


# Improving functional standards of apartments in buildings from large-panels, on the example of solutions applied in Lublin in the 1970s and 1980s of the 20<sup>th</sup> century

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**Abstract:** Housing blocks constructed from prefabricated elements have been the backbone of housing resources in many Polish cities in the last fifty years. Over the time, the residents' expectations regarding the residential amenity standards, as well as demographic structure of the estates built in the communist era have changed. Therefore, the current residents' needs significantly differ from the needs and expectations of those who took over the newly built flats in the last quarter of the 20<sup>th</sup> century. Fundamentally, the functional and spatial standards of flats built before 1989 are already out of date. The proper functioning of the usable dwelling space of these apartments has gained additional importance due to the inhabitants getting progressively older and, especially recently, the prolonged SARS CoV-2 pandemic. The introduction of the lockdown, which involved strict restrictions on movement outside the place of residence during the pandemic, made the apartments the centre of life and a place of work for many families. Suddenly, for psychophysical reasons, the importance of having larger floor space, than the functional solutions typically used in the 1970s and 1980s has increased. It appears that the residents began to take interest in all possible solutions to improve the functionality of their homes. The aim of the article is to present proposals for contemporary architectural solutions that can improve the functionality of these apartments that would increase residents' standard of living and everyday comfort.

**Keywords:** large panel, Polish People's Republic, modernization, living environment, functionality

## 1. Introduction

In Poland, there are currently over 60,000 residential buildings dating from last century that were built in large-panel technology. These residential blocks of flats are inhabited by nearly 12 million people, which constitutes almost 1/3 of Polish population [28]. The imple-

mentation of housing development on such a large scale was the result of the state's housing policy between 1952 and 1989, aimed at solving the serious housing crisis. As a result of the government commissioned research, a multi-storey residential structures built from large precast concrete panels were introduced and mass production was implemented. 1970s and 1980s were the decades of the most intensive development of this type of construction in Poland. The facilities were built in a hurry and their spatial parameters (both interior and exterior) were rigorously governed by strict architectural standards [13] and the specific structural arrangement was required to be adhered to. The vast majority of the facilities erected at that time, have been in use continuously to this day.

For at least a dozen of years, both politicians and construction experts have been urging for need of assessing the current condition and subsequent modernisation of large-panel residential buildings<sup>1</sup>. Furthermore, in the light of the ever-growing demand for new houses, architects, economists, and sociologists draw attention to the issue of the shortage of housing resources. Increasingly, the issues of interior functionality, appropriate technical equipment, aesthetic quality, and energy efficiency are coming into light. Another significant problem of the communist era residential architecture *moral deterioration*<sup>2</sup>, a consequence of the buildings no longer meeting the amenity and comfort expectations of the inhabitants. Furthermore, this issue is very apparent in the residents' feedback, a confirmation that the problems of large-panel constructions have intensified and become a real obstacle to efficient functioning. Strictly defined by law and rigorously controlled spatial standards of flats inside buildings made with industrialized technologies in the 1970's and 1980's does not meet the modern needs of residents, and the functional layout clearly deviates from the solutions proposed today.

This article presents selected technical possibilities and proposals of architectural solutions aimed at improving the functional quality and amenity of flats in prefabricated constructions using south-eastern Poland as an example. The identified problems, analysed examples, and propositioned solutions attempt to indicate the possible functional changes to stop, or even reverse, the process of sub-standardization of the housing estates of prefabricated buildings. Studied issue is one of many factors affecting the standard of housing in large-panel buildings and is intended only as an introduction to a broader study of restoring full functionality to this type of buildings.

## 2. The research status

The historical background, taking into account the broad political legal and economic context of the construction of the analysed types of buildings, is widely described by Basisa [3] and Korzeniewski [13].

Many scientists emphasise the necessity of modernisation and revitalisation of buildings constructed in prefabricated modular technology. The urgent need to outline these innovations is indicated in publications of authors including, but not limited to: Ostańska [17],[18], Cibis and Olejko [4], Gronostajska [7],[8], or Kłopotowski [11]. The analysis of housing standards

<sup>1</sup> In 2013, the Deputy Minister of Construction in the Sejm of the 7<sup>th</sup> term, Janusz Żbik, announced a tender for examining the technical condition of large-panel buildings, while the Minister of Investment and Development in the 8<sup>th</sup> term of the Sejm, Jerzy Kwieciński, assured in 2019 that funds for modernization of 60,000 would be secured in the state budget. this type of facility..

<sup>2</sup> Defined as the persistent dissatisfaction of residents with the surrounding architectural space, resulting from its insufficient spatial, functional and aesthetic standard. Following [12]

and their changes over the years is carried out in their research by Płachcinska and Grudziński [9] and Płachcinska and Zaniewska [22].

The progressive depopulation processes in housing estates of a similar type in countries other than Poland, as well as actions undertaken by individual countries are covered in publications by Balache and Salagnac [2], Łodziński [16], Czado [5], and Dmitruk [6]. The current epidemiological situation confirming the intensification of problems is covered in Ostańska's [18] social researches and calls for an urgent need to take remedial action. As a direct result of many months in isolation, elderly residents were forced to remain in their apartments (SARS CoV-2), which also affected their physical fitness. These adverse effects of the lockdown, as well as restrictions of the movement of the residents within the building and on the premises, contributed to the development of the proposals presented in the article.

Issues concerning pro-environmental solutions applied to buildings of a similar type to those described in this article are studied by Życzynska and Cholewa [23], and Ostańska and Medvedeva [20] in particular in terms of thermal insulation technologies. In a broader context, pro-environmental and pro-social issues that can be applied to the process of modernization of buildings built with the analysed constructional systems are studied by Krężlik [14] and again by Ostańska [21]

Interior arrangements of residential buildings from the 1950` and 1960` are studied and analysed by Kruk [15], from the point of view of users' needs, as well the political and social realities of the communist era Poland. The possibilities of urban revitalization of a housing estate built in the OWT-67 technology, aiming to improve the living conditions of the residents is studied in the works of Janus and Janusz [10].

### **3. Scope of the study and research methodology**

Exemplary flat layouts of apartments within the buildings made with WBLŻ and OWT-67 structural systems<sup>3</sup> were subjected to analysis. These systems were chosen because of the substantial amount of multifamily buildings constructed in the Lublin region in the above-mentioned technology. For this reason, conducted issue addresses the regional, rather than individual significance. The research was preceded by inventory work, archival searches, photographic inventory and an extensive study of the original design documentation, made possible by the courtesy of the administration of the St. Moniuszko housing district in Lublin. Research and analysis of existing solutions were conducted on the basis of a literature study, helpful in determining the contemporary needs of residents, a site inspection, as well as many interviews with residents of Lublin's communist-era housing estates. The proposed solutions are based on the author's design experience, as well as on the evaluation of the implemented solutions by both the author and users after several years of functioning.

### **4. Functional layouts of apartments**

Over the four decades since the construction of the most of the multi-family buildings in prefabricated technology, significant changes have occurred in the expectations regarding spatial standard of flats, room layout, and mutual relationship of dwelling spaces (zoning). The limited functional areas of flats were the result of the construction laws, applied construction systems, and socio-economic conditions of the communist era. According to architect Rita

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<sup>3</sup> Technical abbreviations of the names of Large-panel building technologies from the communist era Poland.

Nowakowska<sup>4</sup>, between 1952 and 1989, there was creative freedom in urban design, while residential architecture was completely subordinated to the limits of the construction system, limited by tight budgeting, giving the architect no possibility of creative shaping of building and its interior.

The architectural norms in the communist Poland [24][25][26], which regulated the size of residential premises, had to be strictly followed, and any deviation, such as increasing the usable area of the object, often resulted in the rejection of the project by the authorities [3]. The spatial standard of flats was determined by the authorities based on the expected number of tenants, naming them successively from M-1 to M-7<sup>5</sup>. It can be observed that despite the gradual increase in the normative values of flat square meterage in subsequent resolutions (Table 1), these parameters differ from the modern expectations of apartment owners. According to the information from the Central Statistical Office for 2017 [1], the average living space per 1 tenant is 27.8 m<sup>2</sup>, which is already in the upper limit of the area allowed for the M-1 category from the 1974 norm. Flats intended for two people, have a floor area of 40-50 m<sup>2</sup>, which corresponds to the normative value, expected for 3, or until 1974, even for 4 people. Thus, it can be observed that the expected spatial standard of a contemporary apartment it is noticeably higher than that offered in large-panel construction<sup>6</sup>.

Table 1. List of spatial standards for residential buildings from 1959 and 1974

Appartment category	Useable floor area 1959 (m <sup>2</sup> )	Useable floor area 1974 (m <sup>2</sup> )	Permitted increase of upper limit for technical reasons (m <sup>2</sup> )	The maximum upper limit of the size of a flat in a given category (m <sup>2</sup> )	Number of residents
M-1	17-20	25-28		28	1
M-2	24-30	30-35	1	36	2
M-3	33-38	44-48	4	52	3
M-4	42-48	56-61	2	63	4
M-5	51-57	65-70	3	73	5
M-6	59-65	75-85		85	6 or 7
M-7	67-71	No norm			

Source: [13]

A significant obstacle in the unrestricted arrangement of residential interiors in large-size prefabricated panel buildings is a system of structural walls. They are often located inside the premises<sup>7</sup>, preventing or considerably hindering any adjustments to the layout of the rooms that the residents may wish to introduce.

<sup>4</sup> The interview was conducted on September 6, 2016 in Warsaw. Rita Nowakowska is the author of many architectural and urban projects in Lublin, incl. the building of the municipal office in Lublin, at ul. Wieniawska 14, housing estate Tatary, housing estate Kalinowszczyzna, housing estate them. Stanisław Moniuszko, the estate of Henryk Wieniawski and the campus of the Lublin University of Technology.

<sup>5</sup> The numer indicating the number of residents.

<sup>6</sup> The actual phenomenon of selling micro-apartments, smaller than 25 m<sup>2</sup>, was deliberately omitted due to a clear violation of building regulations relating to the minimum floor space of a flat and mainly due to the temporary nature of living in this type of premises.

<sup>7</sup> And not only constituting the external walls of residential premises, as is often solved nowadays.

Making openings in structural walls to improve the functionality of the apartment's interior is technically possible, although rarely implemented, due to difficulties in obtaining the consent of the building community or the property manager. This is probably due to the lack of technical knowledge and willingness to understand the current needs of the residents.

As part of the research, functional and spatial solutions of buildings constructed in accordance with OWT-67 and WBLŻ systems, which are two highly popular Polish building technologies from the 1970s and 1980s, were analysed. 20<sup>th</sup> century design solutions significantly differ from the concepts used today. Table 2 compares the solutions adopted primarily in the analysed buildings with the contemporary interior layout design trends. Modern design trends were determined on the basis of an analysis of numerous examples of contemporary realizations of multifamily housing facilities in the country, as well as the author's practical experience in the field of designing such facilities and the knowledge of customer requirements.

Table 2. Comparison of interior layout solutions adopted in prefabricated systems from the 20<sup>th</sup> century, with contemporary design trends

No.	Systemic solutions in 1970s and 1980s	Contemporary solutions
1	No clear zoning of the interior of the apartment	Rooms divided into a day zone (living room, kitchen, dining room) and a private zone (bedroom, bathroom, wardrobe, children's bedrooms)
2	Kitchen as a separate room	Possibility to connect the kitchenette with the dining room or living room area
3	Bathroom and toilet as separate rooms	Bathroom and a toilet as one room + additional toilet in the living area
4	The front door opens into the private zone (WBLŻ) or opposite the toilet and bathroom (OWT-67).	The entrance door opens into the living area
5	Extensive hallway space inside the apartment.	Minimal space dedicated to hallways, increased floor area of functional rooms
6	A living room is also the parents' bedroom, it is not possible to fit in a double bed	A separate bedroom with a double bed as a separate room, in addition to the living room
7	Small, non-functional balconies, no communal gardens	Large balconies and/or communal gardens constituting additional functional space
8	No foreseen service premises/utilities on the ground floors of the building	Service premises are frequently included on the ground floor of the building
9	No passenger lifts in under five-story buildings (OWT-67)	Residential buildings over 4 storeys must be equipped with a passenger lift. Often this type of amenities is available in lower buildings.
10	The ground floor, raised by half a storey, requires climbing 7-8 steps	The entrance to the building is designed to be accessible from the ground-floor level

As part of research, reworked at Lublin University of Technology practical classes, as well as dissertation theses of Architecture faculty students and numerous alike designs implemented by author, a number of design solutions were provided to help adjust the interiors of the communist era buildings to modern standards, while maintaining the existing structural layout, the size and the location of windows, and the number of rooms. The large-block system (WBLŻ) turned out to be more susceptible to changes allowing for fuller interior optimisation. WBLŻ has two basic types of flats, 47.14 m<sup>2</sup> and 57.15 m<sup>2</sup>, which are mirrored in the layout of the entire building. For the purposes of the article, a study of the rearrangement of

the residential interior of the premises with an area of 57.15 m<sup>2</sup> was made, and the effects of the work are presented in Fig. 1.

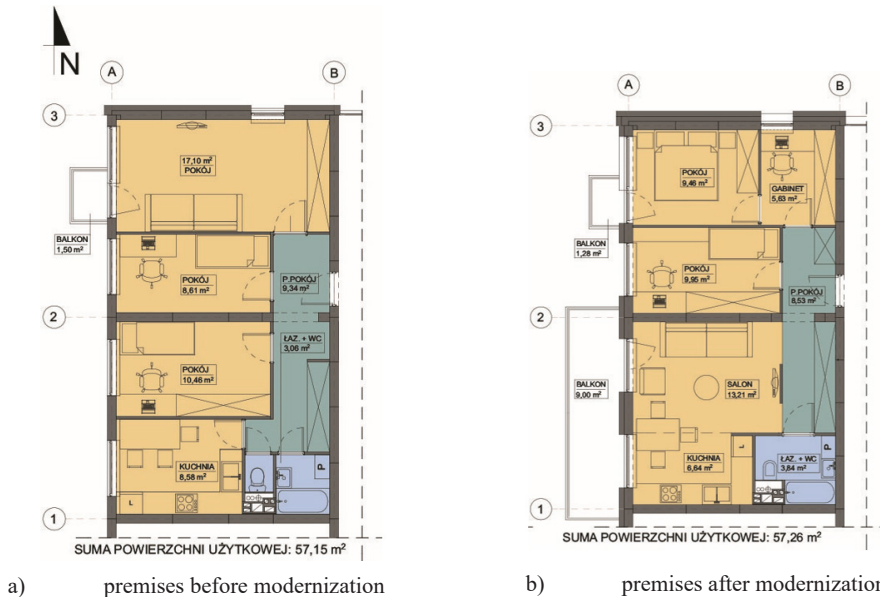


Fig. 1. Comparison of layouts of living quarters in a WBLŻ type building. Original state and designed state. Compiled by M. Dmitruk

The above example shows modern zoning of the apartment into a living zone and private zone. The direction of the front door opening, leading to the living area, was maintained, and the kitchen and the living room were merged. There is a spacious sleeping area with room for a double bed. In addition, a study/office area was included. This was possible due to the access to the window in the gable wall. The correct technological line of kitchen appliances was restored. The bathroom and toilet were merged, increasing its area by 0.78 m<sup>2</sup> and provided the required manoeuvring space in front of the bathroom fittings. The hallway was reduced by 0.81 m<sup>2</sup>, but the storage space was almost doubled. The hallway was significantly shortened as a result of a merged day zone, originally situated on two opposite ends of the apartment. The total usable area was increased by 0.11 m<sup>2</sup>. The ventilation of the rooms, sewage system and gas installation were unchanged, while water supply system was changed only slightly. If necessary, a variant of this design allows to change the location of the cooker and to replace of the gas cooker with an electric one. It is important to note that in order to ensure optimal spatial comfort, the layout of the apartment after the changes will be designed for a family of the 2+1 model, rather than 2+2 as originally envisaged. However, it should be emphasized that the apartment has never actually met the spatial needs of a family with two children, and the number of optional sleeping places in the proposed variant has de facto increased.

The design analyses (Fig. 1) provide for thermal insulation of the facade and, due to the change in the location of the living room, an additional large balcony, which will undoubtedly meet the expectations regarding the residents' leisure needs.

Unquestionably, there are more difficulties with optimizing the interior layout of OWT-67 system buildings. This is due to the cross-structure layout, which makes the layout of passages in individual premises challenging to adjust. In addition, there are as many as five

types of apartments in this system, which requires a more individualized approach to design analyses. Although the suggested modernization of the interior layout (similar to the case of the WBLŹ system) can be solved within the existing arrangement of openings in the façade and structural walls, it requires some major changes to the kitchen and bathroom utilities<sup>8</sup>.

In the sample apartment analysed (Fig. 2), the kitchen and the living room were combined, moving the day zone's location to the south side, and increasing its area by 1.44 m<sup>2</sup>. A proper technological line of kitchen appliances and a place for a full-size refrigerator was provided. Furthermore, the bathroom was relocated, with the use of an existing opening in the structural wall. For structural reasons, the toilet remained separate from the bathroom, but its floor area was extended for comfortable use. There is space for a double bed and a large wardrobe in one of the bedrooms. The direction of the entrance door opening has also been corrected, making it easier to access the wardrobe. These changes will not require additional permits as the design analysis assumes the replacement of the gas cooker with an electric one. As in the case of the WBLŹ system, the thermal insulation of the building was considered. It was also proposed to add a large balcony to the exterior of the day zone.



a) premises before modernization

b) premises after modernization

Fig. 2. Comparison of the layouts of living quarters in a building in the OWT-67 technology. Original state and designed state. Compiled by M. Dmitruk

The possible changes to the layouts of the rooms analysed in the above examples are legally insignificant, which means that they can be without the need to report work or obtain a building permit. However, such adjustments can only be applied within residential premises.

<sup>8</sup> Ventilation channels will have to be led into the kitchen and bathroom above the false ceiling in sanitary rooms.

This evidences that despite the prevailing opinion about rigidly defined interior layouts in prefabricated constructions, numerous functional improvements are still possible. A proposal to relocate and enlarge balconies may be more difficult, due to the need to obtain the consent of residents, the property manager and the relevant building supervisory authorities. In addition, it would be necessary for all residents to participate in the cost of such a project. However, practice shows that this type of solution is used in similar facilities across the country<sup>9</sup>.

## 5. Summary

The main advantage of the presented proposals for reorganizing the space inside apartments in large-panel buildings is the possibility of universal implementation of solutions and making upgrades, according to a single design study. Development of a comprehensive building modernization plan for these constructions, supported by the real needs of residents and considering technical possibilities could be used throughout the country. Similar solutions are already used abroad; the Czech website [panelplus.cz](http://panelplus.cz) [27] offers designs for both interior and facade solutions, tailored to specific building systems, and offers case studies of successfully implemented modernisations. Moreover, the proposed changes in interior layout do not require additional permits or interference with the structure of the building, which greatly simplifies their implementation and gives the possibility to introduce them on an individual basis, according to the needs and financial capabilities of users.

It is possible to improve the quality of life in a prefabricated building. However, it is important to note that improving accessibility for people with disabilities by increasing the functional and spatial standard of flats requires determination, specialist technical knowledge, general consent of residents and a willingness to share in the costs. Also, removal of architectural barriers, e.g., replacement of balconies, requires a team of qualified professionals. Yet, examples of proprietary solutions confirm it is possible to counteract the growing problems of prefabricated buildings' residents, especially people with disabilities and the elderly, but also entire families.

Improving housing standards in communist era developments is a broad and multifaceted issue. It concerns both technical, architectural, urban planning, social and economic issues. Only through comprehensive and coordinated modernization measures, supported by active participation of residents, can a lasting improvement in housing standards be achieved. The study cited in this paper is intended as a starting point for further research and as a contribution to further discussion of the functioning of large-plate buildings in the city space in the coming decades.

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<sup>9</sup> This was done, among others, in the multi-family buildings of the Jaskółka Housing Cooperative in Tarnów.



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