, while crucial, require a long-term

commitment. It is therefore advisable to focus efforts on those areas that can produce the most immediate and measurable results.

The results of the study may have significant practical relevance, influencing regional policy-making and supporting TSUs to better prepare for climate challenges. Appropriate incorporation of the findings into strategic documents can significantly increase the resilience of regions to climate change and improve the quality of life for residents.

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