

ECONOMIC AND NON-ECONOMIC INSTRUMENTS IN CREATING ADAPTATION TO CLIMATE CHANGE IN POLISH CITIES

Adaptation to climate change is one of the key areas of contemporary urban development policy and is understood as a process of gradually adapting urban systems to changing environmental conditions and strengthening their ability to function in the face of growing climate threats. Cities, which are both areas particularly sensitive to the effects of climate change and key participants in adaptation policy, must implement complex and multidimensional measures, using both economic and non-economic instruments, integrated within local public policies.

The aim of the research was to identify, classify, and evaluate the effectiveness of economic and non-economic instruments used by Polish cities in the process of adaptation to climate change. The study focused on determining which tools are perceived as most effective in urban practice and which are considered least effective. The empirical basis was a survey conducted as part of the project “Coincidences of the greening of the financial and spatial economy of cities in terms of adaptation to climate change,” covering 135 Polish cities.

The analysis covered four selected questions addressed to municipal authorities concerning the following problem areas: (1) assessment of the effectiveness of instruments for greening spatial management, (2) the existence of mechanisms for coordinating financial and spatial management in the context of adaptation, (3) the usefulness of selected sources of municipalities' own revenues as economic instruments of adaptation, and (4) the extent of the use of cost-benefit analysis (CBA) in decision-making processes.

Global trends pose new challenges for cities, influencing their responses and actions. Cities are changing along with civilizational processes, in particular the development of technology, to which they themselves also contribute. In response to these challenges, cities are implementing the instruments and actions necessary to adapt to climate change. The study attempts to determine which of the instruments used by cities are the most effective and which are the least effective in implementing adaptation measures in Polish cities.

An analysis of the effectiveness of climate change adaptation instruments in 135 Polish cities shows a clear advantage of planning and strategic tools over economic ones. The highest share of high and very high effectiveness ratings was recorded for planning and strategic instruments, such as planning standards (e.g., setting the biologically active area index), planning coherent and continuous landscaped green areas, adding green roofs to legally binding documents (e.g., local spatial development plans), and planning networks of pedestrian and bicycle routes. Expert support was also highly rated, which emphasizes the importance of professional knowledge in decision-making processes. The perception of these tools as more effective stems from their direct impact on shaping the urban fabric and the sustainability of the changes introduced. The lowest effectiveness rating was given to the instrument of reducing local tax rates or fees related to rainwater retention and infiltration. The result may indicate that the reliefs offered are usually limited in scale and do not provide sufficient incentive to undertake capital-intensive investments in rainwater retention and infiltration systems. As a result, such fiscal instruments, in their current form, are not perceived by cities as an effective tool for influence, while financial instruments such as local tax relief or surface sealing fees are perceived as much less effective. The lowest effectiveness was attributed to reductions in rainwater retention rates, which the authors of the study explain by the insufficient scale of financial benefits in relation to high investment costs. This situation is exacerbated by low awareness among potential beneficiaries, complicated procedures, and a lack of integration of these incentives with subsidy systems. The results of the study suggest that, although finances are important, only the complementary combination of hard planning provisions with

appropriately promoted economic incentives can ensure the real resilience of cities to climate change. Cost-benefit analysis (CBA) plays an important, though not entirely routine, role in the process of planning adaptation measures in Polish cities. The results of a survey conducted in 135 municipalities indicate a moderately high frequency of use of this tool, with an average rating of 6.43 on a ten-point scale. Although more than half of the cities declare frequent use of CBA (values 7–10), in practice there is considerable variation among local governments – from sporadic use of this method in smaller centers to its systematic implementation in cities with more than 100,000 inhabitants.

The greater propensity of larger metropolitan areas to conduct advanced analyses is likely due to their richer analytical resources and more frequent applications for external funding, which require formal economic justifications. The use of CBA shows a strong correlation with other profitability assessment instruments, such as NPV/ERR indicators or the monetization of environmental effects, suggesting that this tool is part of a broader culture of quantitative justification of public investments. Despite the declarative nature of the results, the analysis points to the need to further support analytical competencies in local governments, especially in the area of valuing adaptation benefits that are difficult to estimate, such as improved thermal comfort or flood risk reduction. The dissemination of CBA standards, especially in smaller cities with limited human resources, seems necessary for the professionalization of the selection process for projects that strengthen climate resilience. The responses are declarative in nature and do not allow for an assessment of the detail and methodological quality of the analyses carried out (e.g., the scope of effects, the discount rate used, or the method of estimating uncertainty). Nevertheless, the results obtained are a useful measure of the degree to which CBA is embedded in decision-making processes related to climate change adaptation in Polish cities.

The article also analyzes the potential of municipalities' own revenues as tools supporting local climate change adaptation policy, pointing out that properly designed and used revenue instruments can not only provide financing for adaptation measures but also stimulate the behavior of residents and economic entities. The usefulness of selected sources of municipal own revenues as economic instruments supporting the process of adaptation to climate change was assessed. A survey of local government awareness showed clear differences in the perception of the usefulness of individual sources of revenue. Instruments with a clear environmental profile, such as transport tax, spa tax, and fees for reducing natural retention or waste management, were considered the most effective and “dedicated.” Their economic strength lies in their ability to internalize external costs and directly link the subject of the fee to climate risk. On the other hand, classic fiscal instruments, such as property tax or PIT shares, are treated by municipalities as a general financial resource rather than tools for precisely shaping attitudes. Most other levies, such as agricultural tax or dog ownership fees, are perceived as neutral, revealing a gap between their purely revenue-generating function and their untapped incentive potential. The conclusions of the analysis point to the need for the local finance system to evolve towards strengthening its “green” component. It is proposed that rates and allowances be better linked to environmental effects and strategic documents of cities, which will allow for the simultaneous building of a stable budget base for adaptation investments and active correction of the behavior of economic entities in the face of climate challenges.

The article also analyzes a key problem of contemporary local management, namely the lack of consistency between financial decisions and spatial planning in the context of climate change adaptation. Effective resilience of cities to climate threats requires both embedding actions in planning documents and ensuring stable financing within budgets and long-term financial forecasts. However, research conducted in Polish cities shows the existence of a so-called “bottleneck,” manifested in working in isolated silos of competence. As many as 60% of the entities surveyed declare a complete lack of coordination mechanisms between the financial and spatial divisions, and nearly 40% rely solely on

informal contacts. Although the relational model allows for ad hoc action, it is highly susceptible to the risk of discontinuity and low accountability. The institutionalization of cooperation in the form of formal task forces occurs incidentally and concerns almost exclusively the largest metropolises, while in smaller centers there is a complete lack of systemic cooperation. This situation leads to the inefficient allocation of public funds, where the adaptation standards set by planners are not reflected in spending procedures. Only a transition from ad hoc, relational contacts to a permanent project portfolio management system will allow cities to avoid high transaction costs and effectively apply for external financing for pro-climate activities.

A study conducted in 135 cities shows that cost-benefit analysis is used in the planning of adaptation projects, but it cannot yet be said to be widely and consistently applied. The average level of responses suggests rather “frequent, but not always” use of this tool. At the same time, the scale of responses reveals significant differences between entities – alongside cities where CBA is a permanent element of project preparation, there are those where it is used sporadically. Larger urban centers show a clearly greater tendency to use formal analyses, which can be linked to better expert resources, greater reporting pressure, and experience in implementing projects co-financed from external funds. Importantly, where CBA is used, it is usually accompanied by other efficiency calculation tools, which indicates a more developed analytical approach. With regard to municipalities' own revenues, there is a clear belief that instruments directly related to environmental impact are of greatest importance for adaptation. Fees for water retention, waste management, and transportation are seen as real tools of influence, both in terms of financing investments and shaping the behavior of residents and businesses. On the other hand, general taxes, despite being the foundation of local budgets, are treated more as a neutral source of funds than as active mechanisms supporting climate resilience. This indicates a continuing separation of the fiscal function from the regulatory function in thinking about financial instruments. However, the most obvious weakness concerns the management sphere. In most of the cities surveyed, no formal structures have been developed to link budgetary decisions with spatial planning in the context of climate change adaptation. Cooperation between these areas, if it exists, is usually ad hoc and based on informal contacts. Only the largest cities declare the existence of more structured organizational solutions. This means that adaptation is often not fully integrated into key decision-making processes, but functions in a scattered manner.

The overall results lead to the conclusion that although local governments recognize the importance of the economic aspects of adaptation, the degree of their systematic implementation remains limited. The challenge is not so much to identify the tools as to consistently integrate them into organizational structures and urban development management practices.