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Modernisation of hospital buildings built in the 20th century in the context of architectural, functional and operational problems

Introduction

Hospital buildings are some of the most complex public facilities in terms of technological equipment and functional relationships. Their proper functioning depends on the provision of diagnostic and therapeutic facilities, which often have specific requirements for the features of the building in which they are located. Evolving medical technology and treatment modalities, as well as increasing demands on standards of patient care, mean that hospital buildings are some of the fastest "ageing" building structures. Their operation is fraught with many problems due to the way they operate requiring constant high temperatures in most rooms, meeting changing ventilation and air conditioning standards and requirements, as well as fire protection and sanitary requirements. Against this backdrop, the most significant seems to be the operational problems arising from European and national energy policies that seek to reduce the energy demand of buildings and reduce CO_2 emissions. The need to modernise hospital facilities, particularly in the public health service, applies to virtually all European countries, where a large proportion of the building stock is considered to be inadequately adapted to modern needs [1].

A detailed study of modernisation issues was carried out on a group of 25 reference hospitals established in the 20th century in the Lubelskie Voivodeship, selected from 110 facilities, which were analysed in terms of architectural problems in the context of the modernisation works carried out. All the facilities studied are public institutions. The aim of the study was to identify the problems of modernisation of hospitals against the background of architectural, functional and operational issues resulting from changing usability and legal requirements for this type of facility. The focus was on what modernisation works have been carried out in the last two decades. It also examined the structures and technologies used in the analysed hospitals, which have a significant impact on their susceptibility to changes related to adaptation to modern needs and utilisation requirements.

State of research

A comprehensive analysis of changes in the public health care system and the effects of reforms in it, among 11 Central and Eastern European countries between 2008 and 2019, is presented by Katarzyna Dubas-Jakóbczyk et al. [2]. It shows that management reforms were primarily aimed at transforming infrastructure, improving financial management and/or improving the quality of management. Hospital buildings are some of the facilities with the highest degree of functional-spatial and technological complexity, for which special preparation is required for management and continuous monitoring of technical conditions. A refinement of the Condition-Based Maintenance (CBM) method can be used for this purpose. The successful implementation of this method in the evaluation of hospitals requires the development of performance indicators, as demonstrated in his study by Igal M. Shohet [3]. In Poland, the standard procedure for monitoring the technical condition of buildings is periodic technical inspections; however, research and implementation projects are being conducted worldwide to improve the efficiency of monitoring and management of healthcare facilities.

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Former hospitals are sometimes abandoned due to the difficulty of adapting them to modern requirements. This applies both to individual buildings in the current inner city zones and to entire urban complexes. The suitability of such buildings for further adaptation should be preceded by a thorough analysis and represent a compromise between the desire to preserve architectural values and local heritage with the possibility of adaptation to new purposes [4]. The problem of reclaiming abandoned hospital buildings in Naples was taken up by Claudia Sicignano et al. who pointed out new possibilities for developing the buildings, not excluding also the introduction of medical functions [5]. In the Lubelskie Voivodeship, such examples of "recovered" facilities built before World War II include former hospitals in Jaszczów, Bełżyce, Hrubieszów, Chełm (at a military unit).

In Poland, the subject of hospital modernisation was addressed by Jarosław Bąkowski and Jacek Poplatek, among others [6], while Piotr Gerber dealt with the modernisation and protection of historic hospitals [7]–[10]. In her doctoral thesis, Marta Łukasik analysed functional and spatial layouts as an element of the development strategy of Polish teaching hospitals [11]. In our country, several research centres can be distinguished with teams dealing with the topic of hospitals: Gdańsk University of Technology and Silesian University of Technology. The result of many years of research on the subject of hospitals is, among others, a publication related to the role of research in improving the quality of hospital operations [12].

Material and methods

The first stage of the research involved a complete identification of the stock of existing hospital buildings in the Lubelskie Voivodeship. At the time of conducting the research (June 2022), the number of facilities was 110. The time scope of the research covered the years 2004–2022. Based on the analysis of all projects implemented in recent years under the Regional Operational Programme, 25 facilities were selected for further research (Table 1). The following selection criteria were applied:

1. Function – hospitals were selected for the study (other facilities classified as health care such as sanitary and epidemiological stations were not included).
2. Reference level of the hospital – facilities representing first-, second- and third-level hospitals and nationwide hospitals were selected (hospitals with one profile of services provided – oncology and paediatric hospitals – the subject of separate studies – were not taken into account).
3. Location – facilities representing each of the districts of the Lubelskie Voivodeship. In the case of the city of Lublin, four hospitals were qualified for the study.
4. Time of establishment – the 20th century.

Among the identified facilities, a distinction was made between facilities located in a single building or occupying building complexes. As part of the study, information was reviewed on industry portals [13], websites of all hospitals from the Lubelskie Voivodeship and interviews were conducted with selected facility managers. The surveyed facilities were analysed in terms of the structural systems used in them, functionality, exploitation problems directly related to the architectural form of the building (original and resulting from modernisation), as well as heat transfer parameters of the building envelope. The types of modernisation works and the resulting architectural, functional and operational problems were thus identified.

For the purposes of the study, the definition of a hospital ward was adopted as a part of a hospital building intended for a longer patient stay, while a pavilion was adopted as a building containing one or more wards.

Results

Modernisation work carried out

The possibilities of adapting, modernising or adapting hospital buildings to modern needs depend on a number of factors. Just as important as the technical condition of the building are usually the possibilities of adapting it to modern hygienic, sanitary and technical requirements associated with advances in medicine. Changing methods of treatment, a philosophy of ever–shorter hospitalisation periods, and increasing demands on energy efficiency have left many hospital managers with the dilemma of whether it is worth adapting an existing pavilion to modern needs or whether it is more beneficial to build a new one. Of great importance in the renovation process are local environmental factors that directly influence the architectural solutions applied to the building [14].

From the point of view of the development of medical technology, the modernisation of historic healthcare facilities (not only hospitals) makes little sense [15]. One of the most important problems concerning the operation of existing healthcare facilities is their sterility and hygiene. This is a very broad issue involving the architectural and technological solutions adopted. It is currently considered that a hospital building can serve its function for a maximum of 50 years. After this time, the hospital should be demolished and a new one built in its place. This is an approach that is linked to the belief that a facility after such a period is exposed to a health-threatening proliferation of mutating microorganisms and viruses [16]. There is also a clear link between sterile conditions and the quality of the building architecture. Today, in new hospitals, an interdisciplinary approach to building planning and design includes the inclusion of microbiologists in the work [17].

In the 25 hospitals selected for the study, various types of modernisation works were carried out between 2004 and 2022. Based on the analysis of these hospitals, seven main types of modernisation work were identified (Fig. 1). Thermomodernisation was carried out in most of the surveyed facilities. Most often, this concerned only the insulation of the external envelope and the replacement of window and door joinery. In more than half of the surveyed facilities, bed wards were also modernised (usually to the extent of one storey). The scope of work included, among other things, replacing floor surfaces, replacing or installing suspended ceilings, securing walls, replacing joinery, improving functionality, renovating existing bathrooms, introducing new bathrooms and adapting to the needs of

Table 1. List of surveyed hospitals in the Lubelskie Voivodeship (elaborated by R. Strojny)
Tabela 1. Lista badanych szpitali z województwa lubelskiego (oprac. R. Strojny)

No.	Name of hospital surveyed	Reference level*	Type of hospital	Year of construction**
1	VSH in Biała Podlaska	III	voivodeship hospital	1974–1986
2	IPHCF in Międzyrzec Podlaski	I	district hospital	1929, 1993
3	IPHCF in Biłgoraj	I	district hospital	1950, 1962, 1979
4	VSH in Chełm	III	voivodeship hospital	1970–1973, 1981–2010
5	IPHCF in Hrubieszów	II	district hospital	1966
6	IPHCF in Janów Lubelski	I	district hospital	1974–1982
7	IPHCF in Krasnystaw	I	district hospital	1974
8	IPHCF in Kraśnik	II	district hospital	1972
9	IPHCF in Lubartów	II	district hospital	1972
10	IPHCF in Bełżyce	I	district hospital	1975
11	IPHCF in Bychawa	I	district hospital	1950, 1975–1977
12	IPHCF in Łuków	II	district hospital	1954–1962
13	IPHCF in Opole Lubelskie	I	district hospital	1969
14	IPHCF in Parczew	I	district hospital	1955
15	IPHCF in Puławy	III	voivodeship hospital	1934–1938 – pavilion B 1957 – pavilion C 1969–1974 – pavilion A
16	IPHCF in Radzyń Podlaski	I	district hospital	1972–1982
17	IPHCF in Ryki	I	district hospital	1950s.
18	IPHCF in Świdnik	I	district hospital	1968
19	IPHCF in Tomaszów Lubelski	I	district hospital	1910, 1931, 1957
20	IPHCF in Włodawa	I	district hospital	2nd half of the 20th century
21	Pope John Paul II VSH in Zamość	III	voivodeship hospital	1978–1989
22	IPCH No. 4 in Lublin	nationwide	–	1964
23	Stefan Cardinal Wyszyński VSH in Lublin	III	voivodeship hospital	1974–1992
24	Jan Boży VSH in Lublin	III	voivodeship hospital	1973
25	IPHCF MSWiA in Lublin	nationwide	–	1947

Legend: Independent Public Health Care Facility (IPHCF), Voivodeship Specialised Hospital (VSH), Independent Public Clinical Hospital (IPCH).
* In Poland, there are several reference levels of hospitals: Level I (5 specialties), Level II (9 specialties), Level III (approximately 23 specialties), oncology or pulmonology, paediatrics, nationwide.
** Year/Years of construction of surveyed hospitals and new hospital complex buildings in the 20th century.

people with disabilities. Internal installations (electrical, medical gas, sanitary) were also replaced or extended as part of the modernisation of wards, but works involving the modernisation of installations on a facility-wide scale were rare. Due to changes in legislation, hospital managers were obliged to adapt existing hospital emergency departments (EDs), while developing medical technologies and the desire to increase the competitiveness of individual facilities determined the modernisation of operating theatres and theatres.

In many cases, the existing pavilions were no longer usable in their existing dimensions, requiring extensions, or there was a need to change the form of use of the pavilion (e.g. from bed wards to care and treatment facilities at the disposal of hospitals). It is surprising how rarely it was decided to modernise technical buildings (e.g. boiler rooms). Given the current state of most of these facilities, as well as the energy policy situation and the fuel crisis, it is reasonable to assume that work in this area will be a challenge in the years to come.

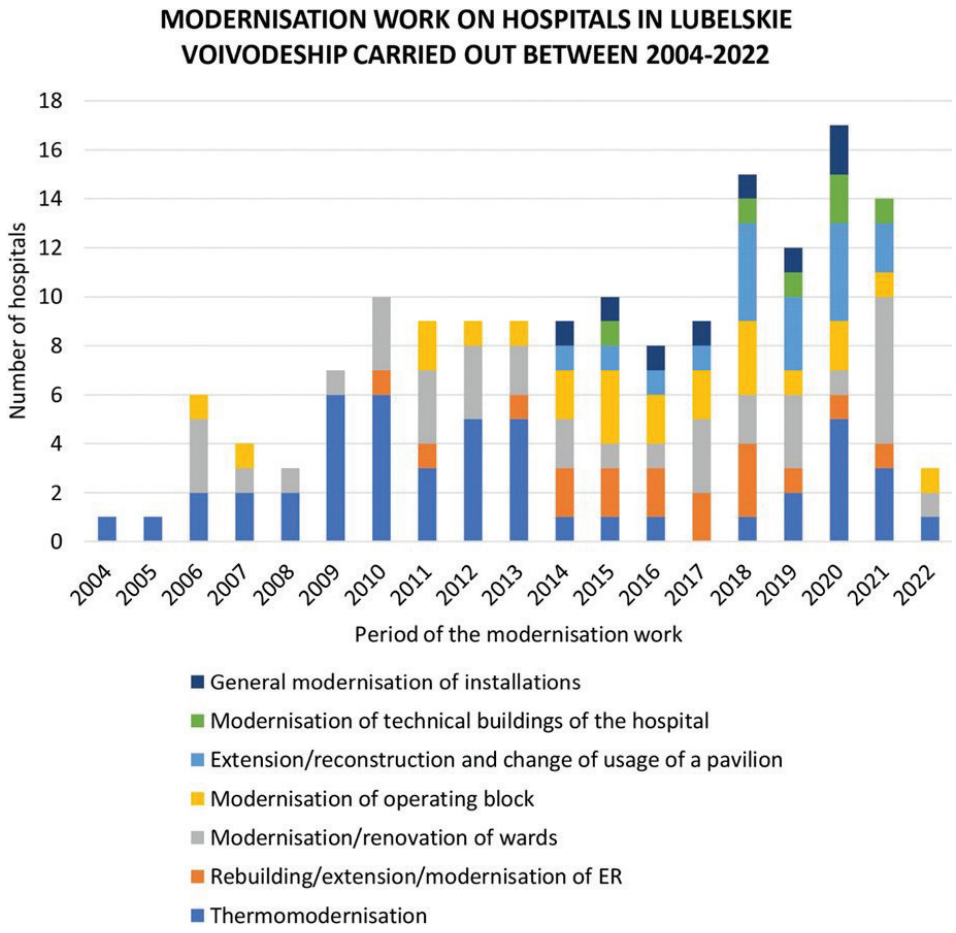

Fig. 1. Identified modernisation works in the surveyed hospitals carried out in the years 2004–2022 (elaborated by R. Strojny)

Il. 1. Zidentyfikowane prace modernizacyjne w badanych szpitalach przeprowadzone w latach 2004–2022 (oprac. R. Strojny)

Construction and technology used in hospitals in Poland in the 20th century

The research shows that until the early 1970s, hospital buildings were constructed using traditional masonry technology, while later industrialised technologies were used in addition to traditional technology. Some of the buildings were extended at different times and are today buildings composed of several segments constructed using different technologies.

Until the 1960s, external walls were initially constructed as solid clay brick masonry in cement-lime mortar. Internal partition walls were usually built of lighter hollow bricks, with necessary installations in shafts. Ceilings between storeys were usually of the Klein type and later also made of ceramic tiles, e.g., DMS.

In the 1970s, buildings were still being constructed using traditional technology, but state policy supported the industrialisation of all sectors of construction [18]. In the traditional technology, walls were built with cellular concrete blocks, truss bricks and solid silicate bricks, and basement walls were built with solid ceramic bricks. In industrialised technology, on the other hand, frame technology was most used. The internal communication route was separated by a row of pillars, which were incorporated into wider walls, dividing the rooms from the corridor. These walls were often made of two layers of masonry made from grid bricks, leaving a technical space of a few dozen centimetres inside. Prefabricated panels, insulated with cellular concrete, were used for the external (gable) walls; the curtain walls were made as masonry from cellular concrete blocks. In some buildings, curtain walls were prefabricated with window openings. Basement walls were built of prefabricated slabs, faced with solid clay bricks. In both technologies, reinforced concrete hollow core slabs or ceramic blocks were used for the ceilings.

In the 1980s, reinforced concrete hollow core slabs, insulated with aerated concrete, were used in industrialised technology, and in the 1990s, for example, the so-called H-frame construction system, with strip walls (sandwich panels) and infill walls (window pillars – clapboard, thermal insulation, asbestos sheet, trapezoidal sheet). For the ceilings, prefabricated reinforced concrete hollow-core slabs of the "Żerań" type or ceramic hollow blocks of the DZ-3 type were used most often. Due to the increase in the requirements for thermal insulation of partitions, from the late 1980s, external walls were built with a layer of air or polystyrene as insulation material, while ceilings under unheated attics or flat roofs were insulated with, among others, glass wool or mineral wool. In the 1980s and 1990s, in buildings erected using traditional technology, the external walls of the above-ground area were built of cellular concrete blocks or of grid or hollow brick, while the walls of basements above ground and in the ground were built of solid ceramic brick. It should be noted that most of the buildings surveyed were built in the 1970s, reflecting national trends in this type of construction.

Table 2. Summary of thermal insulations requirements for building partitions (elaborated by A. Życzyńska)
Tabela 2. Zestawienie wymagań w zakresie izolacyjności cieplnej przegród budowalnych (oprac. A. Życzyńska)

Years	Requirements for *U*-values [W/m^2·K]					
	Type of building envelope					
	outer wall	roof	ceiling under an unheated attic	flooring on the ground	windows	exterior doors
1974–1981	1.16	0.70	0.93	1.16(1)	2.0÷5.8(2)	1.6÷5.8(2)
1982–1990	0.75	0.45	0.40	0.60(1)	2.0÷2.6(2)	1.1÷5.6(2)
1991–2001	0.55	0.30	0.30	0.60(1)	2.3	3.0
2002–2007	0.45(3); 0.55(4)	0.30	0.30	0.67(5)	2.3	2.6
2008–2013	0.30	0.25	0.25	0.50	1.8	2.6
2014–2016	0.25	0.20	0.20	0.30	1.3	1.7
2017–2020	0.23	0.18	0.18	0.30	1.1	1.5
2021–present	0.20	0.15	0.15	0.30	0.9	1.3

(1) – value refers to a 1=m wide strip along the exterior walls, (2) – *U*-value windows and doors available at the time,
(3) – applies to solid walls, (4) – applies to walls with window and door openings, (5) – applies to the floor in the middle zone

The research shows that the construction of hospital buildings used technologies and materials commonly used in traditional construction at the time. As prefabricated technologies developed, they were used in parallel with traditional technologies. Until the late 1960s, as in buildings with other functions (e.g., residential), no attention was paid to the thermal insulation of the building envelope. It was only in the 1970s that the introduction of mandatory standard requirements for the so-called thermal protection of buildings forced changes in the construction of partitions and the need to use insulating materials (Table 2). The requirements for the insulation of partitions increased in subsequent periods, which was reflected in the amended technical conditions to which the buildings should conform.

Contemporary needs and operational requirements

Currently in Poland, we can observe an intensification of modernisation processes in healthcare facilities, in particular hospitals. The demolition of outdated facilities, although often justified from a sanitary and technical point of view, is an extremely rare phenomenon in Poland. The demolition of the hospital in Zabrze, the demolition of the hospital in Włocławek, the ongoing demolition of the hospital complex in Wadowice and the planned shipyard hospital in Gdańsk should be mentioned here. The hospital in Starachowice has been earmarked for demolition (after being removed from the register of historical monuments). Often, in the place of former hospital properties, investments with a different function are planned (e.g. residential – Starachowice, commercial – Ełk, or educational – Nowy Targ).

Among the best-known examples of hospital demolitions in Poland is the demolition carried out in 2014 of a 12-storey, 12,000-bed planned academic hospital, the so-called Religa Hospital in Zabrze, whose construction began in 1978. After four years, the shell of the building was completed, but funding ran out. In 1999, through the efforts of Professor Zbigniew Religa, the university took over the investment, with the aim of creating a world-class medical facility and continuing the construction. The project was to be subsidised from the state budget, but in 2001, the Ministry of Health abandoned the plans. As late as 2005, the university was still trying to complete the construction, but had mounting debts. At that point, the construction, in which PLN 400 million had been invested to date, was halted [19].

The current performance requirements for existing healthcare facilities extend beyond energy issues alone. While the regulations regarding technical requirements for rooms related to their square footage or functional solutions are relatively relaxed [20], increasing fire protection and requirements for sanitary installations (mechanical ventilation, air conditioning) are causing many existing hospitals to opt for new buildings rather than retrofitting existing ones. A criterion that particularly limits the possibility of proper mechanical ventilation installation is the height of the existing floors, which in buildings from the 2nd half of the 20th century usually does not exceed 3 m in clear height. This causes problems of both an operational, technical and utility nature, as well as aesthetics (Fig. 2). The current regulation of the Minister of Health differs from the previous one in that many of the technical building requirements (concerning the size of bedrooms, the width of corridors, lifts, windows) have been dropped. It was probably considered that these issues are sufficiently regulated in the technical conditions [20]–[22].

Hospital buildings are being modernised continuously and, depending on the scope of the activities, construction work is carried out on the basis of different pre-design

Fig. 2. Hospital in Puławy:
a) corridor with visible ducts of mechanical ventilation,
b) nurses' station with visible ducts of mechanical ventilation and air-conditioning – limiting ergonomics within the ward
(photo by R. Strojny)

Il. 2. Szpital w Puławach:
a) korytarz z widocznymi przewodami wentylacji mechanicznej,
b) dyżurka pielęgniarska z widocznymi przewodami wentylacji mechanicznej i klimatyzacji – ograniczające ergonomię w obrębie oddziału
(fot. R. Strojny)

procedures. Obtaining planning permission involves complying with current regulations for the entire scope of the planned work. For existing buildings, the possibilities for change are often preceded by expert studies required by law. In addition to energy audits, the most frequently commissioned in the case of healthcare facilities are technical expert reports on the structural strength of individual building elements and on fire protection. In cases of damage of biological corrosion nature (dampness, falling off, overgrowth), mycological expert opinions and laboratory tests for dampness and salinity are commissioned. However, this mainly concerns older buildings built in the 1st half of the 20th century. The results of these examinations may become a premise for far-reaching interventions or even suggestions for complete demolition of the building (the aforementioned examples of hospitals in Jaszczów, Bełżyce, Hrubieszów or Chełm).

Operational problems also apply to mobile hospital equipment, including the most basic element: beds. The Ministry of Health carried out a study in 2021 on the assessment of the condition and wear and tear of hospital beds in healthcare entities qualified for the Primary Healthcare Provision System. As a result, it found that "the useful life of 58 percent of all beds in use exceeds 12 years" [23]. A major problem of existing 20th-century hospitals in Poland is to ensure that they have appropriate standards of accessibility in the broadest sense: both in terms of information, digitisation and adaptation to the needs of users with disabilities. In these respects, hospital facilities need modernisation work.

Conclusions

Summarising the results of the research, it should be stated that there is a certain lag in the application of modern technologies and architectural-functional solutions in the surveyed buildings in relation to the implementation in the European Union (EU) countries (Table 3). While products and systems for thermomodernisation in terms of improving the insulation of external coatings and windows are currently at a fairly high level in Poland, the presence of advanced insulation solutions (e.g. vacuum insulation, aerogel, insulation panel), energy-saving solutions (e.g. photovoltaics integrated with the roof – BIPV) or ecological solutions (e.g. green roofs) is basically sporadic on the construction market in Poland. Hence, with

Table 3. Analysis of the availability of modern technologies and the application of contemporary design trends when modernising hospitals in EU countries and Poland (elaborated by N. Przesmycka, R. Strojny based on [24])
Tabela 3. Analiza dostępności nowoczesnych technologii oraz stosowania współczesnych tendencji projektowych podczas modernizacji szpitali w krajach UE oraz w Polsce (oprac. N. Przesmycka, R. Strojny na podstawie [24])

Material solutions used	EU countries	Poland
Double glazed, low emissivity windows	mature	mature
Highly insulating windows (low *U*-value)	increasing	increasing
Window films	increasing	increasing
Window blinds	mature	mature
External Thermal Insulation Composite Systems (ETICS)	mature	mature
High-tech insulation (vacuum, aerogel, insulation panel)	emerging	non-existent
Air seals	mature	increasing
Natural building materials in interior design	increasing	non-existent
Building Integrated Photovoltaics (BIPV)	emerging	non-existent
Architectural solutions used	EU countries	Poland
So-called "cool" roofs, extensive greenery	increasing	emerging
Sunlight protection systems	mature	emerging
New prefabricated partitions	emerging	non-existent
Single rooms with bathroom	mature	emerging
Greenery and a therapy-friendly environment	increasing	non-existent
Multifunctionality of public areas	mature	emerging

regard to the thermomodernisation of healthcare facilities, it is currently difficult to speak of its comprehensive nature. A similar trend can be observed in terms of functional and architectural solutions.

Ward modernisations rarely go in the direction of increasing patient comfort by reducing the number of beds in rooms. Commonly used in highly developed countries, single rooms with bathrooms in the realities of Poland constitute only a fraction of the total number of "beds" and in most cases are isolation rooms realised with funds obtained as part of adapting wards to the COVID-19 epidemic (e.g. Hospital in Puławy, Parczew). Attractively shaped, multifunctional public areas (e.g. in entrance and general communication areas) are equally rare, which is related to the low priority of their modernisation in the face of urgent needs to improve the functionality of wards and medical areas. The renovated facilities are dominated by economic solutions, often replaced during construction work by substitutes that are cheaper than the solutions proposed in the designs. While maintaining the basic functional parameters of individual building materials or elements of interior furnishings (e.g. carpets, handrails, wall casings, sanitary ceramics), the contractors, with the consent of the investor, propose the use of less expensive elements, which is often followed by a reduction in overall aesthetics and loss of the original character of the building's architecture.

The use of natural and noble materials such as, for example, stone, steel, glass or properly protected wood is practically non-existent. An exception is the modernised Independent Public Clinical Hospital No. 4 in Lublin (Fig. 3). Another example of a good solution can be the use of handles made of copper as a natural material with antibacterial properties in one of the analysed facilities (the "infectious" pavilion in hospital in Puławy). Modernisations of health care facilities also do not include green areas, which often still bear the features of the original arrangements from the time when the hospitals were established. Despite the development of scientific research into its therapeutic role [25], its real application in public facilities is rare.

Many of the buildings surveyed were fitted with a photovoltaic installation as part of thermal modernisation programmes. Its location in the case of hospitals built in the 2nd half of the 20th century is favoured by the large areas of mostly flat roofs and the clear exposure to the sun without shading. In the midst of a worsening energy crisis, the issues of rational energy use, optimal choice of heating system and proper thermal insulation of hospital buildings have come to the fore. Even a short-term imbalance in the supply of energy or fuel for heating hospitals will be disastrous.

Summary

Through a survey of hospitals in the Lubelskie Voivodeship, it was possible to identify the types of building modernisation works carried out in the last two decades. In connection with these works, a number of problems have

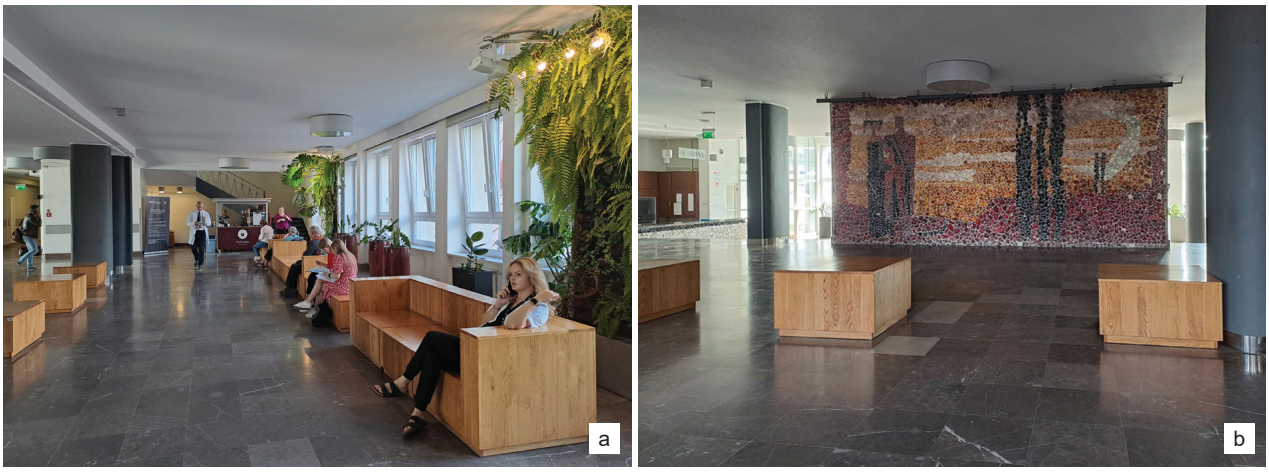

Fig. 3. Independent Public Clinical Hospital No. 4 in Lublin. The entrance area after modernisation: a) wooden seats and green walls added, b) original mosaics and stone floors preserved (photo by R. Strojny)

Il. 3. Samodzielny Publiczny Szpital Kliniczny nr 4 w Lublinie. Strefa wejściowa po modernizacji: a) dodane drewniane siedziska oraz zielone ściany, b) zachowane oryginalne mozaiki oraz kamienne posadzki (fot. R. Strojny)

also been identified, which result, among other things, from the adaptation of 20th-century hospitals to modern needs and requirements. These problems arise from the limited adaptability of existing facilities, the structures and technologies used in them, as well as operational aspects.

When carrying out modernisation work on healthcare facilities, it is necessary to have a long-range plan that takes into account the next stages of adaptation to growing needs and operational requirements. Not all buildings are susceptible to such changes, but in view of the country's current economic situation and ability to finance public health facilities, as well as rising prices in the construction market, it is still more cost-effective to renovate and modernise existing facilities than to demolish them and build new ones.

Translated by
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Abstract

Modernisation of hospital buildings built in the 20th century in the context of architectural, functional and operational problems

Hospital buildings are some of the most complex and fastest "ageing" building structures. The continuous development of technology and the need to adapt hospital buildings to modern needs leads to modernisation work.

The aim of this research was to identify the problems associated with the modernisation of hospitals against the background of architectural, functional and operational issues arising from the changing utilisation and legal requirements for this type of facility. Among other things, it was examined what modernisation work had been carried out, what structures and technologies had been used in the hospitals surveyed (which has a significant impact on their susceptibility to changes related to adaptation to contemporary needs and functional requirements). A comparison was made between buildings selected from among all initially analysed hospital facilities in the Lubelskie Voivodeship. The types of modernisation works carried out in the last two decades and the most common problems were identified. The architecture and construction technologies of individual buildings were analysed.

Based on the results of the research discussed, it is important to emphasise that when carrying out modernisation work in healthcare facilities, it is necessary to have a long-term plan taking into account the next stages of adaptation to growing needs and operational requirements. Not all buildings are susceptible to such changes, but in the current economic situation of the country and with today's funding opportunities for public health facilities, as well as rising prices in the construction market, it is still more cost-effective to renovate and modernise existing facilities than to demolish them and build new ones.

Key words: architecture of healthcare facilities, hospital modernisation, hospitals of the 20th century, operation of hospitals

Streszczenie

Modernizacja budynków szpitali powstałych w XX w. w kontekście problemów architektonicznych, funkcjonalnych i eksploatacyjnych

Budynki szpitali należą do jednych z najbardziej złożonych oraz najszybciej „starzejących się" obiektów budowlanych. Ciągły rozwój technologii oraz konieczność dostosowania budynków szpitali do współczesnych potrzeb prowadzi do prac modernizacyjnych.

Celem badań było określenie problemów związanych z modernizacją szpitali na tle zagadnień architektonicznych, funkcjonalnych i eksploatacyjnych wynikających ze zmieniających się wymagań użytkowych i prawnych stawianych tego typu obiektom. Zbadano między innymi to, jakie prace modernizacyjne zostały wykonane, jakie konstrukcje i technologie stosowano w badanych szpitalach (co ma istotny wpływ na ich podatność na zmiany związane z adaptacją do współczesnych potrzeb i wymagań użytkowych). Porównano budynki wyłonione spośród przeanalizowanych wstępnie wszystkich obiektów szpitalnych na obszarze województwa lubelskiego. Określono rodzaje prac modernizacyjnych przeprowadzonych w ostatnich dwóch dekadach oraz najczęściej występujące problemy. Analizowano architekturę i technologie wznoszenia poszczególnych obiektów.

Na podstawie wyników omówionych badań należy podkreślić, że przy prowadzeniu prac modernizacyjnych w obiektach służby zdrowia trzeba mieć dalekosiężny plan biorący pod uwagę kolejne etapy dostosowywania do rosnących potrzeb i wymagań eksploatacyjnych. Nie wszystkie budynki są na takie zmiany podatne, jednak w obecnej sytuacji ekonomicznej kraju i przy dzisiejszych możliwościach finansowania publicznych obiektów służby zdrowia, jak również rosnących cenach na rynku budowlanym, nadal bardziej opłacalne jest remontowanie i modernizowanie istniejących obiektów niż ich wyburzanie i wznoszenie nowych.

Słowa kluczowe: architektura obiektów służby zdrowia, modernizacja szpitali, szpitale z XX w., eksploatacja szpitali