

Modernization of Housing Estates Towards Sustainable Development: What do Housing Estate Managers Provide, What do the Users See?

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Abstract. *Modernizing multi-family residential estates in operation for about 40 years is a multifaceted and complex process. In Poland, these assets cannot be considered "degraded" yet, they are not an obvious object of deep retrofit actions. The literature on the subject and the author's own research confirm that the management of Polish housing estates is carried out with the focus on current repairs and improving energy efficiency by insulating the buildings' envelopes. Poland lacks long-term programs to implement retrofitting actions based on the analysis of both social and technical needs and aimed at improving the estate's sustainability parameters. The author puts forward an original approach to the programming of sustainable housing stock retrofit based on the PEARS model (People-Environment-Actions-Resources-Sociology). The paper focuses on the social research part of the model and presents the case-based analysis – the results of the recurring survey conducted to provide input for sustainable planning of the estate improvements. The paper is a summary of over ten years of research and studies on practices of maintenance of infrastructure and buildings, changing user needs, and user opinions on the possible directions towards sustainable housing.*

Keywords: *Housing Stock, Deep Retrofit, Sustainable Housing, Recurrent Survey.*

1 Introduction

Polish housing estates with prefabricated buildings, created between nineteen-sixties and -nineties, are still considered a valuable asset (Zyga, 2014). This is due to their generally satisfactory technical condition (Nowogońska, 2017), good location and presence of local amenities, as well as the shortage of affordable housing. However, the maintenance of these assets becomes a challenge because of the scale of the problem (Ostańska, 2019) (buildings of this type and age are present in practically all towns and cities, as shown in Fig. 1), complex ownership structure (obstacle in the decision-making process (Radziszewska-Zielina, 2006)), and changing regulations (promoting individual ownership of flats (Radziszewska-Zielina and Gleń, 2013, 2014)). The growing expectations towards energy efficiency, user safety, and comfort, accompanied by growing requirements of the building codes, make the “prefab blocks” becoming obsolete. Therefore, keeping the buildings fit for purpose requires (Runkiewicz *et al.*, 2014) not only repairs, but also investment (Yiu and Leung, 2005; Taczanowska and Ostańska, 2012; Radziszewska-Zielina and Gleń, 2013; Komar, 2014, Wójtowicz, 2014; Stevenson and Baborska-Narozny, 2017). She wrote about the types and needs of surveys in architecture, among others, about the types and needs of surveys in architecture Niezabitowska (2014).

The residents of the housing estates have the greatest knowledge on the functional deficiencies of the flats, the buildings, and the infrastructure and amenities of the estates. As flat owners, members of the housing cooperatives, or just clients-users, they have also the power

to oppose the investment plans proposed by the estate management as well as the power to affect them. As observed in practice, the residents rarely use the opportunity of the latter, so they rarely participate in the management of the estates in an active way.

The aim of the research presented in this paper was twofold: to collect input for planning improvement measures customized for a particular estate directly from the users, and to stimulate the interest of the residents in the possibilities of influencing the managers' decisions, especially regarding the current needs and corrective or improvement actions aimed at "reviving" the estates (Ostańska, 2009, 2015).

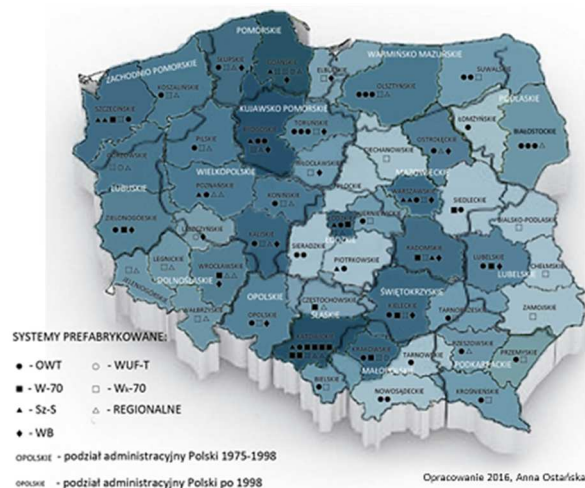


Figure 1. Distribution of prefabricated housing systems in Poland (1975-1985) according to location of prefabrication plants.

The author conducted a number of surveys in selected housing estates in three voivodships (Fig. 2). Most of them were carried out in Lubelskie Voivodship and repeated in regular intervals to juxtapose physical changes in the estate with changes of the residents' opinions on most urgent or most wanted improvements.



Figure 2. Location of surveys.

The paper presents the methodology behind the research and discusses results obtained in three particular housing estates in Lubartów (Ostańska, 2018). The surveys consisted in a questionnaire-based direct interview with the residents conducted first in 2010, and repeated in 2014.

2 Methods

The idea of the survey is presented in Figure 3. Its starting point was the selection of the object of research: an estate. After obtaining the estate management's consent to conduct the survey, a preliminary "in situ" assessment of the condition of the buildings and infrastructure was conducted and clusters of buildings representative for the estate were selected to serve as the sample. The residents of these buildings were then approached at home to provide answers to a set of questions on both renovation (*R*) and modernisation needs of the estate, the building and the flats. The modernisation comprises sustainability (*Me*) and functional (*Mf*) aspects.

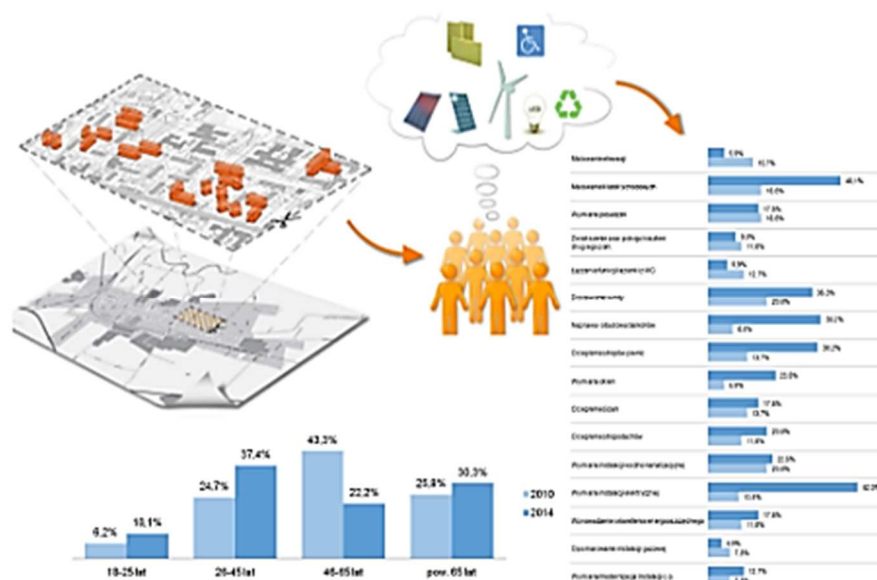


Figure 3. The idea of the survey on the opinions of the housing estate residents.

The interviews were intended to be repeated according to the same questionnaire in regular intervals. The purpose of repeating the survey was to update the insight into the modernization needs based on the opinion of the residents, and analyzing the perceived effects of the estate managers' activities.

The participants of the research were limited to adults living in the blocks of flats selected as the sample. Only one person per flat was asked to give answers.

The interviews were conducted on the basis of an original questionnaire: a standard form adjusted to the particularities of the housing estate in question. The questionnaire contained a total of 26 questions, including open-ended, closed-ended single-choice and closed-ended multiple-choice questions. Semi-open questions (logically open, technically closed) provided a list for multiple choice of feasible corrective actions, including measures for saving energy and improving functionality. Other semi-open questions concerned the list of common-use facilities

present in the estate to check if they are still in use. A single logically and technically open question concerned the works the residents conducted on their own in their flats. The classification and demographic questions concerned: age, education, migration and participation in the costs of renovation.

Thus, the full scope of the survey questions comprised:

- deficiencies in local amenities,
- condition of the estate's infrastructure,
- comfort of living (buildings and dwellings),
- opinion on the priorities for corrective actions.

The complete questionnaire form can be found in Ostańska (2018) (Appendix 3a, Questionnaire C/2010).

3 Results

In the particular case presented in this paper, the survey was conducted twice to answer the following questions:

- 1) Did the residents' priorities on "the most urgent needs" change over time and with the measures actually taken in the estate?
- 2) Did the preferences of the housing estate residents' needs change in terms of repair/renovation works (*R*), modernization measures aimed at environment protection (*Me*), and functional modernization (*Mf*)?
- 3) Did the housing cooperative's spending stay in proportion to the preferences of the residents?

The research conducted on three housing estates in Lubartów produced 102 filled questionnaires in 2010 and 102 questionnaires in 2014. Analysis of the results of three housing estates in Lubartów shows that the age structure of people surveyed in 2010 and 2014 is significantly different ($\chi^2[3, n = 196] = 10.46; p = 0.015; \phi = 0.231$). It should be noted that the number of people aged over 65 slightly increased (25.8% in 2010 vs. 30.3% in 2014). However, significant differences (decrease in 2014 compared to 2010) are observed in the age group 46-65. The remaining groups do not differ from each other in particular years (Figure 4).

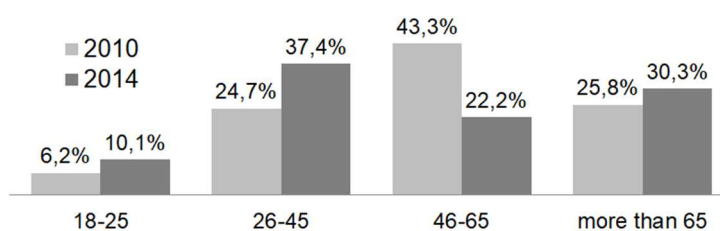


Figure 4. Age structure of the respondents: 2010 and 2014.

Considering the residents' responses to the perceived "most urgent needs" (Figure 5), it was observable that the average number of unsatisfied "most urgent needs" per respondent in 2014 (2.63) was lower than in 2010 (3.95) ($t(204) = 2.96; p = 0.003$). The detailed analyses confirmed differences in seven of the sixteen areas studied:

- Facade painting ($\chi^2[1, n = 204] = 5.10; p = 0.024; \phi = 0.158$) - increase from 5.9% to 15.7%,

- Painting staircases ($\chi^2[1, n = 204] = 19.02$; $p < 0.001$; $\phi = -0.305$) – a drop from 46.1% to 18.6%,
- Installing a lift ($\chi^2[1, n = 204] = 6.17$; $p = 0.013$; $\phi = -0.174$) – a drop from 36.3% to 20.6%,
- Repair or replacement of balconies ($\chi^2[1, n = 204] = 25.81$; $p < 0.001$; $\phi = -0.356$) – a drop from 39.2% to 20.6%,
- Basement ceiling insulation ($\chi^2[1, n = 204] = 15.93$; $p < 0.001$; $\phi = -0.279$) – a drop from 38.2% to 13.7%,
- Window replacement ($\chi^2[1, n = 204] = 12.66$; $p < 0.001$; $\phi = -0.249$) – a drop from 23.5% to 5.9%,
- Replacement of electrical installation ($\chi^2[1, n = 204] = 40.16$; $p < 0.001$; $\phi = -0.444$) – a drop from 52.0% to 10.8%.

No significant differences were noted in other aspects. Interestingly, only one aspect (facade painting) received a significant increase of residents' interest, almost by 10%, in relation to the results obtained in the first study.

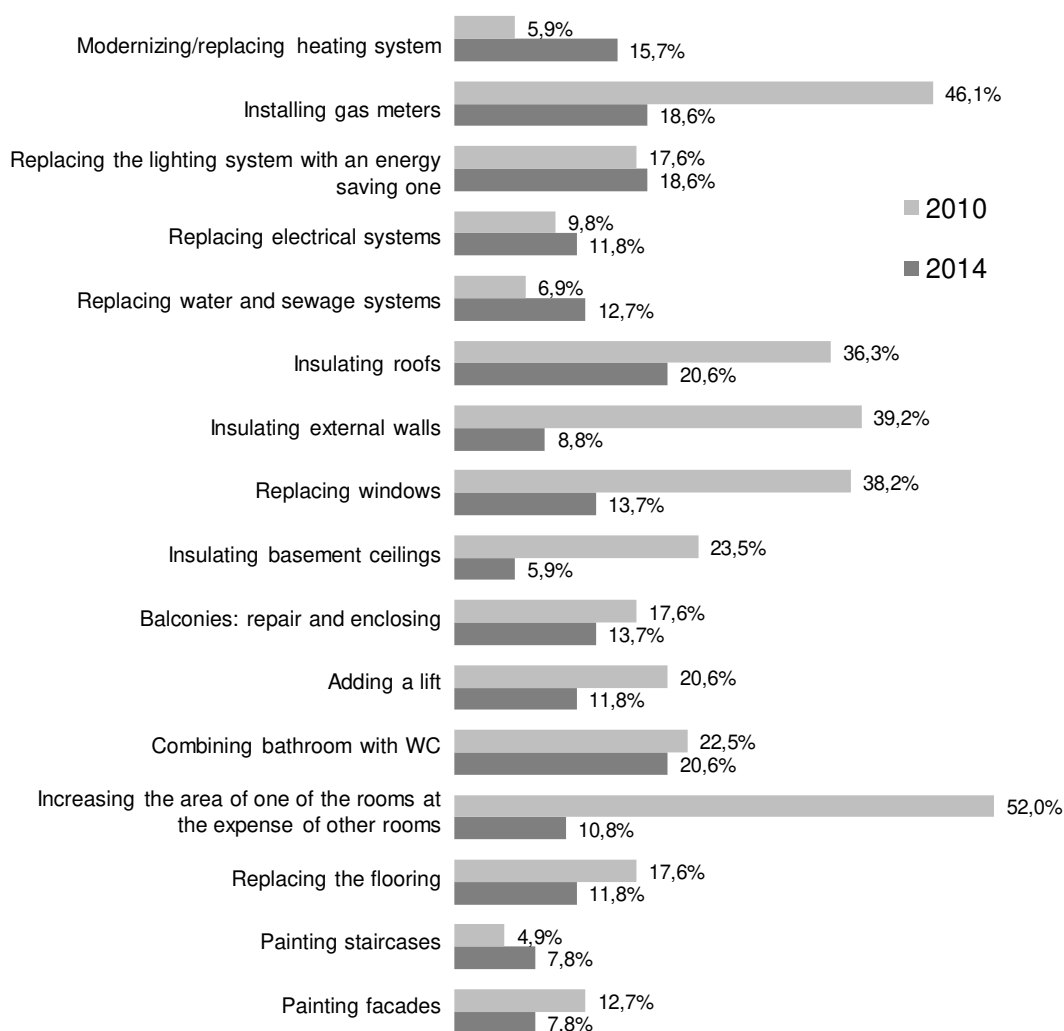


Figure 5. Priorities of improvements according to the respondents (share in the number of all indications).

Comparing the results of 2010 and 2014 (Figure 6), differences were observed in the category of “modernization measures aimed at environment protection” (*Me*) (decrease from 68.6% to 58.3%; $t(204) = 3.975$; $p < 0.001$) and functional modernization (*Mf*) (increase from 16.7% to 30.3%; $t(204) = -2.436$; $p = 0.016$).

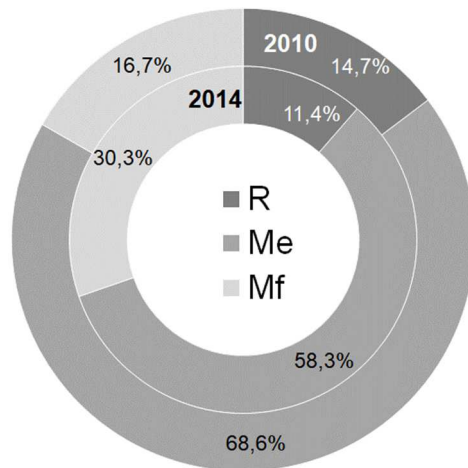


Figure 6. The residents’ priorities of “most urgent” improvements according category and the year of the survey (description in the text).

The next step was to compare the priorities of the estate management with the priorities of the residents. This was done by juxtaposing the shares of actual spending on repair/renovation activities (*R*), modernization measures aimed at reducing the estate’s environmental impact (*Me*), and functional modernization (*Mf*) with the proportions of the numbers of the residents’ indications of the most urgent needs that belong to these categories (Figure 7). As expected, significant discrepancies were found.

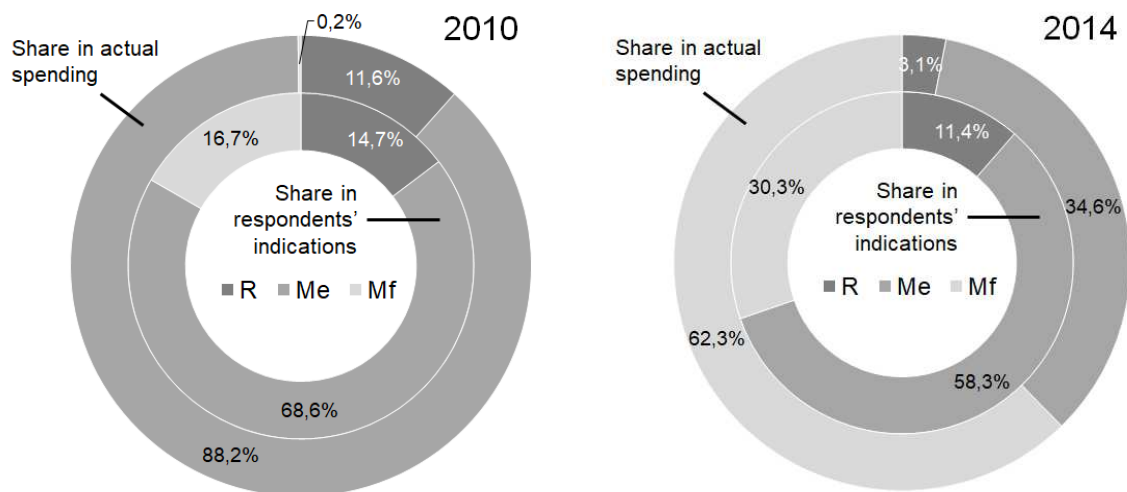


Figure 7. Users’ perceived “most urgent” needs for improvements vs. actions taken by the estate managers expressed as the share in total spending (description in the text)

In 2010, 68.6% of all residents' indications on the "most urgent needs" concerned *Me*, whereas the housing cooperative spent 88.2% of its budget on actions within this category ($t(211) = -7.544$; $p < 0.001$). As for *Mf*, the cooperative spent practically nothing, while 16.7% of the inhabitants pointed to the urgency of actions from this category ($t(211) = 7.000$; $p < 0.001$).

In 2014, current repairs consumed only 3.1% of the cooperative's budget, though the residents' indications on actions from this category were 11.4% of all indications. The *Me*-related "most urgent" needs constituted 58.3% of all residents' indications, whereas the housing cooperative's spending on them constituted 34.6% of their total expenditures ($t(102) = 4.940$; $p < 0.001$). The "most urgent needs" in functional modernization had 30.3% of residents' indications, but the cooperative spent as much as 62.3% of the budget on this category ($t(102) = -6.666$; $p < 0.001$). This was possible due to extra funds from an EU-sponsored urban regeneration grant.

4 Summary and Conclusions

The residents' opinions on "urgent needs" related with maintenance and improvements to the fabric of their housing estates evolve over time (between the first survey in 2010 and the next one in 2014) and with the measures actually taken by the estate management. In particular, the repair/renovation needs seemed to be at least partly satisfied, as less people pointed to the items from this category in the second survey. A similar number of items from the list of "modernization measures aimed at environment protection" were selected as worth implementing in 2010 and in 2014. The need for "functional modernization" visibly increased, which may be related to the growing age of the residents and growing needs for comfort and accessibility.

The proportion between the housing cooperative's expenditures on maintenance and modernization measures does not correspond to the reported needs of the residents, especially in terms of functional modernization: in the case of the presented housing estate, no investment was done in functional modernization at all. Despite the passage of time, the actions taken by the estate management are not consistent with the expectations of the inhabitants.

The method of monitoring the residents' needs adopted in the presented research, so a direct interview, proved feasible. The results provide a valuable input on user expectations, and this input was successfully used in practice to define the scope of modernization projects in several housing estates in Lubartów. Keeping up to date with user needs, the housing estate managers are able to revise the action plans.

Though the face-to-face interview is a labor-intensive way of collecting input, both the cost and effort related with data collection and analysis proved acceptable. However, the surveys should be continued on a regular basis. To facilitate the dialog between the residents and the estate management and to streamline the data collection process in the future, it is advisable to construct an Internet platform. Its design is the current subject of the author's research.

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