Education through inclusive and multi-sensory experiences - a real social space accessibility audit

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ABSTRACT: Global socio-demographic changes and ageing populations require innovative design and planning solutions, but above all it is necessary to address the current spatial needs in the living and residential environment of people with disabilities and future seniors. Hence, architecture students from Kielce University of Technology in Poland, participated in research and data collection on new spatial needs in human functioning based on the social space of the housing estate of the *Sady* Kielce Housing Cooperative in Kielce, Poland, built in the 1960s-1970s. The analyses focused on architectural and urban barriers contributing to the exclusion of people with various disabilities from social spaces. The overarching aim of the research was to identify general factors contributing to the inaccessibility of these spaces and to identify adequate spatial needs to support independence in daily living for people with disabilities. In this experience, the students proved to be excellent observers, able to think logically and verify everything empirically. This will certainly influence the future design practice of young architects-urban planners, as well as facilitate strengthening the scientific capacity.

INTRODUCTION

The phenomenon of an ageing population is characteristic of highly developed countries [1]. Europe, including Poland, has seen an increase in this process in recent years. Population ageing is, therefore, becoming an important issue in demographic research, especially in Europe. The decline in the working population and the increase in the number of older people in need of support and care has numerous socio-economic consequences, with a greater economic burden on people of working age being the most prominent one. The main consequences of this phenomenon include an increase in the demand for health and welfare services, a decrease in labour force participation and a change in the structure of consumption, as well as a transformation in the structure of income sources.

The increasing rate of population ageing in European countries, for the period 2016–2019 compared to 2010, indicates that the problem continues to grow. Poland, too, is clearly approaching the values of the coefficients of the European Union countries, characterised by a higher degree of population ageing [2]. The pronounced global trend of ageing populations presents architects and designers with new and challenging issues. The ongoing socio-demographic changes indicate the need to look not only for innovative design solutions, but above all to address the current spatial needs in the living and functioning environment of the seniors of the future [3-6].

Purpose, Scope and Method of Research

This article presents the research results from workshop experiments aimed at auditing the accessibility of the settlement space of one of Kielce's housing estates in Poland built in the 1960s-1970s - KSM *Sady*. The analyses focused on architectural and urban barriers contributing to the exclusion of people with various disabilities from social spaces. The overarching aim of the research was to identify general factors contributing to the inaccessibility of these spaces and to identify adequate spatial needs to support independence in daily living for people with disabilities.

The study was based on experiments using simulation methods with old-age simulators, disability and disease simulators or wheelchairs.

KIELCE, POLAND AS AN EXAMPLE OF AN AGEING CITY

The past century's political system resulted in a rapid population growth in Kielce. The growth of industry in the city was due to a combination of its location and historical tradition. As the industry grew, so did the demand for labour to support it. The population surge resulted in a shortage of housing, which the authorities of the time addressed through the large-scale construction of housing estates. The city of Kielce experienced its greatest population growth in the 1970s and 1980s [7]. The newly established housing estates meant that during the period of Polish People's Republic

(PRL) the city quadrupled its population. In 1982 it already had 192,500 inhabitants, and in 1985 - more than 200,000 [8]. As in many cities in Poland at that time, these were mostly young people looking for a better life, starting families. As time went on and the youngest generation grew up, they moved out and left their ageing parents behind, thus changing the social structure of the housing estates [4].

Analysing Kielce housing estates built during the communist period, it can be seen that the share of older people living there is above the Kielce average. The increase in the number of elderly people stems not only from increasing life expectancy, but also from falling birth rates and the migration of young people to larger Polish and foreign cities [9]. In 2020, the share of people in the post-working age group in Kielce was 26.8%. According to projections, there will be an 18% increase in the share of people aged over 65 by 2050 [10]. The city of Kielce has been facing serious demographic and accessibility issues for years. In addition, it is the municipality with the highest share of *60+* in the population, with those aged 60-64 and 65-69 accounting for the largest percentage [11][12].

KSM *SADY* HOUSING ESTATE (CASE STUDY)

Analysis of the current state of development and infrastructure:

Kielce Housing Cooperative is the largest and oldest housing cooperative in Kielce, established in 1958 [13]. Between 1964 and 1973, the cooperative erected the sizeable *Sady* Housing Estate in the northern part of the city, adjacent to Szydłówek (Figure 1). Its northern part is bordered by Jesionowa Street, one of the main streets in Kielce, and national road no. 74. Its surface area is 0.43 km^2. The estate is located close to the city centre, with easy access to the other parts of the city and bike paths leading to and from the area.

The KSM *Sady* Housing Estate is an example of a large-scale communist-era housing estate with a characteristic high proportion of open and undeveloped areas (Figure 2). It has numerous parking spaces located along all roads. In addition, there are parking spaces next to most residential buildings. Despite this, their number is still insufficient. In many parts of the estate, rows of cars parked in unauthorised places, on pavements or lawns can be seen.

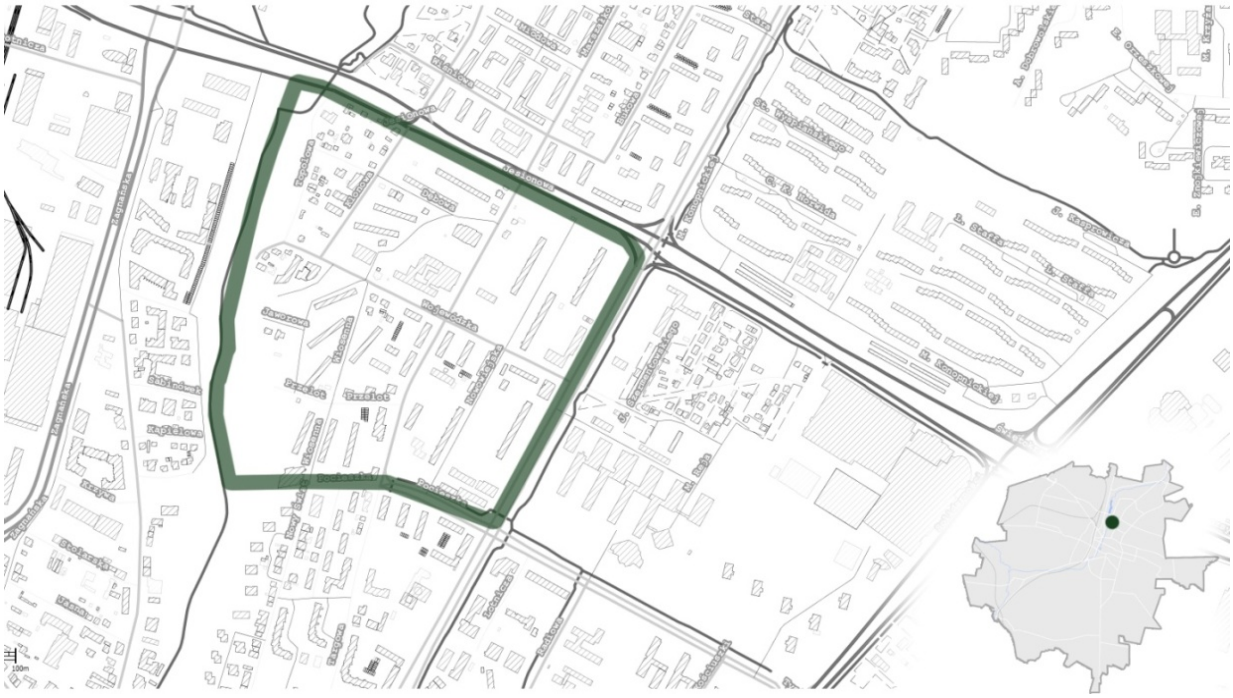

Figure 1: Location of the *Sady* Housing Estate within the city of Kielce (elaboration by the authors, 2022).

Pedestrian communication within the estate is provided by a network of paths of varying condition. There are no parks or urban forests within the estate, but it is rich in cultivated green areas.

Nearby, there is the so-called Silnica Valley, which is a recreational area with a riverside pedestrian path. Moreover, the large space between the blocks is filled with vegetation, mostly tall trees and shrubs giving a sense of intimacy to all residents. However, a significant part of the green areas lacks landscaping elements, like benches or bins. The few seating areas are mainly noticeable at larger organised recreational spaces like playgrounds. Unfortunately, there are only a few of them next to pedestrian routes.

The development of the estate is characterised by varying heights, asymmetrical distribution and buildings positioned at irregular angles. The main service facilities are located on the outskirts of the estate, with small service outlets located within the estate. The *Sady* Housing Estate is characterised by a high share of people of post-working age. (Figure 3).

Figure 2: Spatial analysis of the *Sady* Housing Estate: 1 - areas of service development; 2 - areas of education; 3 - areas of parking lots; 4 - entrance zones to residential development (elaboration by the authors, 2022).

Figure 3: *Sady* Housing Estate in Kielce (photographs by the authors, 2022).

ARCHITECTURAL AND URBAN ACCESSIBILITY AUDIT OF THE KSM *SADY* HOUSING ESTATE IN KIELCE

In November and December 2022, workshops with the participation of students, representatives of the socio-economic environment and others were organised as part of the project *Accessibility Hub - Centre for Practical Accessibility Learning* (Project POWR.03.05.00-IP.08-00-CWD/20), implemented under the Operational Programme Knowledge

Education Development [14] carried out in the Department of Architectural and Urban Design Theory and Planning of the Faculty of Civil Engineering and Architecture of Kielce University of Technology, Poland. The workshop entitled *Universal Urban Design - Accessibility Aspects of Civil Structures and Spaces* was attended by representatives of businesses, experts and designers, as well as members of local authorities, among others. The main objective of the workshop was, in addition to increasing empathy, to gain a better understanding of the concept of accessibility and the principles of universal design, including the architectural and urban barriers present in social spaces that impede the daily functioning of people with various limitations.

A group of participants, with the support of testers with various disabilities, through their assigned tasks, moved around wearing special disability and disease simulators, experiencing first-hand the architectural barriers present within the estate.

The auditors' task was to verify whether a given facility or space that is accessible and welcoming to people with special needs, can be used by everyone without difficulty, whether it has an inclusive infrastructure, and to verify the degree of its accessibility. In this regard, of particular importance was the following:

- reference to criteria derived from the requirements of applicable law;
- diagnosis of architectural barriers for people with different types of disabilities;
- pointing out accessibility faults, but also making specific recommendations for solutions forming the basis for projects and adaptation work by KSM management.

At the same time, as it was emphasised in the introduction that accessibility should not only be considered in terms of people with disabilities. The main challenge becomes the search for a new functional structure of architecture and the universality of formal assumptions.

The group of participants, in addition to designers, architects and industry experts, included also people with disabilities whose insights proved particularly relevant to the experiments being conducted. The workshop was also attended by the representatives of KSM *Sady*.

The area was tested using a special gerontology (GERT) suit to simulate the effects of ageing and intellectual disability, a wheelchair and simulators for various types of disabilities and diseases, including age-related eye diseases and visual impairment through a set of specialised simulation goggles.

The research focused on social spaces with entrance zones to service and residential buildings, particularly in terms of their accessibility for people with various types of disabilities. When moving around the estate area, the accessibility auditors analysed the following:

- development of the estate, including recreation areas, services, surroundings of the buildings (parking lots, driveways, pavements), and other elements affecting the accessibility of the site;
- the entryway of buildings, including the accessibility of the entrance zone and the possibility of entering with an assistance dog, parameters in terms of usability for people with different needs;
- access to vertical communication: lifts, staircases; and to horizontal communication: free movement along corridors and between floors, possibility of evacuation or provision of alternative means of rescue for people with special needs (signalling, procedures, assisting equipment);
- information on the layout of rooms in the building, at least in a visual and tactile or auditory manner - in particular signs/sounders which are helpful particularly for people with hearing or visual impairments.

As a result of their analyses, the audit participants formulated four main groups of architectural and urban barriers encountered, summarised and illustrated below.

1) Pedestrian circulation.

   Due to the way older people move around - mainly on foot - the audit showed numerous inadequacies in the pedestrianised space of the estate. Inadequate stairs and ramps turned out to be the main problem. Due to the many differences in level within the estate, the routes often taken by seniors and people with disabilities include steep stairs and steep ramps - with gradients that do not comply with current regulations and are not equipped with railings. There are also numerous high kerbs that are not properly marked and of a single step form, thus creating a hazard. Uneven pavement surfaces are another barrier to mobility for people with disabilities.

2) Building entrance zones, storey accessibility.

   Due to the high entrance steps and lack of lifts in public facilities, such as a community centre and senior citizens' club, a participant in a wheelchair could not access the activity rooms. Numerous constraints, such as high entrance steps and lack of ramps, as well as lack of manoeuvring space at the entrance door, were noted also in the entrance zones to residential buildings. Despite the existing lifts (in buildings with more than ten floors),

these have become inaccessible for the wheelchair user due to the need to climb several steps leading to the ground floor corridor. Existing passenger lifts do not meet accessibility requirements for people with disabilities. Due to the size of the lift cabin in high-rise buildings, a person on a stretcher can only be transported via staircases. There are no lifts in lower, four-five storey multi-family buildings. Multi-family buildings also lack other equipment, such as platforms, lifts and hoists for transporting people with reduced mobility. These inadequacies, together with the lack of solutions to help people with disabilities move around inside and outside the buildings, significantly limit their independence. It was noted that due to architectural barriers in residential entrance zones, individuals opt for intermediate solutions.

3) Landscaping elements.

Covering a route of less than 200 m (frequented by the elderly) caused a young person wearing the GERT old age simulator a lot of trouble due to fatigue caused by the considerable weight of the suit. Only one bench on which the workshop participant could rest was spotted along the route. The estate space also lacks tables with seating for communal activities, meals or chess games. Landscaping elements not only encourage people to be active and get out of their homes, but are important given the lower mobility of older people. They help them cover greater distances by allowing them to rest. Seniors are aided in orientation problems by space markings. These were not found in the area and due to the nature of this housing estate development, clear signs and boards indicating location and distance to destination are needed. The renovated bus stops located close to the estate, most of which are equipped with electronic boards and voice communication systems that enable visually impaired people to use the public transport, are an added value.

4) Parking lots and green zones.

Numerous parking lots, and often cars parked in unauthorised places, hindered pedestrian traffic due to cramped passages between cars. In particular, one of the larger parking lots located between the residential blocks and the service building forms an unsightly, paved space with no trees. During the summer, this causes an increase in the ambient temperature, making the route from the flat to the shop for the elderly even more challenging.

DISCUSSION AND CONCLUSIONS

The impact of limitations in social space on the functioning of disabled society members:

For people with disabilities, including those with limited mobility, the most important issue affecting the comfort of use of social spaces is undoubtedly independence. Lack of accessibility and impaired mobility excludes people with various dysfunctions and limitations.

Participation in society brings with it certain expectations; everyone should have the same rights, benefits or responsibilities. Preventing access excludes groups of people from full participation in society, causing so-called social exclusion. Combating this phenomenon is one of the objectives of European and international policy. There are studies showing a link between social exclusion and poor health, quality of life or mortality [15].

The space of housing estates is not only a place where residents spend their time moving from home to work, school or shops. It is also a place for meetings and recreation. Playgrounds, parks, squares are places for human interaction, they should be vibrant. Inadequate space and architectural barriers deprive people with limited mobility of the opportunity to make full use of the estate space. These people then most often choose to stay in their flats, limiting social contact. The local environment undoubtedly has a strong impact on the lives of seniors, especially those who do not have family or lack familial support or care. Elderly people who are fully functional satisfy their social bonding needs through neighbourly relationships. A common cause of their loneliness can be the loss of loved ones, a sense of exclusion, retiring, illness or disability. All this has the effect of isolating seniors from the environment in which they currently function. Loneliness can cause fear of failure, lack of self-confidence and loss of motivation to act [16]. A prolonged state of loneliness, unless it is one's own decision, negatively affects an older person's health and quality of life. It can also be a cause of reduced good mood, depression or somatic illness [17].

Retirement age is a time to develop one's skills, take time for social interaction. It is important for the mental and physical health of older people to continue to remain active. Many people have strong ties to their place of residence and neighbourhood, so it is crucial that these people are able to enjoy their already familiar surroundings for as long as possible. This is influenced not only by suitably adapted housing, but also by the absence of architectural and urban planning barriers in the spaces of housing estates.

In conclusion, it should be stated that due to the lower mobility of people with disabilities, including seniors and senior citizens of the future, the space of the housing estate is becoming their main area of social life. The analyses of the architectural and urban space of the KSM *Sady* Housing Estate, carried out by independent auditors, were conducive to an objective assessment and became a source of information on specific spatial solutions, the organisation of residence and the arrangement of places in the context of the perceptive and adaptive abilities of the community living there.

Key data on new spatial needs - guidance for managers and designers of social spaces:

1) Pedestrian circulation.

   Older people are most likely to move around on foot, so the most relevant social spaces are the communication ones. Straight and wide pavements, free of obstructions, with appropriate paving and kerb heights should be introduced. In pedestrian design, the type of pavement is particularly important because it affects the mobility of residents, not only those with disabilities, but also the elderly, children or those walking in heeled shoes. Visible signage for visually impaired people is important. In public spaces, tactile paving and warning signs are worth designing along main streets, at pedestrian crossings and public transport stops, in front of stairs, and in places where it is necessary to warn a visually impaired person of an obstacle. Manoeuvring spaces in front of the ramp runs must be taken into account, as well as the appropriate gradient of the ramp - this value is defined in Poland by the regulation of the Minister of Infrastructure on technical conditions to be met by buildings and their location [18]. Handrails at both stairs and ramps meeting the current regulations must be designed. In the space of housing estates, it is important to keep in mind each age group of users, additional handrails installed at a height of 60-75 cm will be helpful for children and short people.

2) Building entrance zones.

   Free access to the building must be made possible for all people, especially those with various disabilities. Adequate manoeuvring space must be provided in front of the entrance door to enable the disabled to open the door unassisted. Intercoms and videophones must be wheelchair accessible and the buttons must be at a height of 80-110 cm. Small differences in height at the front door can be levelled by a walkway up to a 5% gradient or by stairs and a ramp, but care should be taken to avoid too short stair runs, as individual steps can go unnoticed and cause tripping. Therefore, stair runs should be designed with a minimum of three steps, appropriately marked with visually impaired people in mind. In the case of a three-step run, all of them are to be marked [18]. Corridors, staircases, etc, should be barrier-free to allow unhindered movement for all people, including: wheelchair users, those with prosthetics, those using crutches, canes and other orthopaedic aids on a temporary basis, senior citizens, people with pushchairs and people with temporary disabilities.

3) Landscaping elements.

   The incentive to be active and get out of the flats is provided by a well-designed infrastructure for people-to-people contacts. Housing estate managers, designers and city authorities should design spaces with numerous benches and rest areas, public toilets, roofed bus stop shelters with clear information and messages [10]. Landscaping elements should be arranged in a way that do not impede the movement of wheelchair users and do not pose a danger to people with visual impairments. Some seats should be equipped with armrests to help the elderly and those with mobility impairments sit down and stand up.

4) Parking lots and green zones.

   Greenery should also be integrated to provide shade on hot days and help lower the ambient temperature. The greenery will also prove useful as a stripe separating pedestrian traffic from bike paths, and will help to detect the space of pedestrian communication with a blind stick.

   Parking spaces must be designed in accordance with the applicable implementing regulations [18]. Regardless of the location of the parking lot, safe access to the pavement or pedestrian/bike shared paths must be allowed. A situation when wheelchair user has to navigate on the road because of a high kerb or installed barriers in the form of posts or benches is unacceptable.

SUMMARY

Housing estates from the communist period, such as the KSM *Sady* Housing Estate in Kielce, Poland, presented here, are still home to hundreds of thousands of people today. For this reason, post-communist housing estates represent a problematic and multifaceted space with numerous challenges for housing associations and various designer groups. At the same time, the variability of contemporary conditions associated with population changes, which include the intensification of the phenomenon of life expectancy and its consequences, often affects the residents of the housing estates of prefab-concrete blocks. The assumptions underlying the development of housing estates in the communist era formed completely different set of principles compared to those of today. Hence, an urgent need for new functional and spatial solutions. A detailed analysis of the current constraints points in the direction of necessary action.

Estate spaces from the 1970s and 1980s, which have not yet been modernised, are still full of architectural and urban planning barriers that make it difficult for people with various disabilities to function. This has a significant impact on their social exclusion and psycho-physical health. The level of inclusiveness of the architecture is very much reflected in the activities of the older residents, as well as the youngest and all those with temporary disabilities. Only a properly

adapted and fully accessible estate space can encourage its residents and users to participate in community life and influence the frequency with which they leave their homes. The opportunity to be in communal spaces and the possibility of social bonding influences in particular the quality of life of the 60+ generation. Their level of life satisfaction and psychomotor conditions then increase.

To conclude, workshop participants understood that the chance for improving the current difficult situation lies in complex revitalisation processes modelled on Western countries. Large-scale housing estates should undergo consistent and multifaceted modernisation. Reducing urban and architectural barriers can produce spectacular results - these places can become attractive and meet the needs of all people, including those with special needs.

In the light of the presented and described experiences, it becomes particularly important to shape a positive perception of old age in society by implementing the principles of accessibility - by educating young designers and sensitising stakeholders, as well as constantly raising students' awareness [19].

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