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ACCESS TO EDUCATION IN TERMS OF THE ELIMINATION OF ARCHITECTURAL BARRIERS – ON THE EXAMPLE OF SELECTED POLISH UNIVERSITIES LOCATED IN HISTORIC BUILDINGS

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Abstract

Many universities in Poland are based in historic buildings. As public facilities, they must have accessibility for people with disabilities. Therefore, historic buildings undergo regular reconstruction to ensure accessibility on the basis of technical and construction regulations and the Convention on the Rights of Persons with Disabilities. For the purpose of the study, those with exceptional architectural, cultural and historical are presented. The article is concerned with determining the current state of accessibility of selected Polish universities for students with mobility disabilities. The first part of the paper deals with the verification of the background material in the form of statistical data and support programmes for the studied group of users. The second part presents historical information about the historic buildings along with a qualitative analysis of the elements already applied to eliminate architectural barriers. Nine selected historical teaching facilities located both in Warsaw and scattered throughout the country were analysed using the field observation method. The conclusion presents the results indicating the application in the realizations of the principle of rational improvement stating that the preservation of historic value can become paramount to ensuring full accessibility. Still, monuments should be treated individually, and the same applies to disabilities, where each is different and requires individual perception and treatment.

Keywords: historic building; rational improvement; availability; students; people with disabilities

INTRODUCTION

Poland is a country with a rich history of educational development, which dates back to the beginnings of Christianity. Initially, knowledge was acquired in cathedral, collegiate, monastery and parish facilities, but it was not immediately widely available to all and was mainly aimed at the clergy. Increased accessibility to knowledge for a wider audience came with time from the need for educated counsellors at Polish courts. The founders of the first educational facilities included Casimir the Great, Queen Jadwiga and Władysław Jagiełło [J. Grabowski 1936]. The first Polish university was Cracow Academy. It was founded in 1364 and was the only one to educate students for several centuries, until 1702. It was then that the University of

Wrocław was founded as the second university of the university type within today's Polish borders. In the 19th and 20th centuries many universities, academies and polytechnics were founded. Higher education always took place in monumental, multi-construction buildings of high aesthetic quality and architectural value, located in the centres of large cities. These buildings were representative, grand and designed by the most distinguished architects. The structure of these buildings was intended to reflect the status and seriousness of the functions they performed. The architectural form of the university buildings, therefore, was primarily a raised ground floor with a representative entrance with a significant number of stairs leading up to single or

double doors of massive proportions. Inside the main hall, parade staircases were located axially, from which corridors gave access to the side wings of the buildings, sometimes implemented on different levels. This way of building did not, in today's terms, facilitate accessibility for all. Despite many upheavals in history, rebuilding after war damage or reconstruction, these buildings still exist and function.

All the currently surveyed buildings have the status of a listed monument. While in the development of new public buildings, including schools or universities, the extent of providing access to the facility for people with disabilities (PWD) is obvious and simpler, in the case of existing buildings, even more so historic buildings, the administrative procedures become more complicated and lengthy, and the implementation costs themselves much higher than in new buildings. This is an observation of the authors related to their own experience of carrying out various developments at historic buildings. Buildings of this type have restrictions imposed on the possibility of interfering with the preserved historic structure. The conservator's office, as an opinion-giving and consenting body, supervises design and implementation activities and actively participates in the construction process. According to the Act on the Protection of Historic Buildings, such buildings should have a chance to exist for decades to come, in an unchanged state. However, historical restrictions should not impede access to the facility and education for people with disabilities. Therefore, it is necessary to balance the extent of possible changes without devastating historic buildings and to make efforts to remove architectural barriers in such a way that accessibility can be improved in a reasonable manner.

Over the last more than two decades, the topic of accessibility of designed objects and spaces has been repeatedly studied and analysed in various aspects. There are many studies on universal design in the form of 'guides' or 'good practices' [E. Kuryłowicz 2005], [K. Kowalski 2018], [M. Brutkowski 2017]. A number of ergonomic considerations for a school building for people with disabilities are also described in a research paper on the impact of architectural barriers on learning opportunities for people with disabilities [P. Kaleta, Z. Żurkowski, 2012].

The above studies are concerned with the use of 'friendly' solutions in new buildings and spaces. In contrast, the aspect of an accessible monument is a relatively new issue. At the end of 2021, the conference 'Monuments for All, Accessibility of Monuments for People with Special Needs' was held. The Conference addressed the limitations and challenges of removing barriers in historic buildings. A review of contemporary

publications indicates a lack of specific solutions in the form of guidelines for the adaptation of historic interiors and buildings. The situation of the space surrounding these buildings is relatively better. Proposals for solutions for conservation areas in the form of specific material decisions for the accessible pavement of walkways are emerging [M. Wysocki 2018, pp. 384-393]. The issue of accessibility to a monument can be linked to the topic of adapting buildings to a new function. Most often, monuments are subjected to reconstruction and renovation, and '[a]daptation of historic buildings must be based on knowledge of history, structural problems and realisation of the consequences of necessary interventions in the historic structure of the object' [Z. Jankowski, M. Jankowski, 2009, p.12]. Thus, ensuring the accessibility of such public buildings as universities must be implemented and the question is not 'if' but 'how' to implement them so that the historical and artistic identity of the building is not destroyed and the building is accessible to PWD.

1. METODS AND MATERIALS

For the purposes of this thesis, a mixed research method was adopted, including historical research and qualitative research. Various research techniques were used for the study. Documentation and information on the analysed historic buildings was collected. Field research was carried out in the form of site visits to the selected buildings, together with photographic documentation. Correlations of the applied technical solutions eliminating architectural barriers were analysed. For the purposes of this publication, in the period 2021-23 several existing historical didactic facilities in Poland were examined in terms of their accessibility for people with disabilities. A relatively small number of people with disabilities benefit from higher education. As indicated by data from the Polish Central Statistical Office and the Office of the Government Plenipotentiary for Disabled Persons, there is a global decline in the number of students in the period studied between 2017 and 2020 (no data available for 2021/22). In the 2017/2018 academic year, the total number of graduates was 6,326, in the period 2018/2019 it dropped to 5,744, while in 2020 the number was merely 5,196. The numerical data of students with disabilities in the period under review also shows a decreasing trend, which was respectively: 2017 – 23,828, 2018 – 22,046, 2019 – 21,240 and in 2020 – 20,248 [Central Statistical Office statistical information 2018-2020]. The proportions of changes in the number of students and graduates at Polish universities are indicated in Figure 1.

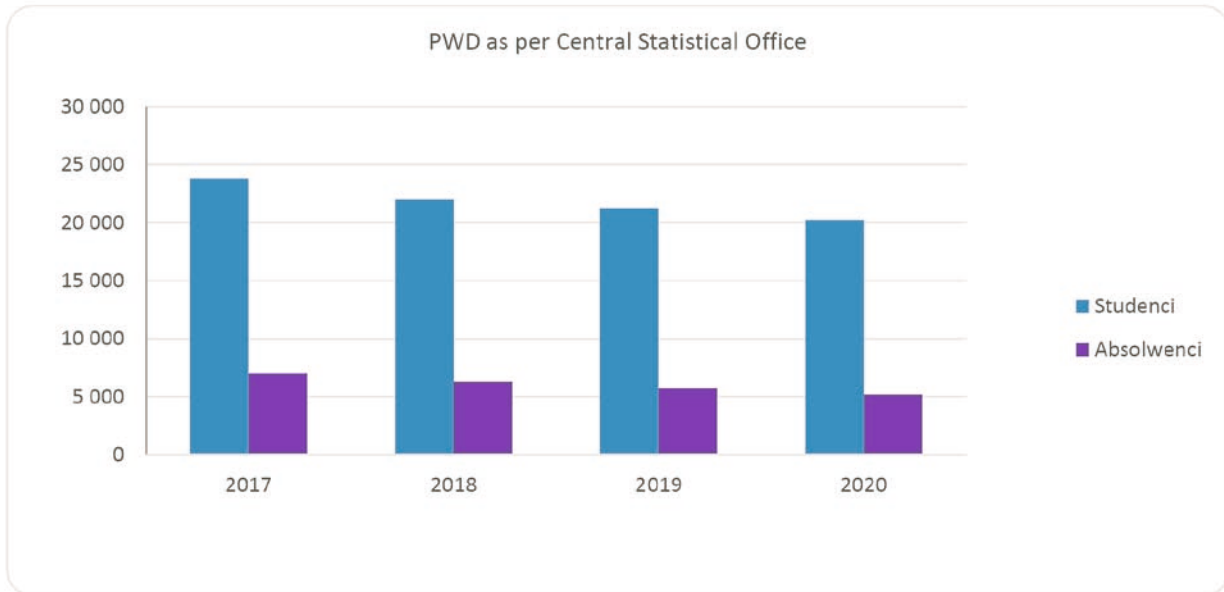


Fig. 1. Number of students and graduates with disabilities at Polish universities; source: Statistics Poland

Analysing the available support programmes, it is possible to identify various forms of assistance for the studied user group. A government programme for universities was established a few years ago to support the elimination of barriers to access to education. Within the framework of the 'Accessible University' programme of the National Centre for Research and Development, funding has been provided in recent years to universities to adapt facilities and eliminate barriers to the needs of PWD. Each university has Offices for Persons with Disabilities to support students in accessing knowledge. In addition, there are tabs on each university's website to provide information on the degree of accessibility of facilities. The research also took into account the results of reports and analysed the 'State of Accessibility of the Public Entity Reports' received from these university units, as well as other descriptions and lists showing the current status in this respect. Access to this information enables prospective candidates to find out about the facilities and obstacles they may encounter when studying at a particular faculty.

Criteria for site selection:

- historic monument (historical value),
- object of representation (aesthetic value),
- teaching object (scientific value).

Site visits led to the identification of nine selected historic buildings which could provide a positive example (although not comprehensive) of measures leading to easier use of buildings by people with physical difficulties. All of them were already renovated and adapted.

It turned out that most of them had solutions that took universal design into account.

The selected facilities were: Faculty of Architecture at Warsaw University of Technology, University of Warsaw – Institute of Polish Culture, Students' Council building, Institute of Philosophy and Auditorium Maximum, Main Building of Gdansk University of Technology, Jagiellonian University in Krakow, Nicolaus Copernicus University in Torun, University of Wroclaw.

Areas covered:

- facility surroundings – forms of spatial obstruction,
- car park – type and legibility of signage, route to main entrance,
- main entrance – legibility, way of overcoming height, way of opening the door,
- side entrance – legibility, way of overcoming the height, way of opening the door,
- extent of interference with existing historic fabric.

The range of support for students with special needs is multi-faceted, such as the removal of architectural barriers, i.e. freeing up space from vertical and horizontal barriers. Providing information on the layout of rooms in the building in a visual, tactile and voice-activated way. Assistance is also provided in terms of grants and the appointment of assistants for people with special needs. It also involves giving access to the facility to people using an assistance dog, providing mobile devices to support education, digitisation and making digital library resources available. Universities also implement quiet, activity or relaxation areas for students. The definition of the scope of minimum requirements to serve accessibility is included in the Accessibility Act 2019. Poland, by ratifying the UN Convention on the Rights of Persons with Disabilities,

recognised the right of persons with disabilities to education, while ensuring that such persons have access to universal higher education without discrimination and on an equal basis with others. The Constitution of the Republic of Poland Art. 69-70 guarantees access to education without discrimination, to every individual in society.

2. CASE STUDIES

2.1. The Faculty of Architecture at Warsaw University of Technology (WAPW)

It is a historic didactic building from 1905 of exceptional architectural, cultural and historical value. Located at 55 Koszykowa Street in Warsaw, it is listed in the register of historical monuments under No. 766A by a decision of March 1969. The building operated in

its early days as the 5th Male Gymnasium of the Tsar, and from 1915 as a teaching institution educating future architects. Detailed historical data is contained in a comprehensive study entitled *Time and Place, Architecture of Warsaw University of Technology* [Wagner A.A., 2015, pp.328-354]. At the moment, the building is equipped with an internal passenger lift, installed in 2019 (Fig. 2). The internal lift is located in such a position as to allow a communication link between all floors of the building. The lift in the entrance hall was installed in 2023, making the main entrance to the WAPW building accessible to all. The location of the elevator does not disturb the historic interior layout and does not impede evacuation from the building. The authors of the project to adapt the main entrance for people with disabilities were Michał Brutkowski and Małgorzata Nowak-Pieńkowska.



Fig. 2. Faculty of Architecture, Warsaw University of Technology, main entrance, interior lifts;
source: photo by the authors

2.2. University of Warsaw – Institute of Philosophy (UWIF)

A building erected as a tenement house with an annexe in 1867-68 and reconstructed in 1948-49, located at 3 Krakowskie Przedmieście Street in Warsaw. In the 19th century, the building functioned as a seven-class Third Male Gymnasium. The building is listed in the register of historical monuments under no. 208 from July 1965. The project to locate a lift in the spirit of the existing staircase was realised as part of the 2011 accessibility of the building for PWD. Incorporating the glass lift into the open space of the staircase required slight interference to the existing balustrade and its base. The project did not require interferen-

ce with the historic walls of the building (Fig. 3). An external ramp for wheelchair users had also been realised a few years earlier. The alignment running to the ground floor was equipped with a stair platform. This type of solution is used less and less due to the limitation in the width of the evacuation from the building; moreover, it is visually unfavourable. About five years ago, a vertical lift was installed on the first floor. This provides access to the wing with the lecture theatre and library. The building is largely adapted, but locally there are level differences that are insurmountable for people with dysfunction or reduced mobility. This is evident, also from the 2019 UW Building Accessibility Summary.



Fig. 3. University of Warsaw, Institute of Philosophy – ramp for persons with disabilities, interior lift; source: photo by the authors

2.3. University of Warsaw – Institute of Polish Culture, Students' Council building

The buildings were originally part of the Villa Regia foundation from 1699, and from 1707 the building operated as the St. Roch Hospital. It was rebuilt several more times with a change of function and rebuilt after the war damage in 1947-49. The building has a spatial layout closed in a quarter with two functions: Student Council located in the front wing facing Krakowskie Przedmieście Street, and the Institute of Polish Culture (IKP) accessible from the interior of the campus. The realisation of the adaptation investment (IKP) was connected with a general overhaul and reconstruction that took place in 2004. Access to the

internal lift is via an external ramp integrated into the pavement, located on the side of the inner university complex (Fig. 4). The three-storey Students' Council building located at 24 Krakowskie Przedmieście Street was entered in the register of monuments under No. 242 of 1.07.1965 and No. 1244 of 27.07.1984. The building in the front wing is equipped with a lift located in the spirit of the staircase (Fig. 5). Due to the small area of the staircase, the lift is narrow and does not meet current accessibility standards. However, its location does not alter the overall character of the building and, importantly, did not require significant building interventions. A toilet for PWD has been provided on the ground floor. Currently, access to the building

for people with mobility impairments is only possible through a gated crossing. Access from the main gate of the campus is not possible due to the restriction of 3

steps in the arcade that leads to the main door of the Local Authority. Design work is currently underway to overcome this problem.



Fig. 4. University of Warsaw, Institute of Polish Culture – interior lift; source: photo by the authors



Fig. 5. University of Warsaw, Students' Council – interior lift; source: photo by the authors

2.4. Auditorium Maximum from the architectural and spatial complex of the University of Warsaw

The building was erected at 26/28 Krakowskie Przedmieście Street, in the years 1936-1937, and rebuilt in the period 1951-55. During the Nazi occupation the building was used as a stable and arms depot. The new Auditorium was erected after the Second World War and was entered in the Register of Historic Buildings on 27.07.1984, under No. 1244, as was the entire UW campus. The project to adapt the building included the implementation of a glass lift connecting the basement with the ground floor (Fig. 6). The installation of the lift in the long entrance hall required interference into the existing ceiling between

the ground and basement floors. The lift has a voice system to indicate its position and a button to provide a call to the gatehouse. Floors 2 and 3 are inaccessible for people with mobility impairments. Toilets for people with disabilities are located on level -1 and on the ground floor. An accessible and signposted entrance from the greenhouse is located to the left of the main entrance, an additional entrance with ramp is located at the rear of the building. Detailed historical data about the facilities are included in the series of publications entitled *The History of the University of Warsaw* [T. Kizwalter, P. Majewski, 2016]. The author of the selected adaptation projects in the University of Warsaw facilities is Archigraf studio, Michał Brutkowski and his team.



Fig. 6. University of Warsaw, Auditorium Maximumum – interior lift; source: photo by the authors

2.5. Gdansk University of Technology – Main Building

The building was designed in the historicist style referring to Northern Mannerism. It was built between 1900 and 1904, and entered in the register of monuments on 27.07.1984 under the number 1244. The body of the building is rectangular in shape with two internal, covered courtyards. The building is located at the end of Gabriela Narutowicza Street, which emphasises the axially of the urban layout. More information about the building can be found in the album *Kampus Politechniki Gdańskiej* [Campus of Gdańsk University of Technology] [J. Szczepański, K. Krzempek 2017]. The 2017 construction of the lift removed barriers to access to the

upper floors of the building. There are three entrances to the building, from Narutowicza Street, with the main representative one housing an extensive staircase that makes the entrance inaccessible to PWD (Fig. 7). A barrier-free entrance with a door that opens with a photo-cell is located to the right of the main entrance. Toilets accessible to PWD are located on each floor to the right of the main entrance. The University of Technology participates in the Accessibility Plus Programme. The university has joined the partnership project 'Accessible School – innovative solutions in creating a friendly educational space taking into account the needs of students and the environment' and the Operational Programme Knowledge Education Development 2014-2020.



Fig. 7. Gdańsk University of Technology, main entrance – interior lift; source: photo by the authors

2.6. Jagiellonian University – Collegium Novum in Krakow

The Collegium was founded in the 14th century by Casimir the Great. Later on Queen Jadwiga and Władysław Jagiełło renovated the facility, which became the Jagiellonian University. The current Collegium Novum was built on the site of 15th-century dormitories, which were destroyed by fire in the 19th century. It is a neo-Gothic teaching and administrative building designed by Feliks Księżarski, which was opened in June 1887. The building was entered into the register of monuments under no. A-315 28/07/1966 Detailed historical data can be found in the publication entitled *Collegium Novum* [M. Bogdanowska, A. Chwalba, 2014].

The building with two internal courtyards is located at the corner of Gołębia and Jagiellońska Streets. Access to the facility is through one of several entrances to the building. On the northern façade, the entrance is equipped with an intercom and leads directly to the inner courtyard to the external elevator installed at the courtyard façade (Fig. 8). The lift connects all floors and allows access to the rooms. The facility has two toilets for people with disabilities located on levels +1 and +2. People using an assistance dog are allowed access. However, there is a noticeable lack of a marked parking space for people with disabilities directly at the entrance with the elevator, and the condition of the road surface makes it very difficult to move around.



Fig. 8. Jagiellonian University Collegium Novum – main entrance, external lift located in the courtyard; source: photo by the authors

2.7. Nicolaus Copernicus University in Torun – Collegium Maius in Torun

The Collegium Maius was built between 1906 and 1907 in neo-Gothic style in Fosa Staromiejska Street. It was entered in the register of historical monuments on 3.06.2005 under no. 509. The building was erected in red brick in the shape resembling the letter 'F', with the main entrance located on the axis of the body on the side of the internal square. The internal layout of the building is 1.5 tracts with cross vaults. During the First World War the building served as a lazarette, and in the interwar period it housed the Pomeranian Provincial Office. During the Second World War the German SS police forces were stationed here and a prison was located; the unit was destroyed in

November 1945. After reconstruction, it was taken over by the Collegium Maius. Between 1906 and 1920, it housed the Industrial School. More information about the history of the building can be found in *History of the building of the Collegium Maius of Nicolaus Copernicus University in Torun* [B. M. Gawęcka, 2011]. Accessibility for people with disabilities is provided in terms of parking on the side of Fosa Staromiejska. Unfortunately, the main entrance to the building is not accessible to people with disabilities. An internal lift has been constructed in the building to the right of the main entrance (Fig. 9). In the historic pavement (cobblestones), large-format slabs have been placed to facilitate mobility by levelling out unevenness, which is a positive example of universal design.



Fig 9. Nicolaus Copernicus University, Collegium Maius, main entrance – interior lift; source: photo by the authors

2.8. University of Wrocław

The building was erected in the 18th century in the Baroque style and was rebuilt several times. After the destruction caused by World War II, it was rebuilt between 1949 and 1958. The building towers over the bank of the Oder River dividing the city. The glass exterior lift is located on the side of the courtyard, where the car park is located from Aleksander Hr. Fredry Street. The building has two entries in the register of historical monuments under No. 35 of 29.03.1949 and No. 163 of 15.02.1962. Historical details can be found in the publication entitled *Z dziejów Uniwersytetu Wrocławskiego The History of the University of Wrocław* [A. Grodzki, 2009]. The new passageway has

become a link between modernity and history, allowing access to all floors of the building, except the Mathematical Tower. The external lift, together with a spiral ramp, was located between the eastern wing of the university building and the Roman Catholic Church of the Holy Name of Jesus (Fig. 10). The entrance to the building from the Stone Hall side is ensured by means of an automatic opening door, accessible to people with disabilities thanks to an installed lift. Access from the Imperial Entrance is limited. The toilet accessible for PWD is located at the Imperial Entrance. However, the shape of the used ramp is not the best solution; moreover, the handrails are inaccessible to people with disabilities.



Fig. 10. University of Wrocław – exterior lift; source: photo by the authors

3. RESULTS

The listed buildings under review are characterised by impressive architecture. The ground floors of the buildings are elevated above the ground level. There is often a need to climb several flights of stairs from the ground floor. Historic and decorative front façades may preclude the location of lifts on the exterior of buildings attached to the façade. However, there are external lift shafts located in the central axes of lateral, less decorative facades, using, for example, existing window openings for future vertical transportation stops. These solutions are the right thing to do, as they can represent a certain compromise between preserving the historic, existing state and providing accessibility. Such a solution was applied in the cases of Wrocław and Krakow universities. The analysis of the indicated buildings has shown that the implementation of passenger lifts provides the best connection of most floors. Such solutions are also the best in terms of comfort and ease of use. It is more common to realise passenger lifts connecting all the storeys than external ramps that are large and disharmonising with the surroundings. Lift shafts most often made with modern technology do not falsify history, as it is obvious at first glance that they are new architectural elements. Often, if spatial conditions permit, internal lifts are realised in the spirit of stairwells, for example. However, given the varied shape of the floor plans of the selected buildings, the locations of the lifts are diverse. Some universities with building plans in a simple single-wing form have lifts in halls at the main entrances or on less prominent elevations, as in the Wrocław case. On the other hand, buildings with a complex spatial form have more frequently implemented lifts in internal courtyards. Nevertheless, such solutions cannot be regarded as typical or universal. Each building is different and should be considered individually. The main finding is that, in almost every case, the main representative entrance is not fully accessible to people with disabilities in an independent manner. Entrances for PWD are usually implemented at side entrances. Architectural accessibility in the elimination of vertical barriers is realised in all the surveyed facilities but not fully. In the case of facilities with a more complex form and differences in levels between building wings, it happens that not all rooms are accessible. Unfortunately, some lifts were built almost 20 years ago, which means that they no longer meet the current requirements in terms of, among other things, dimensions and technology (buttons, voice information, equipment, etc.). This applies to the dimensions of the cabs, lack of voice information, lack of Braille descriptions, illumination or highligh-

ting of the control panel in the lift. Often, in the surveyed facilities, there are several assistive technical elements, apart from the lift stair lifts are used, which is currently not the best solution. They restrict evacuation from the building, visually disrupt the interiors and their form is often aesthetically unappealing. It should not be forgotten that in historical buildings there are massive entrance doors which often do not have servo-operators to assist their opening. Another complication is that both external and internal doors appear as double-leaf doors with a passage width in one leaf less than the required min. 90 cm. In this case, both leaves must be opened in order for a wheelchair user to access the room in question. Unfortunately, this activity requires the help of others and makes the user with a disability dependent on others, far from being independent. A noticeable problem is also the space around the buildings in question, which has spatial impediments in terms of kerbs or thresholds that make it difficult to reach the buildings. There are deficiencies in the vertical as well as and horizontal signage of the space. The buildings were assessed keeping in mind the whole path taken by a person with special needs, together with the access from the public space or parking spaces to the premises, which are their final destination.

There is a noticeable positive trend towards adapting the immediate area of monuments, where there is historic paving in the form of irregular stone cobbles or field pebbles. Although such paving is a beautiful testimony to history, it poses a huge challenge in getting around. This is not just referring to people with mobility impairments, but also parents with children in prams or cyclists. In several examples studied, rectangular concrete or stone slabs were incorporated into the existing paving to provide a safer route. Universal design was also manifested in these facilities by the creation of adequate parking spaces and adapted toilets. Sometimes, despite the adaptation of the side entrance and the good design of the parking spaces, the route was so complicated and inconvenient that it restricted access to the facility.

The needs of the public currently overtake technical solutions. On the other hand, the increasing dialogue between users and institutions represents positive developments in providing accessibility to facilities especially with regard to historic buildings, whose preservation in an almost unchanged form is as important as it is for everyone to be able to use this historic space regardless of the accompanying limitations. The areas were surveyed according to the principles of reasonable improvement (Tab.1):

A – facility surroundings,
 B – car park,
 C – main entrance,

D – side entrance,
 E – extent of interference,
 F – lift / ramp / lift

Tab. 1. Summary of research results

No.	Facility	A	B	C	D	E	F
1	Warsaw University of Technology – Faculty of Architecture	●●	●	●	●	●	●
2	University of Warsaw – Institute of Philosophy	●	●●	●●	●	●	●
3	University of Warsaw – Institute of Polish Culture	●	●	●	●	●	●
4	University of Warsaw – Students’ Council building	●●	●	●●	●	●	●
5	University of Warsaw – Auditorium Maximum	●	●	●	●	●	●
6	Gdansk University of Technology – Main Building	●	●	●	●	●	●
7	Jagiellonian University – Collegium Novum in Krakow	●●	●	●	●	●	●
8	Nicolaus Copernicus University – Collegium Maius in Torun	●●	●	●	●●	●	●
9	University of Wroclaw	●●	●	●●	●	●	●

Legend: ● proper solution ● acceptable solution ● no accessibility to the main entrance
 Dual category designations mean that the assumption was met, but locally there were some difficulties.
 Source: by the authors.

DISCUSSION

After the analysis, it can be concluded that it is much easier and cheaper to apply barrier-friendly design solutions in a newly designed building. The situation is different in existing buildings, where lifts, ramps and hoists are incorporated. A possible and least visible form of accessibility incorporates offset floor platforms. The condition for their use is a limited lifting height of 75 cm. The advantage of this technical element is that they are hidden in the floors and only extend when required. They can be used both indoor and outdoor. They can certainly provide a convertible and invisible form of accessibility. It is difficult to propose standard solutions, as they do not exist, just as every facility and need is individual and unique. At the moment, none of the universities under analysis fully meets all accessibility objectives, it is a long and arduous and – above all – costly process. However, as far as possible, universities are improving this condition and are continuously retrofitting facilities with the infrastructure needed by persons with disabilities. However, upgrades to buildings on the historic register should, nevertheless, be carried out on the assumption that the accessibility aspect may become secondary, in relation to the historical and cultural values of the building. In such situations, consideration is given to implementing the infrastructure in a way that is invisible, far from being eye-catching, aggressive or dominant. In addition, the question must be asked how far

one can go with transformations of historic buildings for the sake of ideal accessibility. There is no clear answer to this question, because there are no ideal solutions. Rather, when realising the idea of adapting a historic building for PWD, one has to think about a certain compromise between history and contemporary needs. Another aspect that needs more analysis is the decreasing number of students and graduates with disabilities in the improving accessibility situation of higher education institutions.

Analysing the available statistical data and the current situation in Ukraine after 24th February 2022, an increase in the number of Ukrainian students at universities was observed. The Ministry of Education and Science reported that 5,699 Ukrainian citizens applied for admission to study in Polish universities (as of 27th April 2022). Due to the ongoing war in Ukraine and the increasing number of physically injured people, as well as people with disabilities, some of them may express a desire to participate in higher education in Poland. Therefore, the need to provide them with dignity in our country takes on new importance and a there is a growing desire to eliminate various barriers. This aspect requires the development of broader and more detailed research not only in the sphere of elimination of architectural barriers, but also the need to ensure psychological comfort and safety in Polish educational institutions.

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AN ANALYSIS OF SOCIAL INNOVATION SYSTEMS IN LIBAN – IMPACT OF NATURE-BASED SOLUTIONS ON THE QUALITY OF LIFE IN A CITY

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Abstract:

The aim of the article is to examine the possibility of using the Temporary Innovation System (TIS) structure in the analysed projects in Lebanon, as well as to verify to what extent nature-based solutions (NBS) can be understood through the prism of TIS. The article presents several examples of nature-based solutions (NBS) in various locations in Lebanon as ways to improve the climate and relations between residents of smaller cities. The study used a case study methodology in which four nature-based solutions (NBS) projects in two Lebanese cities were analysed and compared with the expected characteristics of TIS.

Keywords: social innovation; nature-based solutions; social innovation system

INTRODUCTION

Lebanon is an Arabic country located in the Middle East. It is bordered to the north and east by Syria and to the south by Israel. It also borders the vast expanse of the Mediterranean Sea, with a coastline stretching almost 225 kilometres. The country's location has influenced Lebanon's extensive culture. The country has been torn by conflicts with Syria and Israel for many years. As a result of the war in Syria, many refugees have chosen to settle in nearby Lebanon. In addition, the results of the 2006 war between Lebanon and Israel can still be seen in many areas. As a result of continuing problems – primarily conflicts with neighbours, strikes and social problems, as well as haunting natural disasters – the country has slowed considerably down in economic terms. Numerous disasters have, in turn, caused damage to property or loss of life. For many years, Lebanon's economy has additionally struggled with massive, ever-increasing inflation [Ammar W. et al. 1998].

Each of the above factors means that the country's politicians today pay practically no attention to environmental issues, which are so important for developed countries. Fortunately, the people of Lebanon recognize the potential of nature-based solutions and, by attracting sponsors, often on their own in consultation with local authorities, are trying to put them into practice. Although Lebanon is still a long way off compared to other countries in this respect, the solutions being applied show that, by design, simple proposals can significantly improve the quality of urban life.

The Lebanese community recognizes that human activity and the constant progress of civilization contribute significantly to climate change [C. Seelos et al. 2012]. Nowadays, not only countries in Europe, but also just in the Middle East, for example, are struggling with smog, urban heat island or climate change – although these phenomena are much less often mentioned in such countries. These changes have a negative

impact not only on the environment, but especially on metropolitan residents, who, as a result, avoid spending time together outdoors, blurring relationships between them [R. Murray et al. 2010, p. 40]. In view of these phenomena, it is necessary to look for comprehensive solutions that could respond to multiple problems simultaneously. Such examples certainly include those from the nature-based solutions (NBS) group. In addition to significantly improving the quality of the environment, they also aim to integrate the residents of the area they cover.

The article discusses and presents the most relevant nature-based solutions proposals in Lebanon, along with their analysis and the opportunities they offer to the country's society. Four projects were selected, which are distinguished by their different ways of conducting and scale. Lebanon's temporary social innovation systems were also analysed, and the research approach was described, along with the rationale for selecting nature-based solutions (NBS) projects as examples of multi-stakeholder social innovation initiatives. After a brief description of the project ideas in which those of nature-based solutions (NBS) were found, the results of the author's research on the presence of urban composition elements in the analysed nature-based projects in Lebanon are presented and discussed. The article concludes with a reflection on the benefits of NBS and preliminary observations on their benefits. It also concludes with preliminary conclusions on the implications of theory and practice, particularly for nature-based solutions.

1. RESEARCH GOALS

The purpose of this article is to review and analyse the feasibility of nature-based solutions in Lebanon, and to examine the extent to which NBS can help support such an initiative. It is proposed that NBS provide a framework for multilateral engagement with regard to social and climate problems. The goal is also to examine whether NBS can provide a useful framework for the country's economic development, improve neighbourhood relations, and enable a more informed architectural design in Lebanon.

2. METHODOLOGY AND RESULTS

The research is based on a case study. Four nature-based solutions (NBS) projects were analysed and compared with the expectations of social innovation (TIS). Of the four projects, only one exhibited characteristics identical to TIS. Each, however, was closely related to problems in the city and problems in society.

Only one of the examples analysed, on the other hand, was aimed at solving social problems. Conclusions were drawn from this, which relate to the fact that NBS need not exhibit the functions of solving society's problems and climate change, and that TIS may best fit these elements.

2.1. Limitations/ research implication

The article concludes with theoretical insights from the application of the NBS framework in the context of TIS. The following steps in the development of the NBS framework by addressing social innovation and the needs of the Lebanese people are proposed.

2.2. Originality/reliability of the article

This article examines social innovation systems in relation to four nature-based solution projects in Lebanon. The research data was obtained through a site visit and the authors' own opinion on the occurrence of urban composition elements in these projects. The research presented and the data obtained are the authors' and present a topic that has not been subjected to much analysis to date, making it original and unique.

3. SOCIAL INNOVATION FRAMEWORK

Social innovation is a concept and *modus operandi* that has been operating for many years mainly in European countries. The Middle East, until recently, has not practiced such approaches as public participation or consultation with residents. Fortunately, with the popularization of European standards in Lebanon, more and more attention has begun to be paid to involving the public in the construction and creation of common spaces.

Thus, it is assumed that social innovation focuses primarily on the idea of an established process, which is related to the generation of ideas that, by design, are intended to meet social needs or solve the problems of the population of the cities in question. Over the past few years, researchers at the Trinity Center for Social Innovation (CSI) have been working on researching, engaging and teaching social innovation through the lens of institutional evolution, management practice and complex systems [P. Senge et al. 2015, pp. 27-33]. They have concluded that there is a strong connection between local governments and communities working together to shape shared spaces.

Currently, several types of complex innovation systems are distinguished. Through them, multi-stakeholder innovations can be verified, and the following

article argues for the application of the social innovation systems framework. This article aims to extend the analysis of nature-based solutions and their frameworks to multiple social problems precisely in relation to TIS. The goal is to further verify that TIS and NBS can enable more informed design and facilitate social innovation, which in turn will have a long-lasting impact on the Lebanese community.

Social innovation as a concept (or even a form of action) has been around for a long time, but it is constantly the subject of debate about its meaning and practices [C. Seelos et al. 2012]. A precise definition of the framework of innovation systems has not yet been formulated, but many theories generally centre around the idea of organizing a process [C. Trivedi et al. 2015, pp. 37-62]. It includes meeting social needs or solving social problems. Most often, they also include the creation of new relationships between multiple actors in the process [R. Murray et al. 2010]. Researchers at the Trinity Center of Social Innovation have noted that TIS can largely influence the satisfaction of social needs with appropriate community involvement. Many nature-based solutions (NBS) are excellent examples of multi-stakeholder social initiatives [A. Nicholas et al. 2017]. S. Kuhlmann, on the other hand, believes that a temporary social innovation framework (TIS) is a dynamic process related to managing interdependencies and social contingencies in a prudent (e.g., trial-and-error methods) and preliminary (e.g., time-limited) rather than permanent way [S. Kuhlman et al. 2019, pp. 1091-1097].

One accepted definition of innovation systems defines them as *“new social practices that aim to improve the satisfaction of social needs with respect to existing solutions. They arise from working conditions, education, community development and health, among others. These ideas arise to expand and strengthen community relations”* [TEPISE 2014]. Based on the available definitions of social innovation frameworks, the researchers noted that one of the features of TIS is a “locally defined goal.” According to Frenken, the formulation of a clear goal mobilizes existing organizations to collaborate and seek ways to achieve it, through coordination and cooperation with the community [Frenken, 2017, p. +44]. Frenken also notes that people who have been affected by a social problem in the past can greatly facilitate the creation of a set of solutions.

4. CASE STUDY SELECTION AND RESEARCH APPROACH

This paper examines four nature-based solutions projects in Lebanon – Evergreen City, a commu-

nity park, a vertical farm and a community garden in the Sky Tower. In the early stages of the Evergreen City project, a collaboration between the authorities and residents identified possible links between the developing TIS structure and phenomena known as nature-based solutions (NBS). The latter are defined as “solutions to social challenges that are inspired and supported by nature and bring more natural features to the city.” Organizations around the world, including the UN, have noted the importance of such innovations for combating climate and socioeconomic change. For this reason, nature-based solutions (NBS) are considered an important and growing field of social innovation.

Initial ideas for linking NBS and the TIS framework were presented at the 2018 World Social Entrepreneurship Forum in Glasgow [S. McQuaid et al. 2018], but at the time there was limited data available on nature-based solutions (NBS).

Lebanon is seen as a country where not much NBS has been introduced. On the other hand, however, problems can be seen, such as the economic crisis, the migration crisis or the increase in crime, etc. Nowadays, the public is beginning to see the potential of NBS to solve many climate (and other) problems.

The case study was drawn from work undertaken as part of Connecting Nature, a five-year European project that sought to understand and verify the impact of NBS on developing the practices needed to increase urban resilience, innovation and governance using NBS. It was then expanded by the authors of the article by way of their own observations.

The choice of case studies is primarily driven by the original objectives of the project. The case study examples were chosen for analysis to represent social innovation at different stages and in different parts of Lebanon. The projects that form the basis of the article include: Evergreen City, Life Lab vertical gardens and Green Studios.

5. CASE STUDY ANALYSIS RESULTS

This section of the article presents a summary of the results of the case study analysis to determine the presence of TIS elements, consistent with the system described above, as well as the opportunities provided by the implemented NBS. The examined case study was then analysed, highlighting any insights related to the advantages that affected the quality of life in the city. In the description of the case study, attention was paid to the city’s outline in which the NBS projects deemed relevant to the case study were located.

5.1. NBS project analysis: evergreen city – Beirut

Horsh Park, or Beirut’s pine forest, has existed since at least the 13th century. This green space, the only one on such a large scale in the city, underwent a re-development in 1992. The initiative was commissioned by the Beirut authorities in consultation and with the support of the Ile-de France region. A team of French and Lebanese architects and urban planners (Jacques Sgard, Trebucq, Ivy Papadakis, Jean-Claude Hardy, Pierre Neema, Frederic Francis) proposed a new layout for this forest that included native tree and shrub species. Unfortunately, the park remained closed and inaccessible to the community despite the revitalization. The city authorities, despite pressure from residents, did not make the park area accessible due, for example, to the area’s inadequacy to meet safety requirements.

Lebanon offers few public green spaces [E. Bou-Zied et al. 2002, p. 128]. Evergreen City is a project created by prominent architect Raëd Abillam, who, based on public participation, interviews with residents, and in consultation with the city government, prepared a concept on how to modernize the park to serve as many users as possible. This is a very important project, because for decades Horsh Park was closed, and thus did not serve its function at all.

The architect divided the park into three zones – a green zone for rest and recreation, resembling a classic park with paths and benches. The park was also planned as a zone for culture, public programs and community events, with space for fairs or exhibitions. This would allow residents and tourists to enjoy the space as they see fit. By design, the park was to be bustling all week long – not just at weekends. The design premise was also to create a place that would integrate the residents of the three neighbourhoods that adjoin the park – indigenous Lebanese, Syrian refugees and the so-called slums. Evergreen City was to be a place where the community could practice “urban farming” and socialize together.

Beirut’s pine forest is a huge area that covers about 2 hectares and is a unique green space, considered the largest garden in Lebanon. However, it lacked sufficient infrastructure to accommodate a sufficient number of users. The reconstruction plan promoted the development of facilities and services necessary for the park’s operation.

The architect divided the park into several basic zones:

- Green zone for residents to meet and spend leisure time. This zone consists of benches for lounging or table games and a small botanical garden. It is covered with permeable gravel on which water does not accumulate, penetrating deep into the soil and irrigating it.
- Fitness and sports activities zone – surfaces made of concrete, a playground with a special rubber surface that increases the safety level of children. The architect also proposed a sand pool in this zone, where sensory activities for children take place. The fitness zone, in turn, is enriched with a climbing wall or a gym. Permeable concrete as a surface, in turn, allows for efficient drainage of water into the ground – even during hot days.
- An area for public events with space for an open stage where scenery can be installed.

As a result, Horsh Park was to be a true cultural, entertainment and social centre 7 days a week. Special types of finishes for the walkways and pedestrian routes not only create an aesthetically pleasing surface, but also allow rainwater to freely irrigate the ground. As a result, it remains circulating in the park at all times.

Unfortunately, the project was not finalized in its entirety due to lack of sufficient funding from the government. However, many residents who have been exposed to the idea of Evergreen City are hopeful that the project will one day be realized.

The first observation regarding the mapping of the nature-based solutions project for Evergreen City to the TIS structure is that, for the most part, the premise has similar characteristics to TIS. It is a public

Tab. 1. Overview of TIS features by NBS case (Evergreen City). In each case, it is color-coded to facilitate analysis and reference [green – numerous presence of TIS elements (on a 100% scale it is in the range 100%-70%), yellow colour – moderate presence of TIS elements (on a 100% scale it is between 70%-40%), red colour – no or low presence of TIS elements (on a 100% scale it is in the range of 40%-0%)].

Project	Social aspect	Local aim	Temporary co-alition	Knowledge exchange	Public consultation
Evergreen City					

Source: by the authors.

utility project that involves the revitalization of a public space – a green area. The project encountered a serious social problem – a lack of relations of Beirut’s neighbouring areas and an insufficient amount of green space for common recreation. Therefore a common local goal was defined, which was to create a park that would serve as many users as possible, throughout the week. A temporary coalition was also formed with the government to implement the project. Unfortunately, the cooperation with local governments ended due to insufficient funds that the authorities could offer. In the course of developing the concept, the architects also consulted the public to come up with the best solutions.

5.2. NBS project analysis – community garden in sky tower (New Doha)

with the growing economic crisis that Lebanon is going through, guaranteeing residents access to food has become a priority for many authorities. However, local governments are keen to ensure that this food is produced in a sustainable manner that protects natural resources and enhances biodiversity. The origins of the “environmental health movement” in Lebanon stem from two independent developments that gradually overlapped. The first was a reaction on the part of urban consumers to the poor quality of food that was sold in Lebanon during and after the war period. The second was a reaction from farmers to the chemicals used on farms and in agricultural processing [Tawfic A. 2003].

surrounds the complex. Residents were to gain not only access to healthy food, but also contribute to compost production by segregating their garbage (after being trained by FHF Foundation experts). The project was completed in 2021.

The garden takes the form of a greenhouse, where residents grow vegetables for their own use. The area surrounds the modern New Doha building complex. The garden uses a traditional system of cultivation, which residents take care of themselves – for example, by irrigating them.

The community garden project at the Sky Tower in New Doha has slightly fewer TIS elements than Evergreen City – in contrast, much less community consultation was implemented. The project’s top-down assumption was that Lebanese residents lacked access to sustainable food. Hence it did not analyse what exactly New Doha residents wanted access to. As with Evergreen City, the social problem and the local goal were carefully defined with this project as well. The initiative also included a temporary coalition of residents with the authorities and a foundation [Ammar W. et al. 1998].

5.3. NBS project analysis – community agriculture (Beirut)

The Beirut Social Agriculture Project is an initiative of a local group of urban activists – students from St. Joseph’s University in Beirut and Patrick Gear, president of the Rotaract Club of Beirut Center. It was intended as a quick response to the food crisis the city

Tab. 2. Overview of TIS features by NBS case (social garden at Sky Tower, New Doha). In each case, it is color-coded to facilitate analysis and reference [green – numerous presence of TIS elements (on a 100% scale it is in the range 100%-70%), yellow colour – moderate presence of TIS elements (on a 100% scale it is between 70%-40%), red colour – no or low presence of TIS elements (on a 100% scale it is in the range of 40%-0%)].

Project	Social aspect	Local aim	Temporary coalition	Knowledge exchange	Public consultation
Community garden in Sky Tower					

Source: by the authors.

In early June 2020, the Food Heritage Foundation, in cooperation with Real Estate Beirut, initiated work on a sustainable urban agriculture project at the Sky Tower residential complex in New Doha. The project aimed to implement sustainable agriculture in an urban environment and included various aspects of agriculture – fresh fruit and vegetable production, aromatic plants, free-range egg production, etc. The project also included hiking trails in the pine forest that

is slowly sinking into. Lebanon is a country with beautiful topography, with 12% of arable land suitable for most crops. Unfortunately, the authorities do not pay that much attention to growing food – Lebanon imports about 80% of its food. The economic crisis, in turn, has revealed a serious problem with access to basic foodstuffs.

The garden uses an ecological pavement in the form of water-permeable gravel. The task of this ma-

terial is to reduce the problems of inadequate irrigation for plants and excess irrigation. As a result, the optimum groundwater level is maintained in the garden area at all times, and the ecological balance is maintained. The paving in the form of water-permeable gravel also helps to maintain the natural circulation of water in nature.

This project contains all the features of TIS and is a textbook example of this premise. The main goal of the Beirut urban garden project was to create access to cheap food – it is cheaper to grow your own vegetables or fruit than buy them from foreign markets. A team of activists distributed boxes of vegetable seedlings to residents with the hope that one day the community would become urban gardeners. The activists wanted to introduce urban agriculture in a simple way, so that everyone could grow food on their empty plots, balconies or rooftops. They presented their idea to clubs across the country. When they raised enough funds, they sought partnerships with various NGOs to recruit beneficiaries and connect with families. Agricultural consultants helped the activists purchase seedlings and prepare a brochure in Arabic with simple steps for irrigation and plant care.

The results of the initiative were surprising – more and more families started asking for boxes of seedlings. The process of planting or caring for plants brought families and neighbours together. Groups cooperated with each other, and social ties grew much stronger. In addition, urban agriculture has contributed to some extent to improving the aesthetics of neighbourhoods and increasing access to green spaces. This

in turn has positive social and therapeutic results [Trivedi C. et al. 2015].

5.4. NBS project analysis – urban vertical farming (Beirut)

In Beirut, a Beirut Farm container has been erected on an empty parking lot in Furn El Chebaak. The author and initiator of this project is Sandro Allouche. The project operates as an urban farm in the heart of the city and falls under the category of vertical agriculture. It is the first farm of its kind in Lebanon, giving residents the opportunity to access food while using 95 to 99% less water than traditional agriculture. It is an initiative of the Agricultural Research Center of the American University in Beirut. The project was also intended to integrate the urban community. The results of the innovation are still in the research phase [Poulsen M. 2017].

When initiating the construction of the container, Sandro Allouche wanted a place that would provide the best quality vegetables. The vertical farm in Beirut uses organic aquaponic cultivation. The project stands out from the rest because of its form – it is the first farm of its kind in downtown Beirut.

Depending on the season, the vertical farm uses specific plants. They are placed one above the other, so that the available space is used much better and so that there is no need to constantly enlarge the container due to lack of space. Such ecological cultivation of plants in a container means that the risk of adverse effects of weather factors on the quality of the crop is significantly reduced.

Tab. 3. Overview of TIS features by NBS case (urban garden's in Beirut). In each case, it is color-coded to facilitate analysis and reference [green – numerous presence of TIS elements (on a 100% scale it is in the range 100%-70%), yellow colour – moderate presence of TIS elements (on a 100% scale it is between 70%-40%), red colour – no or low presence of TIS elements (on a 100% scale it is in the range of 40%-0%)].

Project	Social aspect	Local aim	Temporary co-alition	Knowledge exchange	Public consultation
Community Agriculture in Beirut					

Source: by the authors.

Tab. 4. Overview of TIS features by NBS case (vertical farm, Beirut). In each case, it is color-coded to facilitate analysis and reference [green – numerous presence of TIS elements (on a 100% scale it is in the range 100%-70%), yellow colour – moderate presence of TIS elements (on a 100% scale it is between 70%-40%), red colour – no or low presence of TIS elements (on a 100% scale it is in the range of 40%-0%)].

Project	Social aspect	Local aim	Temporary co-alition	Knowledge exchange	Public consultation
Vertical farming in Beirut					

Source: by the authors.

6. SPATIAL FORMS OF SOCIAL INNOVATION AND NATURE-BASED SOLUTIONS

The spatial aspect in relation to social innovation can take different forms [N. Siggelkow et al. 2005, p. 101-122]. In the case of the community garden project at the Sky Tower in New Doha, the innovations related to education and growing edible plants. The FHF Foundation, after discussions with the city’s residents, began creating a garden that was to become a space for neighbourhood activities, a place to provide shade on hot days. The social innovation there is certainly a comprehensive approach to ecology. Residents were to contribute to the production of compost, having been trained by the foundation’s staff as to the principles of garbage collection and segregation. Such a garden on the roof of a high-rise building was to be a self-sustaining space that would unite residents.

Evergreen City, on the other hand, is a design premise that involved the reclamation of a disused area of several hectares of forest in Beirut. The main goal of the city’s community and architects was to create, together with the authorities, a public green space that would allow people to spend their leisure time surrounded by nature throughout the week.

EW in the case of community garden, agriculture and vertical farm innovations in turn manifests itself in a coalition between the idea’s founders and residents. There are no laws or regulations that address the imple-

mentation of such solutions in Lebanon. Nevertheless, many private individuals, organizations or students on their own in consultation with the community are trying to implement NBS with elements of TIS.

Only one project met all the assumptions that temporary innovation systems should meet. In theory, they should be innovative ways of working out specific goals by introducing:

- new and effective organizational forms,
- lifestyles,
- regulations and solutions,
- elements for solving problems, different from traditional practices [A. Łuczyszyn 2005, p. 46].

7. NATURE-BASED SOLUTIONS ACCORDING TO THE PEOPLE OF LEBANON

The study included the author’s evaluation of projects in terms of the presence of given elements on the site that affect the usability, functionality or aesthetics (in the subjective opinion) of the place. The prepared template was based on a 5-point scale, the criteria of which meant:

- 1 – element missing,
- 2 – negligible number of elements,
- 3 – discernible numbers of elements,
- 4 – a lot of elements,
- 5 – a lot of elements.

Tab. 5. Nature-based solutions survey among Lebanon citizens

Evaluation criterion	Evaluation in scale 1-5			
Project name	Evergreen City in Beirut	Community garden in Beirut	Vertical farming in Beirut	Community agriculture in Sky Tower
Presence of vegetation cover	4 – Numerous pine trees, native shrubs and flowers	4 – Numerous ornamental trees, vegetables grown by residents, flowers	4 – Inside the farm numerous cultivated vegetables	4 – Inside the greenhouse many green crops
Level of land devastation	4 – The area is neglected in places. In the vast majority of the park, the area is maintained in very good condition – no traces of devastation of elements of small architecture	3 – In several places visible elements of devastation of the area – damaged benches, trash garbage cans	5 – The area is very well preserved	5 – The area is very well preserved
Saturation with infrastructure	5 – Numerous pedestrian and bicycle routes	5 – Pedestrian routes	5 – Good access infrastructure	5 – Good access infrastructure

Harmony of landscape composition	4 – Park on a triangular plan with numerous ordered landscape elements	4 – Landscape composition at a satisfactory level – garden layout with symmetry and clarity	1 – Not applicable	1 – Not applicable
Presence of water resources	4 – The middle part of the park with a fountain	4 – Fountain	1 – No	1 – No
Degree of land use	3 – The area is not used in its entirety. For the most part, you can see orderly greenery, elements of small architecture, pedestrian routes, a playground or a place for recreation	4 – The area is practically all used	5 – Farm area entirely used for crops	5 – Greenhouse area entirely used for crops
Presence of forms of landscape protection	1 – No	1 – No	1 – No	1 – No
Landscape dominants	1 – No	1 – No	1 – No	1 – No
View axes	4 – View axis at the intersection of streets Sami El Solh, Tayouneh and Old Saida Road	3 – View axes on city buildings	3 – View axis of residential buildings	3 – View axis of the building complex in the New Doha complex
Urban openings	4 – Urban landscape openings – to the adjacent green area	1 – No	1 – No	1 – No

Source: by the authors.

Evergreen City in Beirut is a project that has most of these elements. The presence of vegetation is abundant in Horsh Park – native species of shrubs, trees and flowers. They are preserved in good condition – as is the entire park. The central part of the park is a fountain, which on summer days provides a place where residents can relax. Also, the saturation of infrastructure is at a satisfactory level in the park – numerous pedestrian and pedestrian-pathways. The area is practically entirely used and developed – there are a few wastelands of land in undeveloped form. There are also several urban openings and view axes in the park.

The community garden in Beirut in terms of the variety of greenery is at a satisfactory level – numerous species of flowers grown by residents. Unfortunately, devastation in the form of graffiti on the fence or damaged benches or trash garbage cans can be seen in the park. The garden maintains a harmonious composition with numerous pedestrian routes. There is a fountain in

the area, and the area has been almost entirely landscaped. In some places there are unused or neglected green areas. In the garden, one can also notice view axes to neighbouring buildings.

The vertical farm in Beirut is a peculiar design, as compositional elements were evaluated both inside and outside. Inside the container there are numerous species of grown food. The area is very well preserved and landscaped. Convenient access to it has been provided – access to the building on the roof on which the farm is located is guaranteed by pedestrian and vehicular routes. In turn, the roof of the facility can be reached by stairs and an elevator located inside the building. The view axis from the roof of the building directs to the neighbouring buildings.

Community agriculture in the New Doha complex uses many vegetable species for urban cultivation. The land is well developed for cultivation and maintained in good condition.

There are no landscape conservation forms or landscape dominants in any of the analysed projects.

CONCLUSIONS

The purpose of the research and analysis was to verify whether TIS solutions contribute to a better understanding of the evolution of social innovation projects and/or the potential for more informed design. The main objective of the research was also to verify whether TIS have an impact on the success of the NBS in question. The goal of the research was also to verify whether and to what extent the analysed projects use elements of urban composition.

The author’s analysis of the presence of urban composition elements in the four projects has led to the following conclusions:

- none of the analysed projects is covered by a form of landscape protection;
- most of the analysed projects are in good technical condition and well developed;
- water is an element that significantly increases the attractiveness of projects – in those with fountains, many more users of urban space were observed.

An analysis of four nature-based solutions projects in Lebanon in relation to the TIS system has led to the following conclusions:

- temporary innovation systems may have no relation to nature-based solutions;
- in some projects (especially those that can generate the innovations needed to solve social troubles) there is evidence that TIS-like features are emerging and that they are the same as the needs of society [M.L. Rhodes et al. 2019, pp. 16-18];
- in places where there were social problems (especially lack of social activation), there is a predominance of TIS features [C. Hood 1991, pp. 3-19];
- the presence of established local goals and public involvement in project development does not require the implementation of other TIS features. This means that, based on the analyses performed, public involvement does not have the effect of automatically increasing the complexity of the TIS;
- despite the fact that more and more features of the ‘new public management’ (Hood, 1991) are emerging, such as citizen involvement, private sector involvement and outsourcing, they do not present any pattern specific to NBS projects.

Table 6. Case study analysis. In each case, it is color-coded to facilitate analysis and reference [green – numerous presence of TIS elements (on a 100% scale it is in the range 100%-70%), yellow colour – moderate presence of TIS elements (on a 100% scale it is between 70%-40%), red colour – no or low presence of TIS elements (on a 100% scale it is in the range of 40%-0%)].

Project	Social aspect	Local aim	Temporary coalition	Knowledge exchange	Public consultation	Conclusions
Evergreen City A forest restoration project in Beirut that took advantage of the potential of the area’s location	Yes – lack of community integration, lack of access to green spaces and insufficient space for outdoor events	Yes – to create a park that will serve as many users as possible, throughout the week. Integration of society	Indirect – planners formed a coalition with the government to implement the project. Unfortunately, the cooperation with local governments ended after some time due to insufficient funds that the authorities could offer. During the implementation of the concept, the architects	Indirect - the exchange of knowledge occurred not only between designers, but also between residents	Yes - public participation was conducted to select the best design solutions	Evergreen City is a perfect example of how ideal assumptions that can improve the quality of life in a city can’t be realized without government support and adequate funding. As a result, the project did not come to fruition

			also consulted the public to develop the best solutions			
Community garden at Sky Tower Sustainable urban agriculture at the Sky Tower residential complex in New Doha	Yes – lack of access to cheap and quality food for residents	Yes – implementation of sustainable agriculture in an urban environment containing production of fresh fruits and vegetables, free-range eggs, etc. Education in terms of environmental awareness of residents	Indirect – coalition of authorities with the foundation, but not with residents	Indirect – the foundation provided full support to residents in growing plants. However, the necessary information on plant cultivation and care was missing	Indirect – the project assumed top-down that Lebanese residents lacked access to sustainable food. Thus, there was no analysis of what exactly the residents of New Doha wanted access to	The community garden at Sky Tower is a very useful social initiative that aims to provide access to organic, healthy and affordable food in times of economic crisis. The project was completed in 2021 and deemed a success
Community agriculture in Beirut The project was a quick response to the food crisis the city is slowly sinking into	Yes – lack of access by a large group of Lebanese to basic foodstuffs	Yes – creating access to cheap food – it is cheaper to grow your own vegetables or fruit than to buy them from foreign markets. Integration of residents, access to more green spaces	A group of urban activists – students from St. Joseph's University in Beirut and the president of the Rotaract Club of Beirut Center – have formed a coalition with sponsors and beneficiaries. Agricultural consultants helped the activists purchase seedlings	Yes – the project beneficiaries received the necessary brochures with information on plant care and cultivation	Yes – during the public consultation, information was obtained on the demand for specific food products (vegetables, fruits)	The project is a textbook example of NBS containing TIS elements. Among residents, it was considered a success – more and more families started asking for boxes of seedlings. The process of planting or caring for plants brought families and neighbours together. Groups cooperated with each other, and social ties grew much stronger. In addition, urban agriculture contributed to some extent to improving the aesthetics of neighbourhoods and increasing access to green spaces. This in turn has positive social and therapeutic results
Vertical farming in Beirut Self-sustaining vertical farm project in downtown Beirut – open to the public	Yes – lack of access to healthy food for residents	Yes – the ability for residents to access food while using 95 to 99% less water than traditional agriculture	No	No	No	By design, the project was intended to respond to food accessibility problems. At this point, however, the results of the innovation and the effects of its implementation are lacking

Source: by the authors.

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