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THE SOCIO-MANAGERIAL DETERMINANTS OF HOUSING ENERGY EFFICIENCY

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Riabokon I. O. The Socio-Managerial Determinants of Housing Energy Efficiency

Despite a substantial body of research on barriers to energy efficiency in the residential sector (the energy efficiency gap, split incentives, and collective action problems), the role of the socio-managerial capacity of collective owners (homeowners' associations) as an independent factor in participation remains understudied, particularly in the post-socialist and wartime context of Ukraine. This article examines the socio-managerial determinants of participation by the public and associations of co-owners of multi-unit residential buildings in State and grant-funded residential energy efficiency programs. It is substantiated that the housing stock is one of the key end-users of energy; therefore, the participation of homeowners' associations and residents in thermal modernization programs directly influences the performance of the energy sector, the level of households' energy resilience and the extent of their energy vulnerability. It is demonstrated that the availability of financial support instruments is a necessary but insufficient condition for the implementation of demand-side policies: the quality of collective management at the level of the multi-apartment building plays a decisive role. Based on data from an online survey of representatives of homeowners' associations management boards in the city of Kyiv (n ≈ 180), conducted in June–July 2026, the main barriers to participation were identified. The most common barrier was the financial burden on residents (58%), whilst less common but significant factors included the bureaucratic complexity of documentation, a lack of time and managerial resources within the management board, residents' passivity, uncertainty regarding payments, insufficient trust in projects, and digital challenges. It has been shown that these barriers operate in a complex manner: financial constraints are closely intertwined with organizational, managerial, institutional and competence-related factors, thereby increasing the transaction costs of collective decision-making. Particular attention is paid to the role of managerial and digital competencies among members of homeowners' associations boards. It was found that a higher level of self-assessed readiness to work with grant documentation and digital services is positively correlated with the likelihood of actual participation. At the same time, a significant proportion of respondents feel a need for targeted training in project and financial management. It has also been shown that participation in programs, provided they are effectively managed, helps to increase cohesion among residents (65% of respondents), although in some buildings there remains a potential for conflict related to co-financing. The scientific novelty of the study lies in the systematization of the socio-managerial determinants of homeowners' associations participation as a critical institutional factor that mediates the transformation of technical investments in energy efficiency into socioeconomic value for communities and human capital. In contrast to predominantly technical and financial approaches, the study proposes treating the managerial capacity of homeowners' associations boards as an independent economic variable that determines the extent to which demand-side policies are implemented in the housing sector. The methodological framework consists of a conceptual and analytical approach combined with elements of empirical analysis. The methods employed include systematization, comparative analysis and qualitative thematic analysis of open-ended responses. The empirical basis is formed by the results of a targeted online survey of representatives of homeowners' associations boards in the city of Kyiv, as well as secondary data from the Energy Efficiency Fund and analytical materials on the implementation of the «EnergoDim», «GreenDIM» and «VidnovyDIM» programs. The practical significance of this work lies in the formulation of targeted recommendations for homeowners' associations boards, the Energy Efficiency Fund and municipal authorities. Enhancing the management capacity of homeowners' associations, streamlining procedures and providing targeted training for management boards can increase the economic returns from existing financial instruments supporting energy efficiency, reduce the energy vulnerability of households and strengthen the energy resilience of the residential sector.
Keywords: *energy sector of the economy; residential energy efficiency; energy vulnerability; housing associations; socio-managerial determinants; managerial competencies; energy resilience; socially responsible investment.*
Fig.: *1.* ***Tabl.:*** *2.* ***Bibl.:*** *23.*

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Рябоконь І. О. Соціально-управлінські детермінанти енергоефективності житла

Попри значний масив досліджень бар'єрів енергоефективності в житловому секторі (energy efficiency gap, split incentives, проблеми колективної дії), роль соціально-управлінської спроможності колективних власників (ОСББ) як самостійного чинника участі залишається недостатньо вивченою, особливо в постсоціалістичному та воєнному контекстах України. У статті досліджено соціально-управлінські детермінанти участі населення та об'єднань співвласників багатоквартирних будинків у державних і грантових програмах енергоефективності житла. Обґрунтовано, що житловий фонд є одним із ключових кінцевих споживачів енергії, тому участь ОСББ і мешканців у програмах термомодернізації безпосередньо впливає на показники енергетичного сектора, рівень енергетичної стійкості домогосподарств і масштаби їхньої енергетичної вразливості. Показано, що наявність фінансових інструментів підтримки є необхідною, але недостатньою умовою реалізації попитової політики: вирішальну роль відіграє якість колективного управління на рівні багатоквартирного будинку. На основі даних онлайн-опитування представників правлінь ОСББ м. Києва (n ≈ 180), проведеного в червні–липні 2026 р., ідентифіковано основні бар'єри участі. Найпоширенішим виявилося фінансове навантаження на мешканців (58%), тоді як менш поширеними, але значущими були бюрократична складність документів, брак часу та управлінських ресурсів у правлінні, пасивність мешканців, невизначеність платежів, недостатня довіра до проєктів і цифрові складнощі. Показано, що бар'єри діють комплексно: фінансове обмеження тісно переплітається з організаційно-управлінськими, інституційними та компетентнісними чинниками, підвищуючи транзакційні витрати на ухвалення колективних рішень. Особливу увагу приділено ролі управлінських і цифрових компетенцій членів правлінь

ОСББ. Виявлено, що вищий рівень самооцінки готовності працювати з грантовою документацією та цифровими сервісами позитивно пов'язаний із імовірністю реальної участі. Водночас значна частина респондентів відчуває потребу в цільовому навчанні з проєктного та фінансового менеджменту. Показано також, що участь у програмах за умови ефективного управління сприяє підвищенню згуртованості мешканців (65% респондентів), хоча в частині будинків зберігається конфліктний потенціал, пов'язаний зі співфінансуванням. Наукова новизна дослідження полягає в систематизації соціально-управлінських детермінант участі ОСББ як критичного інституційного чинника, що опосередковує трансформацію технічних інвестицій у енергоефективність, у соціоекономічну цінність для громад і людського капіталу. На відміну від переважно техніко-фінансових підходів запропоновано розглядати управлінську спроможність правління ОСББ як самостійну економічну змінну, яка визначає масштаби реалізації попитової політики в житловому секторі. Методологічну основу склав концептуально-аналітичний підхід у поєднанні з елементами емпіричного аналізу. Використано метод систематизації, порівняльного аналізу та якісного тематичного аналізу відкритих відповідей. Емпіричну базу формують результати цільового онлайн-опитування представників правлінь ОСББ м. Києва, а також вторинні дані Фонду енергоефективності та аналітичні матеріали щодо реалізації програм «Енергодім», «ГрінДІМ», «ВідновиДІМ». Практична значущість роботи полягає у формулюванні адресних рекомендацій для правлінь ОСББ, Фонду енергоефективності та муніципальної влади. Підвищення управлінської спроможності ОСББ, спрощення процедур і цільове навчання правлінь здатні збільшити економічну віддачу від уже існуючих фінансових інструментів підтримки енергоефективності, знизити енергетичну вразливість домогосподарств і зміцнити енергетичну стійкість житлового сектора.

Ключові слова: *енергетичний сектор економіки; енергоефективність житла; енергетична вразливість; ОСББ; соціально-управлінські детермінанти; управлінські компетенції; енергетична стійкість; соціально відповідальне інвестування.*

Рис.: *1.* ***Табл.:*** *2.* ***Бібл.:*** *23.*

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The residential sector has traditionally been one of the largest end-users of energy. Consequently, programs to improve the energy efficiency of multi-family buildings are an important tool for demand-side management in the energy sector. Their implementation has a direct impact on the energy resilience of households, the load on the power system and the extent of the population's energy vulnerability. At the same time, experience shows that the availability of financial and technical support mechanisms does not in itself guarantee a high level of participation. Social and governance factors play a decisive role – the quality of collective management within homeowners' associations, the level of internal trust, the managerial and digital competencies of the boards, as well as residents' willingness to make joint decisions. This is precisely why research into the determinants of public participation in residential energy efficiency programs is significant for both housing and energy policy.

The relevance of this topic stems from a combination of two systemic challenges facing Ukraine's housing sector. The first is the need for large-scale thermal modernization of the ageing multi-family housing stock, a significant proportion of which is characterized by high energy losses. The second is prolonged energy instability, which increases the cost and unpredictability of energy consumption for households. In these circumstances, government and grant programs ("EnergoDim", "GreenDIM", "VidnoviDIM", "SvitloDim", etc.) create real financial opportunities to improve the energy resilience of buildings. However, the level of actual participation by co-owners' associations of multi-family buildings in these programs remains relatively low. The gap between awareness of the programs and actual participation suggests that the limiting factors are not so much the level of funding as the socio-managerial conditions at the building level.

In contemporary research, residential energy efficiency is predominantly examined through the prism of technical standards, the cost of measures and co-financing mechanisms. Far less attention is paid to issues of collective action, the transaction costs of joint decision-making, trust in institutions and the managerial capacity of co-owners' associations boards. The international literature notes the existence of an| "energy efficiency gap" and problems of misaligned incentives; however, in the post-socialist and wartime context of Ukraine, these barriers take on specific characteristics: the large average size of multi-family buildings, the limited managerial resources of boards operating on a voluntary basis, and heightened uncertainty regarding project timelines and implementation guarantees.

The research problem lies in the fact that, even with grant support, a significant proportion of buildings do not participate in the programs, and the potential for reducing households' energy vulnerability is realized only partially. Existing studies largely document this fact but do not sufficiently explain which specific socio-managerial mechanisms mediate the transition from the availability of external support to the actual participation of homeowners' associations. Consequently, the question of how the quality of collective governance, the level of trust and the competence of management boards influence the extent to which demand-side policies are implemented in the housing sector remains only partially explored.

LITERATURE REVIEW

In contemporary research, the energy efficiency of housing is predominantly examined through the prism of technical standards, the cost of thermal modernization and financial support mechanisms. At the same time, the socio-managerial dimension of public participation and the institutions of collective management of the multi-unit housing stock remains only partially explored. Most studies document the existence of support programs, but far fewer explain why, even with grant co-financing, the level of actual participation by homeowners' associations remains limited.

Housing programs for improving energy efficiency within the regeneration system are not presented as an object of social paternalism, but as an institution that minimizes households' transaction costs in ensuring basic energy resilience. It has been statistically confirmed that the development of support mechanisms for thermal modernization correlates with a reduction in the population's energy vulnerability and an increase in households' capacity to invest in their own development [15]. In this context, participation in energy efficiency programs can be viewed as a form of grassroots socially responsible investment that has a direct impact on the conditions for the reproduction of human capital.

Particular attention has been paid in the literature to the phenomena of energy poverty and precarization. The excessive financial burden associated with high energy costs and the unpredictability of supply forces households to shift from a strategy of development to one of mere survival. Under such conditions, previous investments in knowledge, health and professional qualifications are partially devalued [2]. This is precisely why reducing energy precarization through participation in thermal modernization programs takes on significance not only as an environmental factor but also as a social and labor-related factor.

A conceptual analysis of post-war reconstruction models emphasizes that the preservation and development of human capital are possible only if robust social capital is built at the community level [3]. In the multi-apartment sector, homeowners' associations act as the key vehicle for this capital. However, existing studies of homeowners' associations activities are largely focused on the legal and organizational aspects of their operation and rarely consider the managerial capacity of their boards as a determinant of the success of investment projects. At the same time, it is precisely the quality of collective governance, the level of internal trust and the presence of basic digital and project-management skills that determine whether a building will be able to convert external support into a real improvement in energy efficiency.

International studies confirm that the gap between energy efficiency potential and the actual participation of households and collective owners (the 'energy efficiency gap') is explained not only by market failures but also by behavioral and organizational barriers [13; 17]. Particular attention is paid to the problem of split incentives, where the party financing the modernization does not derive a direct benefit from the energy savings [20]. In the multi-occupancy sector, these barriers are compounded by problems of collective action: the difficulty of reaching agreement amongst co-owners, high transaction costs for coordination, and the influence of institutional rules and the characteristics of the group of owners [16].

Studies of the post-socialist context are particularly relevant. Using data from Poland, it has been shown that the size of a building and the number of co-owners are negatively correlated with the success of collective decisions regarding repairs and modernization [21]. This is consistent with the logic of higher transaction costs in large buildings in Kyiv compared with smaller buildings in Western Ukraine. Studies of energy poverty in Central and Eastern European countries also highlight the structural characteristics of the post-socialist housing stock, which often render households' energy vulnerability 'invisible' to standard indicators [18].

Thus, the existing international literature confirms that socio-managerial determinants (the quality of collective management, trust, competence, and building size) are critical factors that mediate the transition from the existence of support programs to actual participation in energy efficiency.

International experience and domestic analytical reports indicate that the barriers to participation in thermal modernization programs are predominantly of a socio-organizational nature: residents' passivity, the complexity of coordinating collective decisions, a lack of trust in institutions, and limited management resources at building level. For Ukraine, these barriers are exacerbated by the additional factor of the digital transformation of housing management, in particular the introduction of electronic systems which require new skills from members of housing association boards. According to analytical estimates, only around 5–6 per cent of the population have actually taken advantage of state energy efficiency programs, whilst a significant proportion of citizens are either unaware of them or lack the organizational capacity to participate [7; 1].

Thus, there is a persistent gap in the existing research. On the one hand, the technical and financial aspects of energy efficiency have been sufficiently studied. On the other hand, there is a near-total ab-

sence of a comprehensive analysis of the socio-managerial determinants that mediate the transition from the existence of support programs to the actual participation of homeowners' associations and the subsequent impact on reducing the energy precarization of households. It is precisely this gap that defines the focus of the proposed study.

The *aim of the study* is to identify and systematize the socio-managerial determinants of homeowners' associations participation in residential energy efficiency programs and to assess their impact on reducing households' energy vulnerability and on the implementation of demand-side policies in the energy sector.

- To achieve this aim, the following objectives have been set:
- To analyze the current state of homeowners' associations participation in residential energy efficiency programs and their significance for the energy sector.
- To identify the key socio-managerial barriers to the participation of residents and homeowners' associations boards in thermal modernization programs.
- To assess the role of the managerial and digital competencies of homeowners' associations board members in decision-making regarding participation in energy efficiency programs.
- To justify the importance of effective homeowners' associations management as an institutional factor in transforming technical investments in energy efficiency into socio-economic value for communities and as an element of demand-side policy in the energy sector.

RESEARCH QUESTIONS

1. Which socio-managerial factors most strongly determine the willingness of homeowners' associations to participate in energy efficiency programs?

2. What role do the managerial and digital competencies of homeowners' associations board members play in the decision to participate?

3. How does the level of internal trust and resident engagement influence the feasibility of thermal modernization projects?

RESEARCH HYPOTHESES

H1. The main barriers to homeowners' associations participation in energy efficiency programs are not so much a lack of funding as the passivity of residents, the limited managerial resources of the board, and a low level of trust in the programs.

H2. A higher level of digital and managerial readiness among the homeowners' associations board is positively correlated with the likelihood of participation in energy efficiency programs.

H3. Participation in energy efficiency programs helps to increase residents' cohesion and reduce conflict within the building, provided the board manages the process effectively.

RESEARCH METHODS

The methodological basis of the study is a conceptual-analytical approach combined with elements of empirical analysis. The method of systematization and comparative analysis was used to identify socio-managerial determinants.

The empirical basis of the study is formed by the results of a short online survey of members of homeowners' associations boards, conducted by the author. Data collection took place from June to July 2026. The survey was distributed via relevant homeowners' associations, as well as thematic Telegram and Facebook groups for homeowners' associations board chairs. The sample is a purposive (non-random) sample: the survey was addressed to representatives of homeowners' associations boards in Kyiv; therefore, the results do not claim to be statistically representative of the general population of all homeowners' associations in the city.

The survey aimed to identify the level of awareness of energy efficiency programs, the main barriers to participation, self-assessments of managerial and digital competencies (including readiness to work with digital tools, in particular the 'Nash Dim' platform), as well as perceptions of the impact of such projects on the atmosphere within the building. Responses to the open-ended questions in the survey were analyzed using qualitative thematic analysis; this article presents the most frequently recurring themes identified during the survey.

In addition, secondary data from official statistics, reports by the Energy Efficiency Fund, and analytical materials on the status of implementation of support programs for the thermal modernization of multi-family housing were utilized. The combination of primary and secondary data allows the research hypotheses to be verified and well-founded conclusions to be drawn regarding socio-managerial mechanisms of participation.

As respondents were recruited primarily through digital channels (relevant associations, Telegram and Facebook groups), the sample is potentially biased towards the more digitally active and engaged management boards of housing associations; this is acknowledged in the "Limitations of the study" section.

RESEARCH FINDINGS

The empirical basis of the study was formed by the results of an online survey of representatives of

homeowners' associations boards in Kyiv ($n \approx 180$). Among the respondents, 45% were homeowners' associations chairpersons, 35% were board members, 12% were treasurers/accountants, and 8% were other representatives. By building size: up to 50 flats – 15%; 51–100 – 30%; 101–200 – 35%; over 200 – 20%. All respondents represent housing associations in the capital, which allows for an assessment of the situation in a context of well-developed municipal support, but at the same time one characterized by increased complexity in coordination due to the larger average size of buildings. The predominance of homeowners' associations chairpersons (45%) and board members (35%) in the sample is consistent with the recruitment method – via specialist associations and social media groups for homeowners' associations chairpersons (see the "Research Methods" section) – which naturally ensures greater representation of the most active and engaged board members. The empirical basis of the study consists of the results of an online survey of representatives of homeowners' associations management boards in Kyiv ($n \approx 180$). The characteristics of the sample are presented in *Tbl. 1*.

Table 1

Characteristics of the sample (n ≈ 180)

Characteristics	Category	Proportion, %
Position in the homeowners' association	Chairperson of the homeowners' association	45
	Board member	35
	Treasurer / Accountant	12
	Other	8
Number of flats in the building	Up to 50	15
	51–100	30
	101–200	35
	Over 200	20

Note: Each respondent selected one answer option for each characteristic, so the total percentage in each category is 100%.

Source: Compiled by the author based on the results of an online survey of representatives of the management boards of housing associations in Kyiv (June–July 2026).

According to the Energy Efficiency Fund, by the end of 2025, over 600 multi-family residential buildings had been modernized under the "Energodim" program, with average energy savings in fully modernized buildings reaching around 50 per cent. In total, the Fund's programs ("Energodim", "GreenDIM", "VidnoviDIM") have reached over 540.000 people, and the total amount of grants paid out has exceeded 4.2 billion UAH [10; 11]. At the same time, coverage remains limited: the programs are primarily aimed at buildings with homeowners' associations, whilst around 80 per cent of the multi-apartment housing stock do not have such associations and are effectively excluded from the main support mechanisms [1].

The results of a survey of representatives of homeowners' associations boards in Kyiv paint a similar picture at the local level. Awareness of the "EnergoDim", "GreenDim", "VidnoviDim" and "SvitloDim" programs is relatively high. However, the proportion of HOAs that have actually joined the programs over the last three years is almost half that of those who are aware of them. Discussions regarding the possibility of participation do take place within the boards, but they do not always result in the submission of an application or the implementation of a project.

From an economic perspective, this means that the available financial and technical tools for demand-side management in the energy sector are being utilized only partially. The housing stock remains one of the largest end-users of energy, whilst thermal modernization has the potential to significantly reduce energy consumption, household expenditure and the load on the system. However, the gap between awareness and actual participation suggests that the limiting factor is not so much the level of funding as the socio-administrative conditions at the level of the homeowners' associations.

The survey results make it possible to quantify and systematize the socio-managerial barriers to homeowners' associations participation in energy efficiency programs (*Tbl. 2*). Respondents were able to select multiple options, which is why the total percentage exceeds 100%.

The most common barrier turned out to be the financial burden (lack of funds for co-financing) – this was cited by 58% of respondents. This was followed by the bureaucratic complexity of documentation (47%) and a lack of time and human resources within the management board (38%). The passivity of residents was noted by 30% of those surveyed. Less common, but still significant, were uncertainty regarding payments and deadlines (25%), low confidence in the completion of projects (18%) and digital challenges (12%).

These barriers have clear economic implications. The financial burden increases initial costs and delays the realization of benefits. Bureaucracy and a lack of management resources increase the transaction costs of organizing participation. Uncertainty regarding timelines and low trust raise the subjective discount rate on future savings, whilst residents' passivity makes it difficult to achieve the necessary majority of votes. Digital challenges create additional time costs and the risk of errors.

Table 2

Key socio-administrative barriers to homeowners' associations participation in energy efficiency programs (n ≈ 180)

Rank	Barrier	Proportion, %	Type of barrier	Economic nature
1	Financial burden (lack of funds)	58	Financial and economic	High initial costs + delayed returns
2	Bureaucratic complexity of documentation	47	Institutional	Increase in transaction costs
3	Lack of time and human resources in management	38	Organisational and managerial	Limited management capacity
4	Passivity of residents	30	Social	Difficulty in securing a majority of votes
5	Uncertainty regarding payments / deadlines	25	Institutional	Increase in the subjective discount rate
6	Low confidence in project completion	18	Institutional (confidence)	Risk of failing to achieve the expected return
7	Digital challenges	12	Competence-related	Risk of errors and additional time spent
8	Other	5	–	–

Note: The question allowed for multiple answers, so the total percentage exceeds 100%. The results are ranked by frequency of mention.
Source: compiled by the author based on the results of an online survey of representatives of the management boards of housing associations in Kyiv (June–July 2026).

Thus, the barriers operate in a complex manner. Financial constraints are the most common, but they are closely intertwined with organizational, managerial, institutional and social factors. It is precisely this interaction that makes participation economically "costly" for the management board and residents, even with grant support.

As can be seen from Tbl. 2, the most common barrier is the financial burden (58%), followed by the bureaucratic complexity of paperwork (47%) and a lack of time and human resources within the management board (38%). Residents' passivity, uncertainty regarding payments, low trust and digital challenges were mentioned less frequently, but are also of significant importance. The results obtained are generally consistent with international studies on barriers to energy efficiency in the multi-family housing sector [19; 22; 14; 23; 21].

Summarizing the survey results, the socio-managerial determinants of homeowners' associations' participation can be presented in the form of a schematic (*Fig. 1*).

The schematic illustrates that the availability of grants and support programs is a necessary but insufficient condition for homeowners associations' participation. A key role is played by a set of interrelated socio-managerial determinants, which mediate the transformation of external support into actual participation and subsequent economic benefits for households and the energy sector.

It is also worth examining the findings regarding barriers to participation in Kyiv within a comparative regional context. Expert assessments by representatives of the banking sector help to clarify the mechanism behind regional disparities in the uptake of credit resources by homeowners' associations. According to Olena Dmitrieva, First Deputy Chair of the Management Board of Globus Bank, Lviv is the undisputed leader in lending to homeowners' associations, with Lutsk in second place; Rivne has recently joined this trend. In contrast, the 'picture is the opposite' for Kyiv – activity in the capital remains very low [8]. The mechanism behind this is institutional, rather than merely "cultural": a decision to take out a loan requires a vote by more than 50% of the homeowners' associations' co-owners, and this significantly increases the transaction costs of coordination, particularly in large apartment blocks, of which there are considerably more in Kyiv than in the western regions [8; 9]. This observation is hypothetical in nature and requires further empirical testing.

Official documents from the Energy Efficiency Fund record project activity by homeowners' associations in the Volyn region, particularly in Lutsk [12]. Lviv City Council provides systematic financial support to these associations through a program to reimburse part of the loan: in accordance with Resolution No. 4956 of 4 July 2024, homeowners' associations and housing cooperatives may receive compensation of up to 30% of the principal amount of a loan taken out for

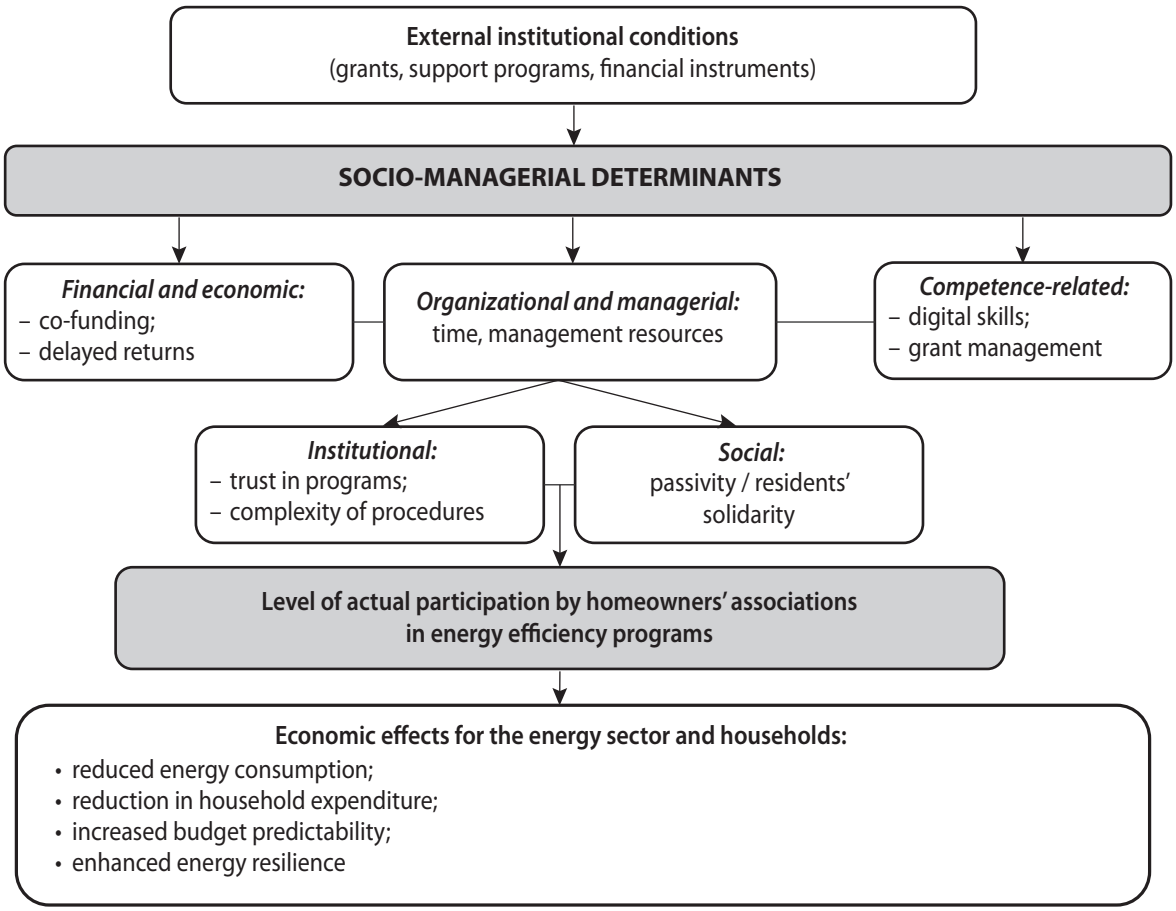


Fig. 1. Social and governance determinants of homeowners associations' participation in energy efficiency programs

Source: author's own work.

energy-saving measures, reconstruction and modernization of multi-family buildings (not exceeding 1 million UAH) [6].

It is important to distinguish between the two types of financial instruments, as this is where Kyiv's specific characteristics come into play. In terms of grant co-financing (without a bank loan), activity in the capital is quite high: since 2022, around 3 billion UAH has been allocated to projects aimed at improving the energy efficiency of residential buildings in Kyiv, of which over 2.3 billion comes from the city budget, and around 700 million UAH represents investments by the housing communities themselves; according to estimates by the Kyiv City State Administration, the investment pays for itself for residents within 2–3 heating seasons [5]. At the same time, the Kyiv Revolving Fund continues to actively finance local projects: as of 29 April 2026, it had provided over 36 million UAH in loans and credits for the purchase of backup power sources and energy-efficiency works in residential buildings [4].

Thus, the barrier for Kyiv is not participation in support programs as such, but rather a specific type of decision – taking out a bank loan, which requires a formal qualified majority of co-owners' votes.

Consequently, the configuration of barriers in Kyiv has its own specific characteristics: high engagement with grant-based mechanisms is combined with a lower willingness to make collective credit decisions, likely due to the higher transaction costs involved in coordinating voting in large buildings. In a number of cities in Western Ukraine, by contrast, there is a greater willingness among homeowners' associations to independently secure loan funds. These observations are preliminary in nature; the methodological limitations on their verification are set out in the section "Limitations of the study".

Based on the empirical data presented, it is possible to assess the extent to which the results obtained are consistent with the research hypotheses put forward. The survey results allow us to assess the extent to which the data obtained are consistent with the hypotheses put forward.

H1. ***The main barriers to homeowners' associations' participation in energy efficiency programs***

are not so much a lack of funding as the passivity of residents, the limited managerial resources of the board, and a low level of trust in the programs.

The survey data generally support this hypothesis. Most frequently, respondents cited the financial burden (58%) combined with the bureaucratic complexity of procedures (47%), a lack of time and human resources within the management board (38%), and insufficient confidence that projects would be completed (18%).

Residents' passivity was less frequently cited as a standalone major barrier. Financial constraints do not operate in isolation, but in conjunction with socio- and managerial factors: a lack of organizational resources, trust and competencies increases the perceived 'cost' of participation. A lack of information played a secondary role.

H2. ***A higher level of digital and managerial readiness among the homeowners' associations' board is positively associated with the likelihood of participation in energy efficiency programs.***

The hypothesis is supported by respondents' self-assessments; however, within the scope of this study, it was not subjected to formal statistical testing. The targeted (non-random) nature of the sample and the descriptive format of the collected data do not allow for the correct application of the χ^2 test for independence or logistic regression to establish a link between the level of competencies and actual participation – such testing is identified as an area for further research.

Within the scope of the available data, the qualitative analysis is consistent with the logic of the hypothesis. Boards that rated their readiness to work with digital tools (in particular the "Nash Dim" platform) and grant documentation more highly were more likely to demonstrate experience of participation or a willingness to submit applications. At the same time, a significant proportion of respondents explicitly highlighted the need for further training. They identified project and grant management, financial planning for co-funding, working with digital services, and communication with residents as the top priorities. This confirms that a lack of managerial and digital skills acts as a barrier in its own right: it increases the transaction costs of preparing documents, raises the risk of errors and reduces the board's confidence in successfully navigating the procedures.

Thus, even with financial support, the board's limited competence may hinder the conversion of potential participation into actual projects.

H3. ***Participation in energy efficiency programs helps to strengthen residents' cohesion and reduce conflict within the building, provided the board manages the process effectively.***

The survey data generally support this hypothesis. 65% of respondents believe that participation in programs tends to bring residents together. At the same time, almost one in ten homeowners' associations' reports potential for conflict, mainly related to co-financing issues. A positive social effect does not arise automatically, but depends on the quality of the board's management of the process.

Overall, the empirical data support the logic of the study, as illustrated in Fig. 1: a complex of interrelated socio-managerial determinants mediates the transformation of support programs into actual participation by homeowners' associations and subsequent economic effects.

Barriers to homeowners' associations participation operate in a complex manner and depend on the local context. The financial burden does not in itself prevent participation if there is trust, competence and organizational resources. Conversely, even in the presence of a grant, a lack of managerial capacity and trust makes participation economically "costly" for the board and residents. A comparative analysis reinforces this conclusion: in towns with smaller buildings and a greater willingness to make collective decisions (particularly in a number of towns in Western Ukraine), homeowners' associations' lending and project activity is higher. In Kyiv, where large blocks of flats predominate, the transaction costs of coordination rise even with well-developed municipal support. Consequently, improving the management capacity of homeowners' associations (through training, streamlining procedures and building trust) is not only a social but also an economic lever.

From the perspective of the energy sector, the housing stock remains one of the largest end-users of energy, and thermal modernization programs are a tool for demand-side management. Realizing their potential (reducing energy consumption and household expenditure, and increasing budget predictability) depends directly on socio-managerial factors at the homeowners' associations level. Enhancing the management capacity of housing association boards has the potential to increase the economic returns from existing support instruments and strengthen the energy resilience of the housing sector.

LIMITATIONS OF THE STUDY

The study has several limitations that should be taken into account when interpreting the results. Firstly, the sample comprises only representatives of homeowners' associations boards in Kyiv; therefore, the conclusions cannot be automatically generalized to all regions of Ukraine. Secondly, the data were collected via an online survey, which may introduce a bias

towards more active and digitally competent respondents. Thirdly, the assessment of managerial and digital competencies is based on self-assessment rather than objective measurements.

Fourthly, hypothesis H2 (the relationship between board competencies and participation) was tested only descriptively, without a formal statistical test: the size and targeted (non-random) nature of the sample, as well as the lack of detailed cross-tabulations by participation status, do not allow for the correct application of the χ^2 test for independence or logistic regression within the scope of this study. Finally, the comparative analysis of regional disparities is based on point data from official sources and expert assessments of the banking sector, rather than on a complete register of program participants at regional level: the available statistics from the Energy Efficiency Fund and the banks are not always comparable in terms of level of aggregation (region/city), time period and denominator (total number of potential participating housing associations), which limits the scope for formal statistical comparisons between regions. The optimal tool for such an analysis in future studies would be a χ^2 test for the independence of the proportion of homeowners' associations participating in the programs across regions, or logistic regression controlling for building size and the year of homeowners' associations registration, provided access to the Energy Efficiency Fund's complete register of applications.

Despite these limitations, the results obtained make it possible to identify key socio-managerial determinants of homeowners' associations participation and to outline directions for further research.

CONCLUSIONS

The study carried out has made it possible to identify and systematize the socio-managerial determinants of homeowners associations' participation in residential energy efficiency programs and to assess their role in reducing households' energy vulnerability and implementing demand-side management policies in the energy sector.

- Despite the existence of government and grant programs and a relatively high level of awareness, the actual participation of homeowners' associations remains limited. The potential of these programs as a demand-side management tool is only partially realized.
- Key barriers include the financial burden combined with bureaucratic complexity, a lack of managerial resources, insufficient trust, competence gaps and the passivity of some residents. These barriers increase the transaction costs of collective decision-making.
- The managerial and digital competencies of management boards play an important role: a higher level of self-assessed readiness is positively correlated with the likelihood of participation, whilst a significant proportion of management boards require additional training.
- Effective management of homeowners' associations is a critical institutional factor that enables technical investments to be transformed into socio-economic value for communities and helps to foster greater cohesion among residents.

Thus, socio-managerial determinants are key factors in the effectiveness of demand-side policies in the housing sector. Enhancing the management capacity of homeowners' associations, streamlining procedures and providing targeted training for management boards can significantly increase the economic return on existing financial instruments supporting energy efficiency. ■

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