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INTRODUCTION

This issue of our scientific journal, which brings together the results of our research, "reflects" the current tense global political situation.

The research is not necessarily related to the manifestations of military aggression. On the contrary, the scourge of the world has prompted scientists to work on research that values the balance and harmony of the natural environment, gathering results in two blocks: the cultural and historic landscape and the green structure of the urban environment. The historical built-up ensemble of Trakai with a park in Lithuania is evaluated by means of digitisation and mathematical calculations. Walking is still a permanent and integral function of historic parks, despite their transformations throughout history. In this study, the concept of isovist was used for the analysis of spaces. The park as a catalyst of human activity and experience is in quantitative terms a system of objects and serves as a source of stimuli for human perception.

Similarly, research materials have been gathered for the landscape space of the left bank of the Daugava River, seeking context for the natural substrate, sacred landscape and built heritage in Ilūkste.

Ukrainian scientists have developed a methodological approach based on "blue-green" planning. Urban infrastructure for the waterfront as one possible way to adapt settlements to climate change. An adaptive model for "Blue-Green" infrastructure in coastal cities is proposed.

For most people, park walking paths and ski slopes are very important for recreation. This points to the need to develop design principles for the park trail network based not only on spatial considerations but also on environmental psychology. This holistic approach is expected to lead to better recreational outcomes and improved human health. These lessons can be read about the urban environment of Ogre.

Perceiving the spatial structure of Chinese and Persian gardens through philosophical metaphor and art. Like physical reality, landscape is also an emotionally symbolic structure that intertwines with human cognitive perception. As a cultural expression, landscape creates links to historical and political events, traditions and customs that are expressed in symbolic terms.

As the world's population ages, the potential benefits of the concept of nearby nature for people with disabilities require a multidisciplinary approach, involving researchers and practitioners from different When studying the urban environment, it is undeniably important to be familiar with the methodology of urbanism and its system development, fields – environmental psychology, urban planning, plant science, landscape architects.

PRIEKŠVĀRDS

Mūsu zinātniskais izdevums, kas apkopo pētnieciskā darba rezultātus, šajā numurā “atspoguļo” esošo saspringto globālo situāciju politiskajā aspektā.

Pētījumi nebūt nav saistīti ar militārās agresijas izpausmēm. Gluži pretēji – pasaulē ienākušais posts ir rosinājis zinātniekus strādāt pie meklējumiem, kuros tiek augstu novērtēta dabas pamatnes sabalansētība un harmonija, apkopojot rezultātus divos blokos – par kultūrvēsturisko ainavtelpu un zaļo struktūru pilsētvidē. Ar digitalizācijas un matemātisko aprēķinu risinājumiem ir novērtēts vēsturiskais Traķu apbūves ansamblis ar parku Lietuvā. Pastaigas joprojām ir pastāvīga un neatņemama vēsturisko parku funkcija, neskatoties uz to pārvērtībām vēstures gaitā. Šajā pētījumā telpu analīzei tika izmantots izovista jēdziens. Parks kā cilvēka darbības un pieredzes katalizators kvantitatīvā izteiksmē ir objektu sistēma un kalpo kā stimulu avots cilvēka uztverei.

Līdzīgi ir apkopoti izpētes materiāli Daugavas kreisā krasta ainavtelpai, meklējot kontekstu dabas pamatnei, sakrālai ainavai un apbūves koka mantojumam Ilūkstē.

Ukrainas zinātnieki ir izstrādājuši metodisko pieeju, kuras pamatā ir “zili zaļā” plānošana. Pilsētvides infrastruktūra ūdensmalai - kā viens no iespējamiem veidiem, kā pielāgot apdzīvotās vietas klimata izmaiņām. Tiek piedāvāts piekrastes pilsētas “Zili-zaļās” infrastruktūras adaptīvs modelis.

Lielākajai daļai iedzīvotāju parku pastaigu celiņi un slēpošanas trases ir ļoti svarīgas atpūtai. Tas norāda uz dabas parka taku tīkla plānošanas principu izstrādi, balstoties ne tikai no telpiskā, bet arī no vides psiholoģijas viedokļa. Paredzams, ka šī holistiskā pieeja nodrošinās labākus atpūtas rezultātus un uzlabos cilvēku veselību. Šīs atziņas ir lasāmas par Ogres pilsētvidi.

Ķīniešu un persiešu dārzu telpiskās uzbūves uztvere caur filozofijas metaforu un mākslu.
Tāpat kā fiziskā realitāte, ainava ir arī emocionāli simboliska struktūra, kas savijas ar cilvēka kognitīvo uztveri. Ainava kā kultūras izpausme veido saikni ar vēsturiskiem un politiskiem notikumiem, tradīcijas un paražas, kas izpaužas simboliskā nozīmē.

Pasaules iedzīvotājiem novecojot, tuvējās dabas jēdziena iespējamos ieguvumus iedzīvotājiem ar īpašām vajadzībāmir jā izmanto daudznozaru pieeja, iesaistot pētniekus un praktiķus no dažādām jomām: vides psiholoģijas, pilsētplānošanas, augu zinātnes, ainavu arhitektus.

Pētot pilsētvidi, nenoliedzami ir svarīgi pārzināt urbānisma metodoloģiju un tās sistēmas attīstību, telpisko plānošanu, apdzīvotības sistēmu. Pilsētvides attīstības mērogs, drošības apsvērumi, telpas īpašumtiesības veido jaunu jēdzienu POPS jeb publiski pieejamo telpu potenciālu. Tas ir saistīts arī ar pilsētas zaļo infrastruktūru, meklējot dizaina un plānošanas ieteikumus pilsēttelpā. Latvija veido savu pieredzi.

spatial planning, the settlement system, the multidimensionality of space. This can be found in the study on the city of Lviv in Ukraine. The scale of urban development, security concerns, ownership of space are creating a new concept of POPS or potential for publicly accessible space. It is also related to urban green infrastructure, looking for design and planning recommendations in urban space. Latvia is developing its own experience. In the urban environment, quality and accessible outdoor space at the main entrance of residential buildings plays a major role in ensuring the level of comfort, safety and belonging of residents. Access to building entrances is one of the key conditions for people to be able to get outdoors and enjoy equal mobility opportunities. The results of the study reflect the situation of the Jugla neighbourhood in Riga. The above mentioned design errors in the design of the accessibility of residential areas apply to the occupation period. The legacy of the Soviet era is also visible in Lithuanian cities, where Sovietisation led to profound economic and cultural changes. At that time, significant changes also took place in the architectural and spatial sense. This was argued on the basis of the need for "socialist reconstruction" of Lithuanian cities.

Continuing with the occupation period in Latvia, the overly dense development of many airfield areas in the mid-20th century is evident. Undoubtedly, some of them served agricultural, sporting and civil purposes, which could be easily and quickly adapted to military needs. Their location in Latvia was strategically "right" in the struggle against "Western imperialism", which hindered the prosperity of the Soviet state. ArcGIS mapping was used for the study.

Modernist buildings of different typologies in Lithuania are examined and analysed as heritage that embodies modernism. including sanatoriums. The aim of this article is to contribute to a comprehensive understanding of cultural heritage, architectural aspects of early modernism in sanatoriums, their preservation through memory, place and the healing effects of nature.

Finally, the study of the principles of professional identity and creativity of architects, which has been carried out by the generational change of the Lithuanian architectural community, is important. The problem of the research is formed by the current controversies in the field of architecture about the status, activity and duties of the architect - sociological research, reflections on the global situation of architecture and the new design of architectural form. Due to the increasing complexity of urban regeneration issues, many cities are seeking new informal mechanisms of cooperation to ensure more effective involvement and representation of citizen groups in improving the quality of the urban environment. In order to test urban development ideas, the concept of "urban experiment" has been developed in recent years as an effective planning tool.

telpas daudzdimensionalitāti. To var lasīt pētījumā par Ļvivas pilsētu Ukrainā.

Pilsētvidē lielu lomu spēlē kvalitatīva un pieejama ārtelpa dzīvojamo ēku galvenajai ieejai, kas nodrošina iedzīvotāju komforta līmeni, drošību un piederību sabiedrībai. Piekļuve ēkas ieejām ir viens no galvenajiem nosacījumiem, lai cilvēki varētu izkļūt ārpus telpām un baudīt vienādas mobilitātes iespējas. Pētījuma rezultāti atspoguļo situāciju Juglas apkaimei Rīgā.

Iepriekš minētais par dzīvojamo teritoriju pieejamības projektēšanas kļūdām, ir attiecināms uz okupācijas laiku. Padomijas laika mantojums ir redzams arī Lietuvas pilsētās, kurās sovjetizācija noveda pie dziļām pārmaiņām ekonomiskā un kultūrā. Tolaik būtiskas izmaiņas notika arī arhitektoniski telpiskajā izpratnē. Tas tika argumentēts ar Lietuvas pilsētu "sociālistiskās rekonstrukcijas" nepieciešamību.

Paturpinot par okupācijas laiku arī Latvijā, ir redzama pārspīlēti blīva daudzu lidlauku platību attīstība 20.gs.vidū. Neapšaubāmi, daļa no tiem kalpoja lauksaimniecības, sporta un civilajām vajadzībām, kurus ērti un ātri varēja pielāgot militārām vajadzībām. To novietojums Latvijā bija stratēģiski "pareizi" ievērtēts cīņā ar "Rietumu imperiālismu", kas traucēja padomju valsts uzplaukumam. Pētījumam tika izmantota kartēšana ar ArcGIS programmu.

Dažādu tipoloģiju modernisma ēkas Lietuvā tiek aplūkotas un analizētas kā mantojums, kas iemieso modernismu. tostarp arī sanatorijas. Šī raksta mērķis ir veicināt visaptverošu izpratni par kultūras mantojumu, agrīnā modernisma arhitektūras aspektiem sanatorijām, to saglabāšanu caur atmiņu, vietu un dabas ārstniecisko iedarbību.

Visbeidzot, svarīgs ir pētījums par arhitektu profesionālās identitātes un radošuma principiem, ko ir veikusi Lietuvas arhitektu kopienas paaudžu nomaiņa. Pētījuma problēmu veido pašreizējās pretrunas arhitektūras jomā par arhitekta statusu, darbību un pienākumiem – socioloģiskie pētījumi, pārdomas par globālo arhitektūras situāciju un jauno arhitektūras formveides dizainu. Sakarā ar pilsētu reģenerācijas jautājumu pieaugošo sarežģītību, daudzās pilsētās tiek meklēti jauni neformāli sadarbības mehānismi, lai nodrošinātu efektīvāku iedzīvotāju grupu iesaisti un pārstāvniecību pilsētvides kvalitātes uzlabošanā. Lai pārbaudītu pilsētvides attīstības idejas, pēdējos gados kā efektīvs plānošanas instruments tiek attīstīts jēdziens "pilsētvides eksperiments".

Aija Ziemeļniece
Editor in Chief

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Cardiogram of the Park: Quantitative Analysis of Walking Scenarios of Trakų Vokė Historic Park

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Abstract. In this research, the concept of isovist [1,6] was employed to analyze spaces of the park as a container and catalyser of human activities and experiences in quantitative terms. The concept of the isovist defines the visual environment as a system of objects that structures the light as a source of stimuli for human perception. Trakų Vokė ensemble was selected as a case study object to test this quantitative approach towards historic park analysis. Methods of the research include a literature review on specific characteristics of Trakų Vokė ensemble, observation on site, analysis of available maps and satellite images, development of linear drawing of the park using AutoCAD, modelling using Isovist_App and ESRI ArcMap software, analysis, and discussion of results. The research has demonstrated that the results of the isovist and visual graph-based analysis reflect the observed spatial features of Trakų Vokė Park quite well and can be used for various purposes, including a more detailed description of valuable features of heritage objects, a detailed comparison between different parks, simulative reconstruction of the character of the historical park in the past based on historical data, maintenance and management of the park, parametric design of landscape spaces, etc.

Keywords: Trakų Vokė, historic park, walking scenarios, quantitative analysis, isovist

Introduction

Historic parks and gardens of private residential ensembles created in the 18th and 19th centuries play an important role in the history, culture, and landscapes of European countries, including Lithuania. Walking, and itinerative exploration on foot, was the inherent function of these landscape architecture creations. Considering this, the research focuses on the walking dimension of the selected historic park of former private residence in Lithuania Trakų Vokė designed by French landscape architect E. Andre. According to the Florence Charter [5], "a historic garden is an architectural and horticultural composition of interest to the public from the historical or artistic point of view", thus the research employs a quantitative approach in order to understand the usage of the park by walking in its contemporary situation and how the artistic and historic values can be perceived in this itinerative way. The concept of isovist [1; 6] was employed as the primary theoretical model allowing quantitative analysis of the park for this research.

Methods of the research include a literature review on specific characteristics of Trakų Vokė ensemble, observation on site, analysis of available maps and satellite images, development of linear drawing of the park using AutoCAD, modeling using Isovist_App [8] and ESRI ArcMap software, analysis, and discussion of results.

Trakų Voke ensemble and its historical context

A major part of survived Lithuanian manor residencies with parks and gardens were created or reconstructed in the second half of the 19th century. Trakų Vokė's residence owned by the members of the Tyszkiewicz family also belongs to this category. After the uprising of 1861 against the czarist regime and following repressions Lithuanian noblemen were even more in opposition to the Russian culture and were directed to the West. Consequently, the design of residencies also followed western trends, and neo-styles, such as neogothic, and neoclassicism, and architects form Poland and from more distant countries to the west were invited. Leandro Jan Ludwik Marconi (1834–1919), son of the architect of Italian origin Henryk Marconi, created the architectural ensemble of Trakų Vokė manor residence [9] (Fig. 1a). The invitation of landscape architect E. Andre to design the park in the residence also reflects this orientation towards western culture.

In the 19th century, regular planning of residencies and regular garden design were increasingly abandoned, in favor of irregular landscape style, and Trakų Vokė corresponds to this trend; however, the distinctiveness of the residence is determined by the park design of E. Andre. According to M. Omilanowska [12], E. Andre is considered to be the creator and proponent of the so-called mixed park design style, sometimes referred to as composite style


a)

b)

c)

Fig. 1. Trakų Vokė residence: a) the perspective view of the main facade of the palace framed by the lime tree alley; b) scenic view visible from the observation deck behind the palace; c) spaces and landscaping details of landscape style Trakų Vokė Park designed by E. Andre

[4], integrating formal, symmetrical design in the vicinity of a palace and landscape style park stretching in a further distance. This tendency is visible in Trakų Vokė Park.

Not only the architectural ensemble but also the park existed in the residence of Trakų Vokė before the intervention of E. Andre. Consequently, E. Andre, while designing Trakų Vokė Park, had considered the local landscape of Vokė river valley and the preexisting ensemble. This caused a more regular design of the ensemble: representative and utilitarian zones are regular with perpendicular alleys; in the center of the residence, a shield-formed parterre extends in front of the palace. At the end of the 19th century system of fish breeding ponds was created in the northern part of the territory of the residence. Only park extending in the eastern and southeastern parts of the residence, limited from the north by railway tracks, and from the south by the road to Vilnius, was designed in an organic landscape style (Fig. 1c). The palace building was situated on a steeply descending plateau that offered a scenic view (Fig. 1b).

It is possible to distinguish the features of this park, representing both the creative genius of E. Andre and the landscape architecture trends of his epoch: emphasis on picturesque accents, contrasts created by alternating picturesque and intimate scenes, connections between landscape and architectural elements created using thematic and dynamic spaces, perspective views formed and framed by green structures, mutual relationship between the park and its surroundings (scenic views, observation from the park, parks and buildings of the ensemble as significant landscape component) [4; 13]. E. Andre has also introduced elements of mountainous landscape unusual in Lithuanian landscape and reflecting his unique style. Characteristic E. Andre landscape design elements are still visible today in the landscape part of the ensemble: picturesque groups of artificial rocks, multi-step cascade, steps, and benches from unworked stone [11; 12; 14].

During the Soviet period, Trakų Vokė manor residence was adapted to the needs of the Lithuanian Agricultural Institute. The ensemble was declared the local architectural monument, though this had not prevented the construction of new buildings of poor architectural quality, distorting the integrity of the ensemble [11]. In 2013 the palace of Trakai Vokė residence was taken over by Vilnius City Municipality; currently, the palace is owned by the public institution "Trakų Vokė manor homestead" established by Vilnius City Municipality. Excursions, exhibitions, and various events are organized in the residence [16; 17].

Quantitative analysis of Trakų Vokė Park and selected routes

Methodology

In order to analyse spaces of the park as a container and catalyser of human activities, experiences and various possible scenarios of usage, the concept of isovist was employed as the basic theoretical model based on the works of Gibson and Benedikt [1; 6], it defines the visual environment as a system of objects which structures the light as a source of stimuli for human perception: "Ambient light is structured as an array at a point of view in accordance with laws of ecological optics... The array at a stationary point consists of the perspective projections of things in the world – the surfaces, corners, curvatures, and edges of the permanent layout - and the changing perspectives of moving or changing things." "The most obvious cause of the structuring of light is the geometrical structure, the layout, of the environment" [6].

Benedikt [1], based on the above-mentioned ideas of Gibson, offers the concept of isovist as "... a method to for recording landscape ". In simple words, the isovist could be described as the volume of space visible from a single point. Features of such a form could be analysed either in 3D volume or 2D planes, either horizontal or vertical. Each point within the spatial structure has its own isovist. According to Benedikt, "... various perceptual and cognitive factors are well presented by certain numerical measures of shape and size attached to the isovist "[1]. According to Wiener and Franz [20], isovists could be seen as "... as objectively determinable basic elements "of visual environment, which "... capture environmental properties of space that are relevant for spatial behaviour and experience".

Based on conducted experiments, it was concluded that "For experiential qualities and navigation behaviour, already single isovist measurements were sufficient to widely explain the variance in the behavioural data." [20].

The simulative mathematical graph model allows to analyse properties of 2D isovists if based on so-called visual graph analysis [18]. It is a part of the Space Syntax methodology, which looks at a space primarily as a container of social content. The mathematical graph model is constructed out of nodes and links or edges. In the case of spatial structure, a street segment, visual axis, cell of visual space, building could be modelled as a node. Links in the graph represent connections or direct interaction between nodes, e.g.: common crossroad between street segments, entrance to a building from a street, symmetric intervisibility of buildings or spaces, etc. In the case of visual graph analysis, first of all, all space within defined boundaries is tessellated into cells of equal size – each cell becomes a node of a graph. In the next stage, l inks of a graph are created – in a visual graph two cells or nodes of visual space are considered as having a common link if they are either visible from each other and a person can move from one cell to another without changing a direction of movement or if cells-nodes are just visible from each other. Both ways to create links in the visual graph were used in the presented research. According to Hillier [7], various centralities of the graph nodes could be calculated starting from connectivity as a simple sum of links with the neighbouring nodes and ending with more complex ones as normalised closeness centrality (integration), etc. The properties of the isovists, which will be described and explained in detail while presenting the results of the modelling, are calculated based on the briefly described visual graph. It is important to note, that such mathematical, simulative modelling of architectural spaces allows to perform analysis, which otherwise would be difficult to realise in any bigger structure because of a big number of observation points and the complexity of forms of the isovists.

The Isovist_App software [8] was used for the visual graph analysis. The choice was caused by the possibility in the app to represent various types of boundaries as solid, transparent, and reflective, while the well-known Space Syntax analysis tool Depthmap [19] does not have such a possibility. The need for this expanded modelling functionality was caused by the specificity of the park, where edges of groups of trees could be seen either as partially transparent or solid boundaries. Both variants were tested and compared between themselves.

The other tools which were used in the research were ESRI ArcMap software for additional precise analysis of selected routes in the park as Isovist demonstrated a lack of precision in such modelling because of the big size of the graph; AutoCAD for preparation of the input data (Fig. 2) for modelling and MS Excel as a tool for both numerical and visual analysis of received data based on comparison of visual scatterplots.

The research was conducted in two stages:

1. Modelling and analysis of the isovists of the whole park to understand the essential features of the structure from the point of view of observer and to test if the model catches the observed character of landscape spaces and could be used for a more detailed description of the DNA of the object.
2. Analysis of the isovists properties along the specific selected segments of park routes to test if mathematical modelling is able to reflect different characters of the routes.

Fig. 2. Park plan. Solid boundaries are presented by buildings and tree trunks; partially transparent and transparent boundaries are shown as edges of tree groups and water ponds, park routes, and the boundaries of the park [from authors private archive]

As it was mentioned above, the analysis of isovists was conducted in two ways: with both solid and translucent boundaries represented based on the idea that perforated green borders affect properties of the isovists; with all boundaries modelled as solid based on the idea that even perforated or totally transparent boundary still is a boundary that marks some perceived limitations of the exact space. It could be stated that these two models might represent park in the summer and winter period, but in the future results of both calculations should be validated on empirical data and observation but within this research, the aim was to see if there are significant and radical changes in the park model appear if green boundaries are marked in a different way, or the character of the park is reflected similarly in both ways thus verifying if further investigation is needed.

Results of the analysis of the park

The first and the simplest measure of the isovists, which was calculated in the investigated park was ***Area*** of an isovist. In terms of the mathematical graph, it represents the number of nodes or visual cells which have a common link with the calculated node (connectivity of this node) or are visible from it if speaking in simple terms. Traditionally in Depthmap software, connectivity is calculated by multiplying connectivity and the area of one cell. In the Isovist_App, the calculation is not so straightforward and is presented by the following formula [15]:

$$A_v = \frac{\pi}{n}\sum_{i=1}^{n} L_i^2$$

Where A_v means area, V is a point for which calculation is conducted, i means every connected or visible node from V, L_i means radial length between the calculated point and any other node i visible from it, n is the total number of radials sampled. In this case, the area is calculated as a mean of the areas of all circles visible from V with radiuses L_i. L_i is calculated based on the scale of the drawing, and in the presented case, one linear unit of the drawing was taken for 10 meters.

The results of the calculations are visualised in Fig 3 (A). Three types of calculations were conducted:

- With all boundaries (edges of ponds and tree groups, buildings) modelled as solid. All boundaries create a limit for movement and view.
- With both solid (buildings and tree trunks) and transparent (edges of ponds and tree groups) boundaries are modelled. In this case, solid boundaries create limits for both movement and view, while transparent boundaries limit just movement.
- Both models were merged by multiplying the numerical results of the calculation for each point. In this case, synergy between both models was analysed. These results are presented in the visualization (Fig 3 (A)).

Visualisation of the results was based on standard deviation where a bigger standard deviation value and more hot colour allow us to identify how many isovists with similar values exist in the park, e.g.: +- 1 st.dev. means that the presented visual field falls within 64.2% of the values close to mean; +- 2 st.dev. show that the exact isovist represents smaller groups uo tp 13.6%; +- 3 st.dev. show that there are only 2.1 % of similar isovists in the park, etc. In such a case, the bigger positive and smaller negative values show more important, exceptional, unique spaces in the investigated area.

In the first model with solid boundaries only, the biggest isovists could be found in front of the palace and beside the southern entrance to the park – in most public spaces. However, suppose the size of the space could be related to various types of psychological distances such as intimate, private, social, and public. In that case, the location of the biggest visual spaces in the most representative area of the park looks logical.

In the second model with transparent or perforated boundaries modelled, the biggest isovists are located around the ponds, thus reflecting the openness of the landscape of the park beside water bodies. In this case, they represent the unique in terms of space openness recreational zone in the park.

The combination of both models indicates both patterns of the biggest isovists – in the representative area in front of the palace and the recreational zone beside the water. In this case, the combination of the two previous models looks quite promising but the question should be asked: are the other properties of the isovists affected in the same way by perforated boundaries?

Compactness of the isovists was calculated as the second indicator. The indicator shows closeness of the visual spaces to the most compact – circular form. It could be expected that in the more compact spaces, observers visual experience is more coherent and less versatile because boundaries of the isovist are evenly allocated around the central isovists point and similarity of views in different directions, etc. Compactness in Isovist_App is calculated by the following formula [15]:

$$C_V = \frac{4\pi A_V}{P_V^2}$$

Where C_v is compactness, A_v is the area of isovists from point V; P_v – the perimeter of the isovist. In essence, the formula compares the actual length of the perimeter of the isovist with the length of the perimeter of circular isovists of the same area. Based on the area and perimeter of the circle formulas, it could be demonstrated that compactness of a circle is equal to 1 if the above-presented formula is used:

$C_{circle} = 4\pi(\pi R^2)/(2\pi R)^2 = 4\pi^2R^2/4\pi^2R^2=1.$

The least compact isovists will have an index closer to zero value.

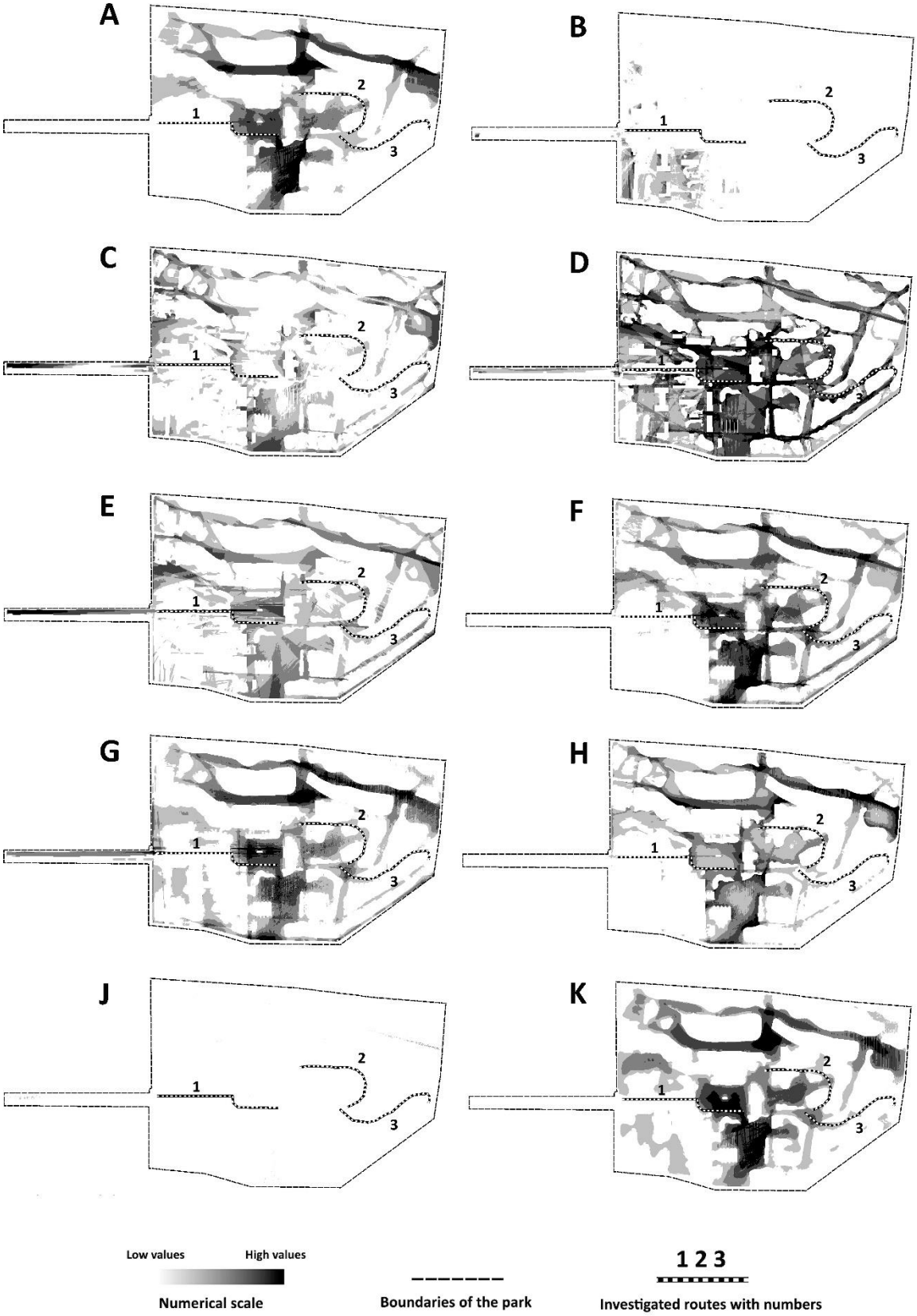

Fig. 3. Properties of the isovists: A – area, B – compactness, C – drift, D – occlusivity, E – vista lenght, F – perimeter, G – closed perimeter, H – variance, J – skeness, K – average radius [created by authors]

Fig. 3 (B) represents compactness calculation results. The biggest or closest to zero values in all three cases are observed just in zone of household buildings while the rest of the park demonstrates various values fluctuating around mean compactness. In essence, the result is logical as the park offers a diversity of changing perspectives, planes, and views. It should be noted that in this case, perforated or translucent boundaries do not change the position of the exact isovists in terms of compactness within the park – the most compact zone remains the same in both cases.

Drift index of isovist calculates distance from the calculated point from which isovist is generated to its geometrical or gravity centre [3]. Based on the fundamental concepts of static and dynamic architectural compositions [2], it could be assumed that big drift value represents a more dynamic composition which encourages or invites observer to move to the centre of gravity, e.g.: while standing at the beginning of the corridor or the tunnel. In Space Syntax drift magnitude is calculated based on the simple following formula [10]:

$$Drift\ Manitude = \sqrt{(G_x-V_x)^2+(G_y-V_y)^2}$$

Where G_x and G_y are x and y coordinates of the gravity centre of the isovist; V_x and V_y are coordinates of the point for which calculation is conducted and which serves as the isovist generation point. Square lifting eliminates negative values which might appear depending on the starting point of the coordinate system used in the calculation. Square root brings the scale of the final calculation closer to the initial scale of the measurement, e.g.: meters, decimeters, etc. The bigger value shows bigger drift as a certain distance according to the scale of the map.

Calculation of the drift in Isovist_App is not so straightforward in this case and is not a direct calculation of drift as such, but rather a measure of the spatial properties of the isovist. First, the area-weighted mean of all radial-plan intersections with the boundaries of the isovist for point V is calculated based on the formula [15]:

$$M_V = \left(\sum_{i=1}^{n} \left| L_i^{\,2} \cdot R_i \right| \right) / \left(\sum_{i=1}^{n} L_i^{\,2} \right)$$

Where M_v is mean of vertex V, R_i are the coordinates of the nearest intersection of the isovist radial with its perimeter, L_i is radial length from V to the intersection i. The original literature source [15] does not explain the calculation of the coordinates, but it could be presumed that in order to get values suitable for weighting the negative values should be eliminated in a similar manner as in Drift formula explained by Koutsolampros et al. [10] just using the intersection points instead gravity centre coordinates. Such a formula might look the following:

$$R_i = \sqrt{(i_x-V_x)^2+(i_y-V_y)^2}$$

Where R_i is the generalised index of coordinates of the radial and the isovist boundary intersection points i which demonstrates how far away is the boundary node from the isovist generation point *V;* i_x,V_x, i_y, V_y are x and y coordinates of every point i and the isovist generation point V.

It could be stated that the calculation allows to identify the point M in the isovist which has the same mean access to all intersection points for the App. Therefore, the measured distance between M and V gives a similar result as drift magnitude in Space Syntax and is presented as the final drift value.

Drift calculations presented in the Fig. 3 (C), in essence, demonstrate significant uniformity between all three models (just solid boundaries, both solid and perforated boundaries, combined both models) with more "dynamic", presenting bigger drift isovist being clustered at the outskirts of the park and in more linear spaces. It is interesting that the combined model looks more precise with demonstrating some rhythm of "static" and "dynamic" isovists when approaching the palace. In general, it could be stated that in each park character of interaction between "static" and "dynamic" spaces could be very different but revealed certain rhythm of its change reflects the attempt of the designer to create certain variation and complexity of landscape along the park routes in order to avoid uniformous visual stimuli.

Occlusivity represents the proportion of the boundaries of the isovist which are formed not by physical elements directly, but because visual space is blocked by some closer elements within the visual field and is invisible from the isovist point, e.g.: zero occlusivity is observed in an empty room while standing in its centre, and high occlusivity could be observed in a forest where trees block view and create a big number of invisible not physically defined edges. According to Benedikt [1; 10], occlusivity is "… pointing out potential stimuli as a person moves in areas "just around the corner". In Space Syntax, it is calculated simply as the length of the occlusive perimeter of the isovist. The Isovist_App calculates it like "occlusive importance" based on the following formula [15]:

$$O_V = \frac{k}{nP_V} \sum_{i=1}^{n} \left| E_{i\_occ}^{\,2} \cdot L_i \right|$$

Where O_v means occlusivity, L_i means the radial length from isovist generation point V to every point i on the edge of the visual field; E_{i_occ} is the fraction of occluded edge; P_v is the perimeter of the isovist; n is the total number of radials sampled and k is the number of samples in one 360-degree cycle. The bigger result of the calculation means that the fraction of the occluded perimeter points is bigger and distance to the V is smaller so it could be seen as a kind of normalised value.

The results of Occlusivity calculation are presented in Fig. 3 (D). In the first two models, the results of calculation are practically identical, and the least occlusive spaces formed by buildings in the homestead zone in west-south corner of the park; mean values could be seen in the representative part of the park in front of the palace; the more private zone behind the palace in the eastern part demonstrates the biggest values and, in this way, reflects more "adventure offering" Environment there. The combined model points out the highest occlusivity along the narrowing spaces around the park routes thus demonstrating some culmination moments before the visual discovery on new views.

Vista length accordingly shows what the longest visual axe or view is available in every isovist. the Isovist_App calculates the indicator by the following formula [15]:

$$H_v = \max\left(H_v, L_i\right)$$

Where H_v means vista length and L_i is radius length.

The results of vista length calculation are presented in Fig. 3 (E). The first two models demonstrate the longest visual axes created at the outskirts of the park and in the representative zone in front of the palace. The combined model, again, is more specific and strongly points out the man symmetrical representative alley in front of the palace and some banks of the water ponds. The maps, in general, demonstrate a certain rhythm of spaces with longer and shorter perspectives in the area thus reflecting the complex and diverse nature of the landscape.

Perimeter is measured as the total length of the boundaries of the isovist. However, the Isovist_App calculates it not directly as a length of isovist polygon borders but in indirect way, based on the following formulas [15]:

$$P_v = \frac{k}{n}\sum_{i=1}^{n} E_i$$

$$E_i = \sqrt{\left(X_i - X_{i-1}\right)^2 + \left(Y_i - Y_{i-1}\right)^2}$$

Where P_v means perimeter, E_i is the 'edge' length between radial ends or graph nodes which form isovist boundary, X_i and Y_i are the coordinates of the nearest boundary nodes, n – the total number of radials-boundary nodes sampled, and k is the number of samples in one 360-degree cycle. In simple words the perimeter is calculated as a sum of distances between the graph nodes, which form boundary of isovist.

The longer perimeter may provide more visual information and richer experience for perception in the park. The results of the calculation (Fig. 3 (F)) show the biggest perimeter values in the recreational zone of the park, while representative zone holds the mean results and household zone – the minimal values. Thus, the first and the second models (just solid boundaries, solid and transparent boundaries) quite clearly represent idea of the park where representative zone provides a limited amount of visual information, thus allowing to focus on the main object – the palace; the area designed for recreational walks provides a maximum of information. However, the situation looks a little different if the third–combined model is analysed. It reveals certain pulsation between the isovists rich and relatively poor with visual information with the highest values concentrated around the palace and water ponds. This result demonstrates that the palace and water ponds, as the factors that increase landscape diversity, are catalysing production of quantity of visual information.

Closed perimeter simply represents length of closed edges of the isovist and could be seen as an opposite to occlusivity. In the Isovist_App it is measured by extracting occluded perimeter from the total perimeter of the visual field. Perimeter or edge length is calculated in the same way as in the formula of the perimeter. The closed perimeter formula looks following [15]:

$$U_v = \frac{k}{n}\left(\sum_{i=1}^{n} E_i - \sum_{i=1}^{n} E_{occ}\right)$$

Where U_v is closed perimeter, E_i is the 'edge' length between radial ends or graph nodes which form isovist boundary; E_{occ} is for 'edge' length between graph nodes which form boundary of the isovist detected as being occlusive; n is the total number of radials sampled; k is the number of samples in one 360-degree cycle. A bigger amount of closed perimeter creates more clearly defined, visually autonomous, introvertic and, depending on radius length – even more intimate spaces, where activities are less seen from outside and visual concentrations stay within a space.

The results of the calculation of closed perimeter for Trakų Vokė Park look similar to all three models. In Fig. 3 (G), two zones which are more autonomous visually and catalyse concentration on "own" visual content are located around the palace and around the water ponds. The results look quite logical as both objects are possibly the most contrasting and attractive objects in the landscape so it might be that the designer's idea was to support visual dominance of them by creating specific types of content.

Variance, according to Benedikt [1], expresses the mean of the square of deviation between all radial lengths and average radial length of an isovist. The bigger numerical value shows a bigger variety of radials within the isovist and, correspondingly, more rich visual experience because of higher diversity in terms of close-mean-distant visual

planes. It corresponds to the so-called point second moment in space syntax model [13], which is calculated as the sum of differences between all radiuses and the mean radius of the isovists raised by square. Square raise eliminates negative values when real radius is shorter than the mean one. The Isovist_App performs calculation in a similar way by the following formula [15]:

$$T_V = \sqrt[2]{\frac{1}{n}\sum_{i=1}^{n}\left|L_i - Q_v\right|^2}$$

Where T_v is variance of the isovist visible from the node V; L_i is radial length; Q_v the average radial length from V; n is the total number of radials sampled. If compared to the Point Second moment calculation, the Isovist_App shrinks the scale of the results by dividing sum of squared radial differences by the number of radiuses used in calculations and by taking square root from it, but in essence results demonstrate the same spatial properties.

Variance calculations with the first two models (Fig. 3 (H)) look very similar and demonstrate concentration of the most diverse spaces in terms of the presence of close-medium-distant planes around the water ponds thus reflecting exceptional and visually rich character of this area in the park. The third model, besides the above-mentioned zone, points out perimetric areas of the representative zone beside the palace. Such a result corresponds to observed facts that the diversity of visual planes is potentially increasing closer to the boundaries of bigger open spaces.

Skewness demonstrates a more prolonged character of the form of the isovist. In Space Syntax, it is named as the Point First moment, and it is calculated in a similar way as the Point Second moment – by calculating a sum of differences between radials and mean radial of the isovist, but without raising those differences by square. In such a case, the negative values are not eliminated, and the total sum is bigger when more radials are longer than mean radial. The Isovit_app calculates skewness by the following formula [15]:

$$S_V = \sqrt[3]{\frac{1}{n}\sum_{i=1}^{n}\left|L_i - Q_v\right|^3}$$

Where S_v is Skewness of the isovist visible from the node V; L_i is radial length; Q_v the average radial length from V; n is the total number of radials sampled. If compared to the Space Syntax formula [10], the scale of the calculation results is shrunk, but results demonstrate the same properties of spaces.

Skewness or degree of prolongation of the isovist could be seen as an expression of intelligibility of the route or path pattern which could be related to some visual landmarks or functional nodes of the analysed spatial structure.

While analyzing the calculation results of the two first models, the higher values of skewness are demonstrated at the boundary of the park, where bigger open spaces are accessible. At the same time, the "dotted" character of the results when not continuous clusters of the isovists with similar properties are nested beside each other should be noted – it means that even a slight change of the position of an observer can change the perception of Skewness radically. The third combined model (Fig. 3 (J)) demonstrates bigger Skewness values just in a very limited number of spots. The results, in essence, clarify that the investigated park is not of geometrical nature and quite well reflects the typology of landscape parks. It could be stated that, at least in the investigated case, the indicators of Skewness are less important if compared with the other numerical properties of the isovists.

Average radial simply represents the mean radial of the isovist and is calculated by the following formula [15]:

$$Q_v = \frac{1}{n}\sum_{i=1}^{n} L_i$$

Where Q_v means average radial, L_i is radial length, n is the total number of radials in the isovist.

Average radial is a good indicator of the size of the isovist as are gives no clues about the form of the visual field.

The results of calculation (Fig. 3 (K)) demonstrate similar results based on all three models: bigger mean radius concentration around the ponds and palace. In this way, it shows that the bigger landscape "rooms" or visual spaces are created around the objects which should be admired during the walks in the park and need to be demonstrated more.

It could be concluded that the results of the visual graph analysis reflect the observed spatial features of the park quite well and might be used for various purposes as follows:

- More detailed description of valuable features which, at the moment, quite often are limited to the term "valuable spatial structure and greenery";
- Detailed comparison of various parks;
- Simulative reconstruction of the character of the historical park based on historical data, if available, etc.
- Maintenance and management of the parks.

Despite the demonstrated potential usefulness of simulative modelling for various purposes related to the analysis, design, and management of historical parks, two questions still remain unanswered. The first one: which of three models should be used for analysis – one with just solid boundaries, one with both solid and transparent boundaries of the combinations of both? It is impossible to give the final answer based on the investigation of just one park, but at least initial insight could be obtained even within the presented research.

Tables 1, 2 and 3 represent mean and maximum values, sums, and sizes of dastard deviations of all

the indicators calculated. The numerical values demonstrate the diversity of the numerical scales which makes even the same indicator in different models hardly comparable, so, the normalisation procedure was conducted in two ways: 1) first while dividing the mean from the standard deviation; 2) second while looking at ration between max and mean values. The results of the second normalisation, which include both indicators (max and mean values), were found to be the most unified in scales for all indicators and are presented in Fig. 4. According to those results, all three models demonstrate similar tendencies in change of relative values but, while having in mind the above presented visual analysis of the isovist properties, it could be preliminary concluded that it is still useful to use all three models as in some cases they supplement each other and provide additional clarification for specific zones of the park.

TABLE 1

Solid boundary model calculation results [created by authors]

#	area	compactness	drift	occlusivity	vista length	perimeter	closed perimeter	variance	skewness	average radius
Maximum:	0.85109	0.724272	1.49741	0.913749	3.96883	19.6571	7.10259	36.1559	7562660	0.440333
Sum:	101154	65977.77269	90849.68	208101.5	433134.742	1899872.6	860869.5165	3449690	2379064477	80790.40937
Mean:	0.249155	0.162511	0.223774	0.512579	1.066863	4.679616	2.120426	8.497003	5859.923489	0.198997
Standard Deviation:	0.169407	0.094323	0.153711	0.124391	0.505843	2.231759	0.824434	5.656952	70066.84724	0.085634

TABLE 2

Solid and transparent boundary model calculation results [created by authors]

#	area	compactness	drift	occlusivity	vista length	perimeter	closed perimeter	variance	skewness	average radius
Maximum:	4.53439	0.495099	2.35515	0.980933	4.90431	159.074	14.2762	215.242	53612400	0.997749
Sum:	709428.2	3393.921788	255615.2	372060.5	1239721.59	31368155	1813747.118	26467689	8.03563E+11	208423.1293
Mean:	1.747407	0.00836	0.629611	0.91643	3.053584	77.263558	4.467478	65.19312	1979273.728	0.513371
Standard Deviation:	1.122753	0.015216	0.452408	0.070201	0.869731	38.468695	1.656168	41.21086	3304017.428	0.210244

TABLE 3

Combined model calculation results [created by authors]

#	area	compactness	drift	occlusivity	vista length	perimeter	closed perimeter	variance	skewness	average radius
Maximum:	1.784014	0.245123	2.362449	0.870592	17.496944	1993.9262	65.214703	3799.615	5.39782E+13	0.303125
Sum:	180518	572.124678	57768.12	191256	1338512.92	146914242	3997230.488	2.26E+08	5.52E+15	42569.82786
Mean:	0.444638	0.001409	0.14229	0.471087	3.296919	361.86754	9.845662	557.3708	13604756428	0.104855
Standard Deviation:	0.394604	0.003698	0.162708	0.122596	2.002099	251.63323	5.815019	508.943	2.98538E+11	0.063732

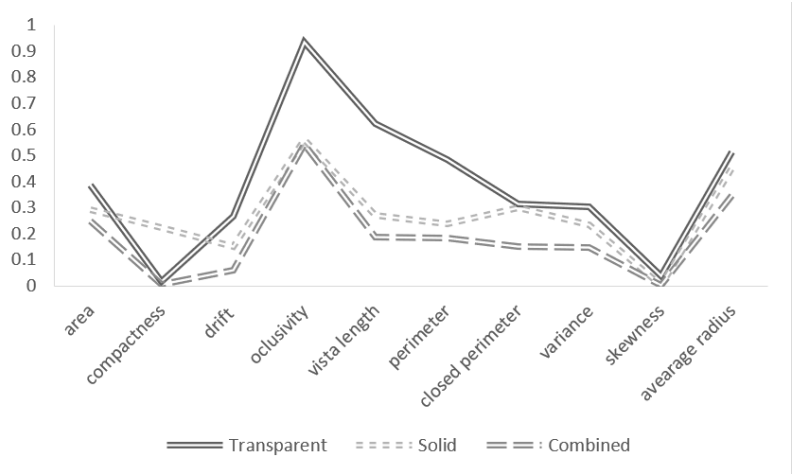

Fig. 4. Mean max ratio changes of the isovist measurements [created by authors]

The second unanswered quest is the following: could the isovist properties be related to certain scenarios of park usage based on historical of newly designed park routes?

Results of the analysis of the routes

To test the possibility to use the visual graph analysis for the identification of the character of the park routes, the second part of modelling was conducted. First of all, three segments of the routes with *in situ* observed different characters were selected (Fig. 3): representative route (No.1), the scenic route (No.2), and the "forest" route (No.3).

Even if the Isovist_App [8] offers the possibility to analyse the isovists along the selected route, but it is limited just to a certain number of automatically pre-selected indicators and looks that the precision of the results is not good enough if the investigated area is relatively big with a high diversity of sizes of spaces, so the ESRI ArcMap was used for this purpose. The procedure consisted of the importing data into GIS environment, drawing the selected route segments as lines on a separate layer, making spatial join of the visual graph point and the route lines, and exporting the numerical route data for further analysis into MS Excel.

It was noted that some indicators of the isovist properties are supplementary to each other, so to make a comparison of the routes easier, it was decided to select just part of the indicators while using the following argumentation:

- Area of the isovist could be related to social, public, or private character of spaces and the rhythm of such spaces along a route, but in essence, the average radius allows to analyse the same attributes more precisely as is directly based on the visible distance. Therefore, the indicator was not selected for further analysis.
- Compactness was not selected for further analysis as mean values of this indicator are quite close to zero values, thus demonstrating that it is not the essential feature of landscape park spaces.
- Drift was selected as an indicator which demonstrates the dynamic character of spaces along the route.
- Occlusivity is opposite to closed perimeter, so there is no need to use both indicators. They are both calculated in a similar way, but the final preference was given to the closed perimeter as the indicator that created clearer patterns of clusterisation during the visual graph analysis.
- Vista length could be seen as supplementary to skewness, but the last one produces not so clear patterns and does not demonstrate the clear territorial clusters in the investigated park, so vista length was selected as the indicators to be used for further analysis.
- Perimeter was selected for further analysis as the indicator of the amount of visual information of the isovists.
- Closed perimeter was selected instead of occlusivity as mentioned above.
- Variance was chosen as an important feature which demonstrates the diversity of visual planes of the isovists.
- Skewness was omitted because the visual graph analysis demonstrated its insignificance for the investigated park.
- Average radius was chosen instead of the isovists area as the indicator important for the identifications of the private/social/public character of the visual spaces.

The scatterplot of the first–representative route is presented in Fig 5. In order to make scales of the different indicators more visually comparable on the scatterplot, the numerical scales were normalised by dividing them by standard deviation. Such normalisation allows easily to identify the most exceptional or unique aspects of the route both within its indicators and within the context of the whole park.

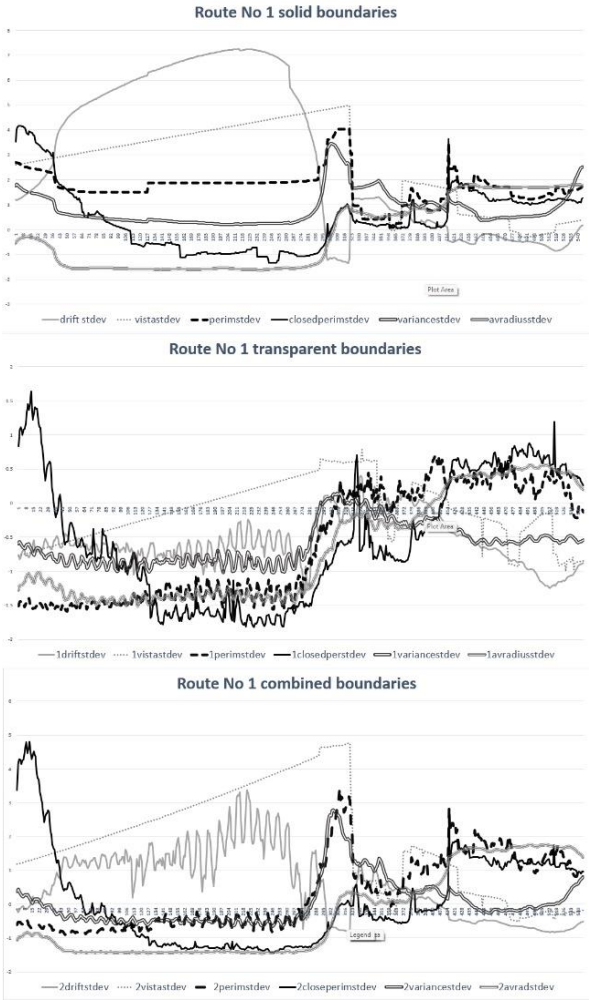

Fig. 5. Route No 1 (representative) scatterplots. Vertical scale represents the size of standard deviation, horizontal – movement sequence from the starting point till the end of the selected route according to the Fig. 3 [created by authors]

There are two clearly distinguishable parts that could be identified in route No 1 scatterplot (Fig. 16): Linear alley and route around the parterre in front of the palace. The first part could be described as more dynamic (higher drift values), with more strongly expressed route archetype (bigger vista length values), smaller perimeter and closed perimeter and variance. The calculated indicators quite well describe the space which aims to orient the observer towards one object without the provision of other visual alternatives. The second part, which represents the route around the parterre in front of the palace, is quite different – it demonstrates significant fall if drift and vista length as the observer has arrived into the representative space which is inseparable from the palace itself and its views need to be enjoyed. From the other side, such indicators as perimeters, closed perimeter, variance and average radial are not only increasing but demonstrating certain rhythmical variations thus reflecting visual intrigue created in the representative space or marking the entrance point to it.

If the fists and the second models of route No 1 are compared (solid boundaries versus solid and transparent boundaries), it could be noted that perforation of the "walls" of the landscape spaces or rooms, creates additional visual fluctuations of the indicators based on certain rhythm (e.g.: by opening regularly a wider view on landscape spaces) but it is not affecting the essential changes of the character of the segments of the route in general. Drift and perimeter are increasing while approaching the parterre space by the alley – they exceed 1 st dev. in this part thus demonstrating the uniqueness of the space within the whole park context. At the same time, the closed perimeter, variance, and average radius increase after the entrance to the parterre, thus demonstrating a more informative, diverse, and visually attractive space in from of the palace. Average radius and perimeter in the alley part of the route are beneath -1 st dev. thus showing the smallest extremes within the investigated park.

The route No 2 (scenic) (Fig. 6) demonstrates a clear and regular rhythm of increasing and decreasing drift, variance, closed perimeter, total perimeter, and average radius, with vista length partially supporting such rhythm. Three "quiet" spaces are indicated by a decrease in the above-mentioned indicators on the route. If these three "quiet" spaces are compared between themselves, the variety could be noted as well – the middle space has a longer vista length and slightly bigger other indicators except drift. As in the case of route No 1, perforation of the "green walls" creates additional diversity and smaller rhythm along the route, without changing the general features. In general, if compared to route No 1, the scenic route demonstrates quite a different character with more regular change of all investigated properties of spaces along it.

The route No 3 (forest route) (Fig. 7) demonstrates the rhythm of the three negative peeks of the higher occlusivity of spaces where less visually predictable experience of what will be seen next is created, followed by small fluctuations of drift, vista length, average radius with contracting culmination at the end. Because of the low standard deviation values of many indicators, we can expect similar characteristics in many routes in the park. Culmination in terms of bigger values of the closed perimeter, average radius and decrease in variance and drift could be observed at the end of the route thus demonstrating "arrival" to final, different space and shift of the character of the walk. Perforation of the "walls" adds additional smaller rhythm to otherwise a little monotonous rhythmical spaces but does not exclude culmination of the indicators at the end of the route.

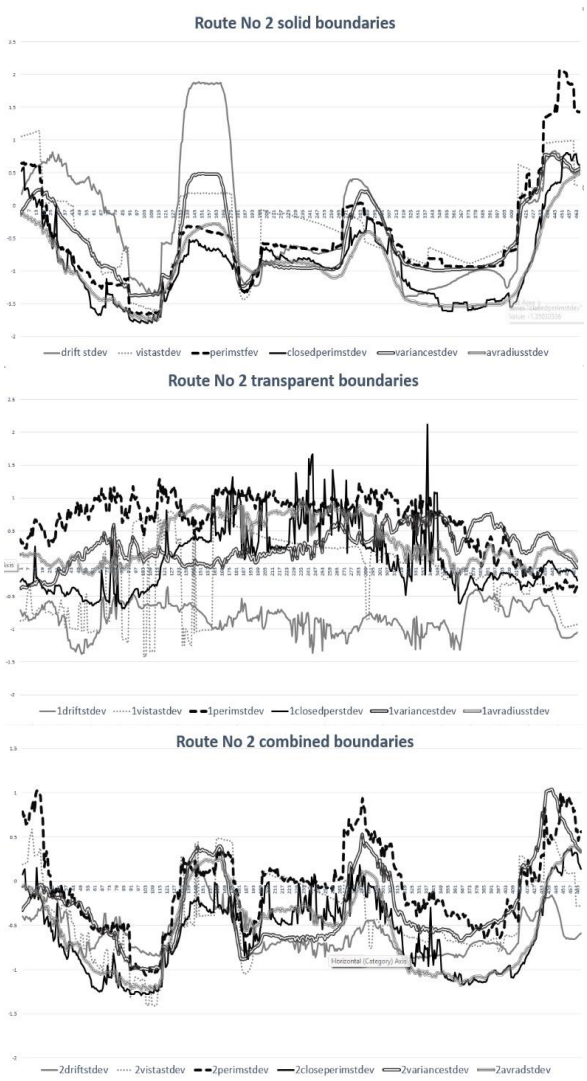

Fig. 6. Route No 2 (scenic) scatterplots. Vertical scale represents the size of standard deviation, horizontal – movement sequence from the starting point

till the end of the selected route according to the Fig. 3 [created by authors]

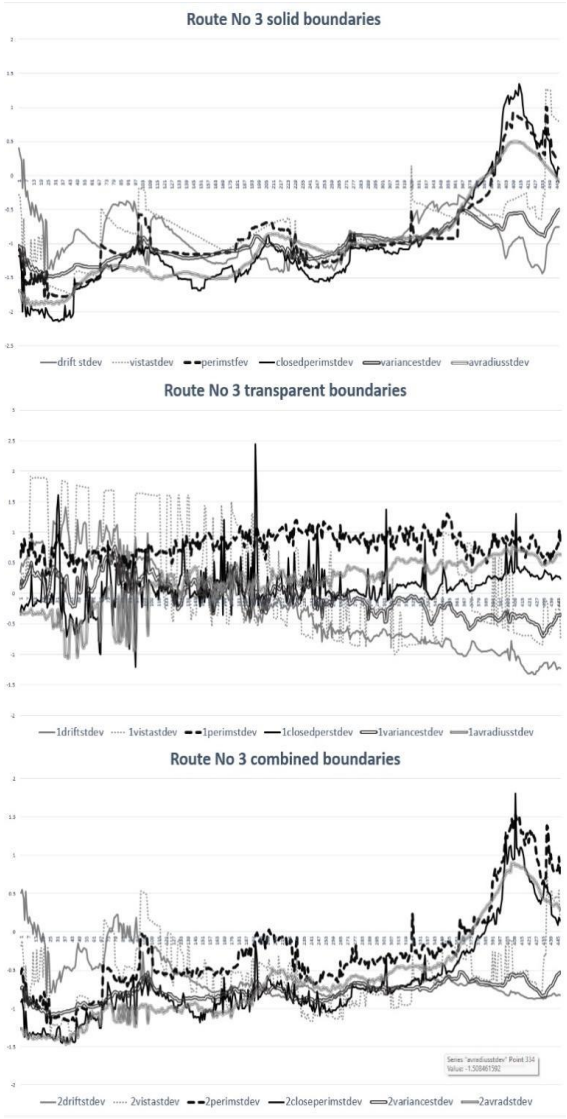

Fig. 7. Route No 3 (forest) scatterplots. Vertical scale represents the size of standard deviation, horizontal – movement sequence from the starting point till the end of the selected route according to the Fig. 3 [created by authors]

It could be finalised that in the case of the three selected routes, the numerical indicators of the isovists correspond to the subjectively perceived character of the routes and reflect their unique character. Such analysis of all the routes in the park can make a background for in-depth inventorization of the valuable features of the object and monitoring of its changes caused by natural processes.

Conclusions

Trakų Vokė Park is one of the mixed or composite style parks that E. Andre designed with special landscape park features. It contains all thematic and dynamic elements which create different scenarios in its every route with different perspectives, which can form and frame green structures and mutual relationships with the park and its surroundings. The analysis, which was performed on the selected three segments of the routes that were chosen by the researchers due to their different characteristics, produced interesting results.

The results of isovist and visual graph-based analysis reflect the observed spatial features of the investigated Trakų Vokė park quite well and might be used for various purposes as following:

- More detailed description of valuable features of landscape heritage objects, which, at the moment, quite often are limited to the term "valuable spatial structure and greenery";
- Detailed comparison between different parks.
- Simulative reconstruction of the character of the historical park based on historical data, if available.
- Maintenance and management of the parks;
- Parametric design of landscape spaces, etc.

It could be finalised that in the case of three selected routes in Trakų Vokė Park, the numerical indicators of the isovists correspond to the subjectively perceived character of the routes and reflect their unique character. Consequently, the isovist and visual graph-based analysis of the walking routes in the park can make a background for in-depth inventorization of the valuable features of the object and monitoring of its changes caused by natural processes.

The method should be tested in the other parks and validated with more precise comparison with observation in situ results of the bigger number of observers.

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Kopsavilkums. Rakstā ietvertas vairākas metodes, kas sniedz daudzpusīgus materiālus un rezultātus par *Trakų Vokė* parku. Pētījuma metodes ietver literatūras apskatu par *Trakų Vokė* ansambļa specifiskajām īpašībām, novērošanu uz vietas, pieejamo karšu un satelītattēlu analīzi, parka lineāro zīmējumu izstrādi, izmantojot AutoCAD, modelēšanu, izmantojot *Isovist_App* un *ESRI ArcMap* programmatūru. Pētījumā ir pierādīts, ka izmantotās vizuāli grafiskās analīzes rezultāti diezgan labi atspoguļo novērotās *Trakų Vokė* parka telpiskās iezīmes un ir izmantojamas dažādiem citiem mērķiem. Piemēram, pie pētījumu izstrādes iespējams iegūt daudz detalizētākus mantojuma objektu vērtīgo iezīmju aprakstus, simulatīvu vēsturiskā parka rakstura rekonstrukciju pagātnē, pamatojoties uz vēsturiskiem datiem, parka uzturēšanu un apsaimniekošanu, ainavu telpu parametrisko dizainu u.c.

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Urban Squares within the Framework of Urban Design: Kadıköy Square, Turkey

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Abstract. This article aims to give a comprehensive perspective to the design concept in urban squares, which is the research subject of landscape architecture and related disciplines, and to reveal the criteria in the design process. This research was carried out with the idea of "how to design urban squares as a qualified urban service area?". For the squares to fulfill their functions and be well-functioning urban services, they should be evaluated in the light of various design criteria. In this study, using AHP (Analytical Hierarchy Process), 40 different design criteria were brought together and examined in Kadıköy square in Istanbul. In this context, a multi-criteria design approach has been developed that will enable citizens to spend more of their free time in the squares and to adopt positive feelings in these spaces. By evaluating the research criteria, it was found that 21 criteria were not included in the design process in Kadıköy Square. For this reason, Kadıköy Square is in a low suitability class. The study is seen as a mechanism that shows the unique features of urban squares in the design process and how the squares should be developed in the process of becoming a qualified service area. While studies are emphasizing that the squares in the cities are important open spaces, there are no studies that include concrete criteria that can ensure that the squares are qualified spaces. Bringing together all the criteria related to squares and creating a basis for a multi-criteria design process reveals the value of the study.

Keywords: public spaces, Urban squares, Urban design framework, AHP, İstanbul (Turkey)

Introduction

Squares are places that have become the symbols of the city where social and cultural encounters take place. Square; "Platea", meaning open place or extended street in Latin, was born from the word "Place" in English and French. Spanish "Plaza" and Italian "Piazza" are also of the same origin [22]. In general, the square; is a three-dimensional volumetric arrangement limited by horizontal and vertical volumetric elements, in which people perform their actions, surround them, and create a sense of integration and ownership [56]. Fauole defines the square as empty spaces defined by the designed environment and states that for a place to be defined as a square, it must first be pedestrianized. According to Kevin Lynch, squares are centers of intense public activity created in urban spaces, reflecting the identity of the city. The main criterion in the design of a square is to increase the quality of the place where that square is built [28]. At the same time, it should have features that will affect society and make it easier for people to meet [22]. In this respect, it is seen that urban squares are highly effective in social life. The meanings added to the squares are the most important elements that affect the communication between the individual and society. Space and human interaction also contribute to the dimension of human behavior relations in space and to the practice of using space. In this sense, the human-space interaction reveals the degree of the square function [28, 26, 57]. Squares have fulfilled very important social and social functions since the ancient period and have the feature of being a "city center" because they were the scene of important events of the period. Squares are an organic part of society from the past to the present. The first urban open spaces that emerged in the form of squares in Ancient Greece, Rome, and later periods symbolize the culture and splendor of the city [56]. The people who make up society have needed squares in all cultures to come together, meet, shop, and discuss their daily problems.

Squares; for a long time until the 19th century, they were characterized as closed forms with the architectural structures around them. The square form, which is based on the continuity of the facades, has begun to change, especially with the isolated building form that emerged with modernism and the spread of the residences that form the historical squares to the suburbs [28]. Functional changes in cities in the 20th century have led to the arrangement of squares as spaces that respond to different forms and functions. Thus, squares are designed as open spaces that serve free-time activities that still take place today [30]. Walter Benjamin introduced the concept of "flâneur" to more clearly express the relationship between the urban square and usage types, which people use extensively in open spaces. “Flâneur” is the situation in which individuals feel at home in urban squares. In other words, it refers to individuals who can freely roam in the urban squares. In this way, cities and urban squares gain meaning [15; 13]. In this situation, the main feature that distinguishes the urban square from any place or open space is its scale which gives a feeling of closeness to people. This situation reveals the importance of the view that the size of the square should be proportional to the number of users [49]. Since the urban squares are one of the most important places in the city, they enable those who live in the city and come to visit the city to establish a relationship with each other

and the city. In addition, squares are communication areas that strengthen the relationship between people and support establishing relationships in the context of new urban culture [49].

Squares have an important role in the development and change of urban culture. In this process, the situation that should be considered is to increase the quality of the squares and to have positive meanings. As it should be in every changing and developing place, users should feel positive feelings in squares as well. In this context, the fact that squares are characterized by their forms or functions, as well as creating a sense of belonging to a "place" in its users, also shows the quality of that square. According to him, the square is almost a "psychological resting place" within the urban fabric. When the historical development of squares is examined, it is seen that the most successful squares are the places where the user feels as a natural part of urban life [89; 58].

Feeling as a part of a place arises from the perceptual relationship that people establish with the "place". A square perceived for the first time creates a perception of space by combining the images accumulated in memory and past experiences and the physical elements it presents to the person at that moment, and thus develops a usage type. In this case, the importance of the attributes loaded into the squares also emerges. In this way, urban squares can stimulate, encourage social events and support a wide variety of uses (and users) [59]. It is seen as a tool for users to attribute positive values to squares and to characterize squares well to achieve these goals. In this direction, this study is aimed to determine the qualities of the squares in establishing the relationship between the square and the concept of design. This approach has been evaluated in Istanbul Kadıköy Square.

Materials and Methods

The main material of the study is Kadıköy Square (Rıhtım) in the city of Istanbul (Figure 1). Kadıköy Rıhtım Square has an average depth of 245 meters and an average width of 145 meters. The location of the square is the part between Haydarpaşa Train Station and Kadıköy Metro Station. There are Kadıköy-Eminönü, Beşiktaş ferry port, and Haldun Taner Stage, which are used extensively in the square. Space usage near the square, which causes intensive use of the square, is also shown in Figure 2. Kadıköy has an important position in terms of city transportation. The historical core that forms the beginning of the settlement in Kadıköy District, the area formed by Haydarpaşa Bay and Moda Cape is also located in this region. While Kadıköy Square is located on the Anatolian side of Istanbul, in the southern part of the Bosphorus where the Bosphorus opens to the Sea of Marmara, it is a port area that has seen many uninterrupted settlements and has been the scene of various civilizations since ancient.

Fig. 1. Location of the research area [created by authors]

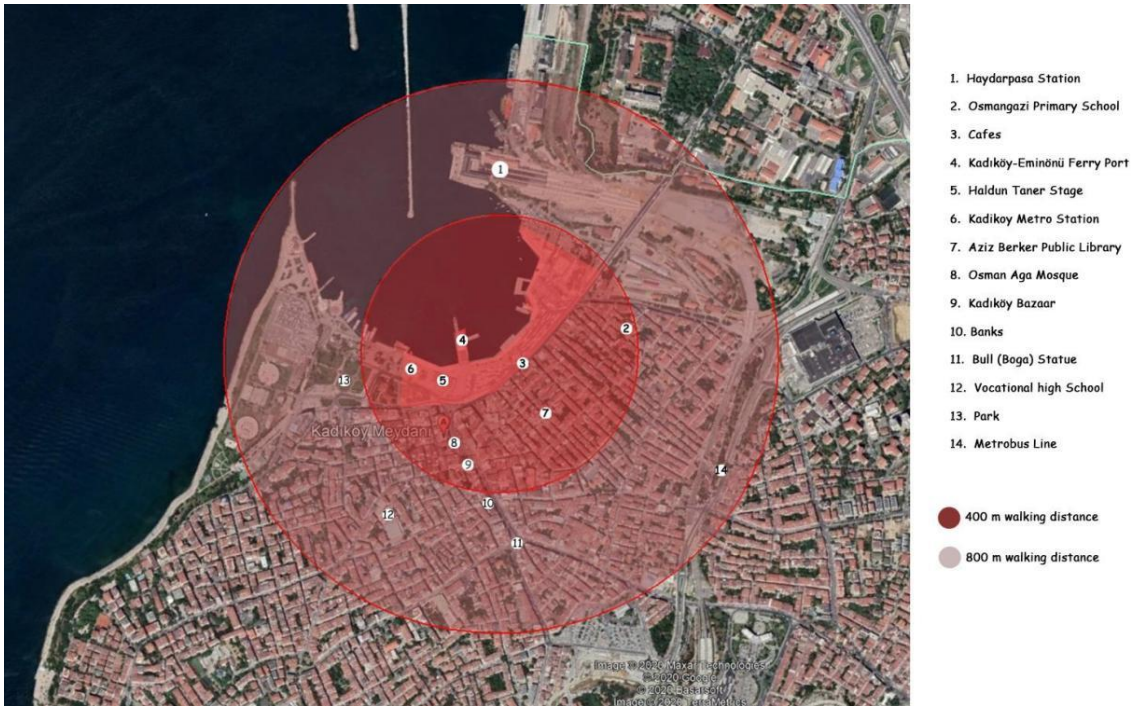

Fig. 2. Space usage in Kadıköy Square and its surroundings [created by authors]

Since Kadıköy Square is the center of trade and transportation on the Anatolian side, it has many functions together. Especially the diversity in terms of transportation draws attention. The square stands out as a transfer point in terms of sea and land transportation. While there are regular services to various coastal districts in the city from Kadıköy, Bostancı, Eminönü, and Beşiktaş sea bus piers, there are also services to nearby cities. Bus, minibus, and minibus stops are also located in the square. The fact that it is a transportation center with sea, land, and railway terminal points causes the area to be used very intensively. With all these characteristics, it is understood that Kadıköy Square and the coastal areas are important recreation areas and transfer centers.

The fact that the integrity of the square is repeatedly interrupted by vehicle roads causes the area to be divided into parts, preventing it from being perceived and used as a whole. As a result of this interruption, the square loses its function and becomes a transit route, coastal road, and walking route. While the square has empty and secluded areas in the western and southwestern parts, the high level of human circulation in the northern part, which is associated with public transportation, creates an inhomogeneous usage situation. At the same time, Kadıköy Rıhtım Square creates an unusual square due to its relationship with the sea [40]. All these situations caused Kadıköy Square to be chosen as the research area.

The study consists of a 4-stage method. The stages are as follows:

Determination of Design Criteria of Urban Squares

In the first stage of the method, the square design criteria group and the qualifications/criteria to be used in the evaluation within the scope of these criteria groups were determined. For this purpose, the criteria determined from domestic and foreign research on squares in the urban design process and the scope of these criteria were examined.

There are not many studies on the perception of the squares by the users and the management of the design process in this direction. The criteria in the studies reached in the literature were evaluated in this study. The criteria used in the studies of Lynch (1960), Alexander and Poyner (1970), Gehl (1971), Smardon (1979), Jarvis (1980), Whyte (1980), Carr et al. (1992), Strumse (1994), Özer and Ayten (1995), Van Mansvelt and Kuiper (1999), Hooke (2000), Sternberg (2000), Tibbalds (2000), Weinstoerffer and Girardin (2000), Aklanoğlu (2002), Carmona et al. (2003), Clay and Smidt (2004), Virbašienė ve Janušaitis (2004), Hacıhasanoğlu and Aytem (2005), Günal and Esin (2007), Oktay (2007), Watson and Bentley (2007), Crankshaw (2008), Semerci (2008), Temelli (2008), İnceoğlu and Aytuğ (2009), Taşçı (2012), Song and Yan (2013), Jafarzadeh (2014), Şahin (2015), Erdönmez and Çelik (2016), Aytaş (2017), Uzgören and Erdönmez (2017), Durak (2018), Şahin (2018), Argan (2019), Alpuğuz (2019), Altay and Batman (2019), Bolat (2019), Cabarkapa and Djokic (2019), Hançer (2019), Altay et al. (2021), Karaçor et al. (2021), Xu et al. (2021), Nabil (2022) were developed and 40 criteria were determined under 18 design criteria group (Table 1).

TABLE 1

Criteria for urban square design and their references [created by authors]

Design Criteria Group	Criteria	Reference
Definable	1. Guidance of design lines 2. Understanding the concept 3. Feeling the separation of spaces	[29], [53], [62], [71], [27], [75], [25]
Legibility/Openness	4. Adequate range of motion 5. Order in design elements	[45], [73], [31], [62], [41], [71], [75], [38]
Functionality	6. Understanding the main idea/subject 7. Appropriateness of space functions	[29], [1], [62], [70], [6], [14], [34], [75]
Diversity in Design	8. Diversity of living material 9. Diversity of non-living material	[78], [62], [69], [6], [38], [86]
Permeability	10. Connecting streets and public spaces 11. Integrating with different routes	[1], [23], [62], [73], [75]
Sustainability	12. Suitable material 13. Suitable plant 14. Usage of recycling or renewable energy sources	[1], [31], [62], [41], [71], [70], [10], [75], [14], [25]
Balance	15. Conformity in scale 16. Homogeneous distribution of living material 17. Homogeneous distribution of non-living material	[55], [53], [25], [69]
Order	18. Compatible functions of spaces and equipment 19. Related and balanced spaces and equipment	[2], [78], [53], [25], [69]
Integrated Design	20. Integrity between living materials 21. Integrity between non-living materials	[29], [14], [34], [25]
Harmony in Space	22. Harmony of each of the design elements in the whole place	[55], [31], [62], [70], [27], [69]
Associated with Surrounding Items	23. Harmony of the identity of the place and its surroundings	[2], [31], [62], [27], [14], [34], [7]
Direction Finding	24. Orientation of spaces and equipment 25. Order in the transport network 26. Free mobility	[27], [69], [6], [7]
Compatible with Human Scale	27. Proportion	[2], [82], [73], [62], [41], [27], [75], [25], [34], [7]
Color	28. Relaxing effect of colors 29. Color balance 30. A sense of sincerity	[63], [9], [11], [62], [72], [71], [36], [6], [8], [7], [51]
Shape	31. Formal harmony 32. Order in shapes 33. Detection of surfaces	[63], [9], [62], [72], [71], [36], [6], [8], [7]
Texture	34. Different textures	[63], [9], [11], [62], [72], [71], [36], [25], [6], [8], [7]
Form	35. Effective (to encounter an unusual form) 36. Dynamism in forms 37. Boundary effect	[63], [9], [11], [72], [71], [36], [6], [62], [8], [7]
Lighting	38. Gloss/opacity 39. Effective (to encounter an unusual light) 40. Sufficient / safety	[53], [62], [66], [25], [6], [8], [14], [16], [7]

TABLE 2

Evaluation Scoring of Comparison Scales [74]

Numerical Value	Definition	Explanation
1	Equal Value	Both options are equally important
2	Weak or Light Value	
3	Partial Value	One criterion is considered more important than the other.
4	Average Value	
5	High Value	One criterion is considered much more important than the other.
6	Strong Value	
7	Very High Value	One criterion is considered more important than the other.
8	Much Stronger Value	
9	Absolute Value	It is based on various information that one criterion is extremely important over the other.

TABLE 3

Random Index (RI) Values [74]

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.53	1.56	1.57	1.59

Calculation of Determined Criteria Scores

The square design criteria included in the method of this study are an important determinant for the study. The significance of the criteria was evaluated using AHP (Analytical Hierarchy Process). It was first put forward by Myers and Alpert in 1968 and was developed as a model by Saaty in 1977 and became a method that can be used in solving decision-making problems. In the method, the experiences, perceptions, and judgments of the people who make or evaluate the choices play an important role in determining the criteria weights, defining the problems, and classifying the concepts. It is one of the most preferred methods for multiple criteria or processes [19]. Because it facilitates the selection of importance and priority among competing or conflicting criteria in the decision-making phase [60]. AHP was used as a method by Song et al. (2011), Wang and Li (2013), Zhang and Feng (2013), Allahyari (2017), Wang (2018), Laroche et al. (2019), Mushtaha et al. (2019), Karacor et al. (2021), Zhang (2020), Lu et al. (2021)'s urban design researches.

The hierarchical structure created for the purpose is scored as in Table 2. The values required to determine the consistency in line with the scoring are given in Table 3. At this stage, the coefficient called "Consistency Index-CI" is calculated. The consistency ratio (CR) should be evaluated by comparing the RI (Random Index) and the CI (Consistency Index). In this case, if the consistency ratio is less than 0.10, it is decided that the comparison matrix is consistent [74].

In line with the method, a three-person group consisting of landscape architect authors was the decision maker for the criteria. The 40 criteria in the study method (100 full points) received the same scores. All criteria are of equal importance (2,5 points), so its coefficient is 1, and the random index value is 0 (Table 2-3). This is because no statistically significant weight difference was detected in the analytic hierarchy process in the calculation.

Evaluation of Determined Criteria in Research Area and Determination of the Suitability Classes

It was determined whether it was applied in Kadıköy Square and the qualifications were evaluated as a result of the scoring made with the points determined according to the AHP. The total score of the urban square was calculated with the scores as a result of the qualifications. While determining the suitability classes of the urban square, the total score was divided into 5 equal parts. The suitability classes are named lowest (0–20), low (20–40), medium (40–60), high (60-80), and highest (80-100).

Development of Improvement Approaches for Kadıköy Urban Square

Suggestions have been developed to improve the low score criteria in the results calculated by evaluating the AHP and field studies. It has been tried to create approaches that can increase the suitability class of Kadıköy square.

Results

In this section, criteria evaluations and scores are given in Table 4. The graph of AHP scores and total scores in line with the calculations is given in Figure 3.

TABLE 4

Design Criteria Scores [created by authors]

Design Criteria Group	**Criteria**	**Evaluation**	**AHP Score**	**Criterion Total Score**
Definable	1. Guidance of design lines	-	7,5 (2,5x3)	0 (2,5x0)
	2. Understanding the concept	-		
	3. Feeling the separation of spaces	-		
Legibility/Openness	4. Adequate range of motion	+	5 (2,5x2)	2,5 (2,5x1)
	5. Order in design elements	-		
Functionality	6. Understanding the main idea/subject	-	5 (2,5x2)	0 (2,5x0)
	7. Appropriateness of space functions	-		
Diversity in Design	8. Diversity of living material	-	5 (2,5x2)	0 (2,5x0)
	9. Diversity of non-living material	-		
Permeability	10. Connecting streets and public spaces	-	5 (2,5x2)	2,5 (2,5x1)
	11. Integrating with different routes	+		
Sustainability	12. Suitable material	-	7,5 (2,5x3)	0 (2,5x0)
	13. Suitable plant	-		
	14. Usage of recycling or renewable energy sources	-		
Balance	15. Conformity in scale	+	7,5 (2,5x3)	2,5 (2,5x1)
	16. Homogeneous distribution of living material	-		
	17. Homogeneous distribution of non-living material	-		
Order	18. Compatible functions of spaces and equipment	-	5 (2,5x2)	0 (2,5x0)
	19. Related and balanced spaces and equipment	-		
Integrated Design	20. Integrity between living materials	-	5 (2,5x2)	0 (2,5x0)
	21. Integrity between non-living materials	-		
Harmony in Space	22. Harmony of each of the design elements in the whole place	-	2,5 (2,5x1)	0 (2,5x0)
Associated with Surrounding Items	23. Harmony of the identity and design of the place and its surroundings	+	2,5 (2,5x1)	2,5 (2,5x1)
Direction Finding	24. Orientation of spaces and equipment	-	2,5 (2,5x1)	0 (2,5x0)
	25. Order in the transport network	-		
	26. Free mobility	-		
Compatible with Human Scale	27. Proportion	+	2,5 (2,5x1)	2,5 (2,5x1)
Color	28. Relaxing effect of colors	-	7,5 (2,5x3)	0 (2,5x0)
	29. Color balance	-		
	30. A sense of sincerity	-		
Shape	31. Formal harmony	+	7,5 (2,5x3)	2,5 (2,5x1)
	32. Order in shapes	-		
	33. Detection of surfaces	-		
Texture	34. Finding different textures	+	2,5 (2,5x1)	2,5 (2,5x1)
Form	35. Effective (to encounter an unusual form)	-	7,5 (2,5x3)	5 (2,5x2)
	36. Dynamism in forms	+		
	37. Boundary effect	+		
Lighting	38. Gloss/opacity	+	7,5 (2,5x3)	5 (2,5x2)
	39. Effective (to encounter an unusual light)	-		
	40. Sufficient / safety	+		
		Kadıköy Square Total Score		**27,5**

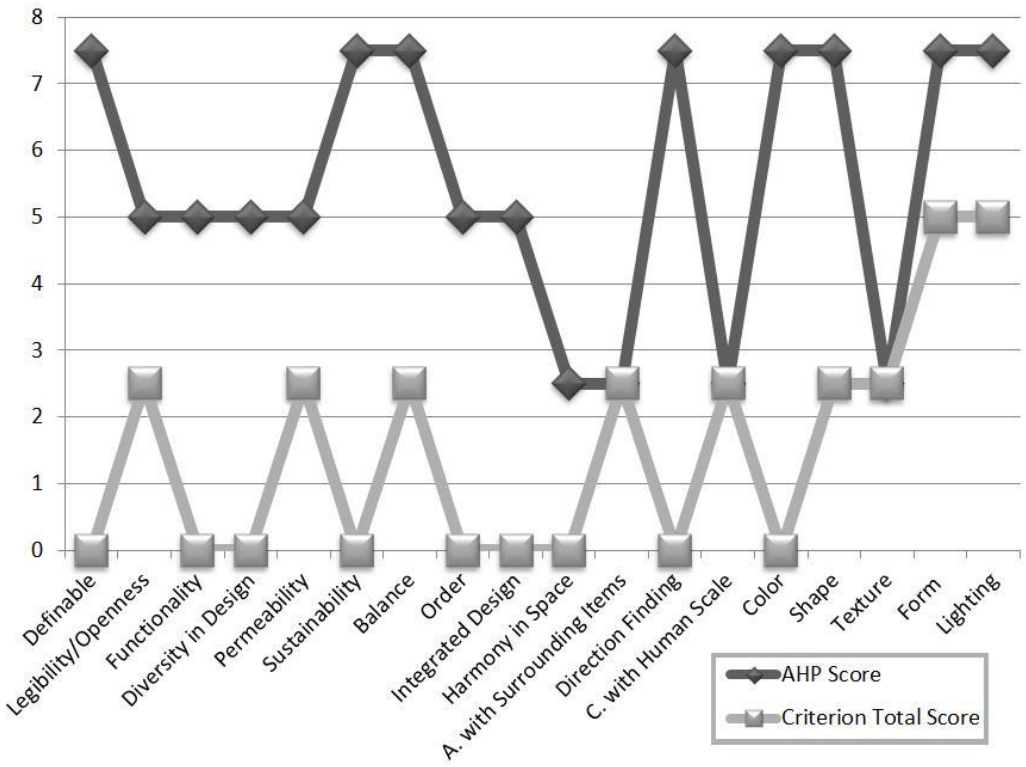

Fig. 3. AHP scores and total scores of criteria for Kadıköy Square [created by authors]

Urban Square Design Approaches for Kadıköy Square

When Table 4 and Figure 3 are examined, Kadıköy Square was found to be a low suitability class, with a total score of 27,5. Kadıköy Square does not have 21 design criteria that determine the qualities and evoke positive feelings in the urban square. When the design criteria groups are examined; it has been revealed that there are no positive qualities in terms of definability, functionality, diversity in design, sustainability, order, integrated design, harmony in the space, direction finding, and color effect. To increase the scores of these criteria and for the users to add positive values to the square, approaches that can increase the usability and desire to use the square should be developed.

The coastal area becomes the focal point of the city by integrating with the square. To present a holistic design in the research area at the urban scale, an integrated system should be created with the effects of the use of the area around the square. It will be possible to establish new functions that will support the recreation and transfer center function, which is the most important feature of the research area and increase the quality level of the square. To ensure that users use the square efficiently throughout the year instead of transit passes, spaces that can appeal to different user profiles such as resting areas, playgrounds and sports fields, open-air cinema, observation tower, pedestrian-bicycle transportation, and sightseeing routes should be created. The fact that users can spend time in different places with different activities will prevent confusion and make it easier to find directions. At the same time, irregular circulation and irregularly located cafes create negative feelings. It has been observed that there are no interesting design elements in Kadıköy Square. To emphasize the importance of this square, a special item can be designed that can create a landmark.

It should establish an uninterrupted coastal movement by moving in continuous extensions along the coastline. This pedestrian path, which can be the main axis of pedestrian circulation in the square, should be articulated to all pedestrian foci and streets of the region, increasing permeability. The design approach for the urban square should be created with energy efficiency and recycling. It is an important design criterion for the sustainability of Kadıköy Square.

These approaches have been developed as a result of the criteria calculated in Table 4 and the photographs in Figure 4 showing the current situation and problems of Kadıköy Square.

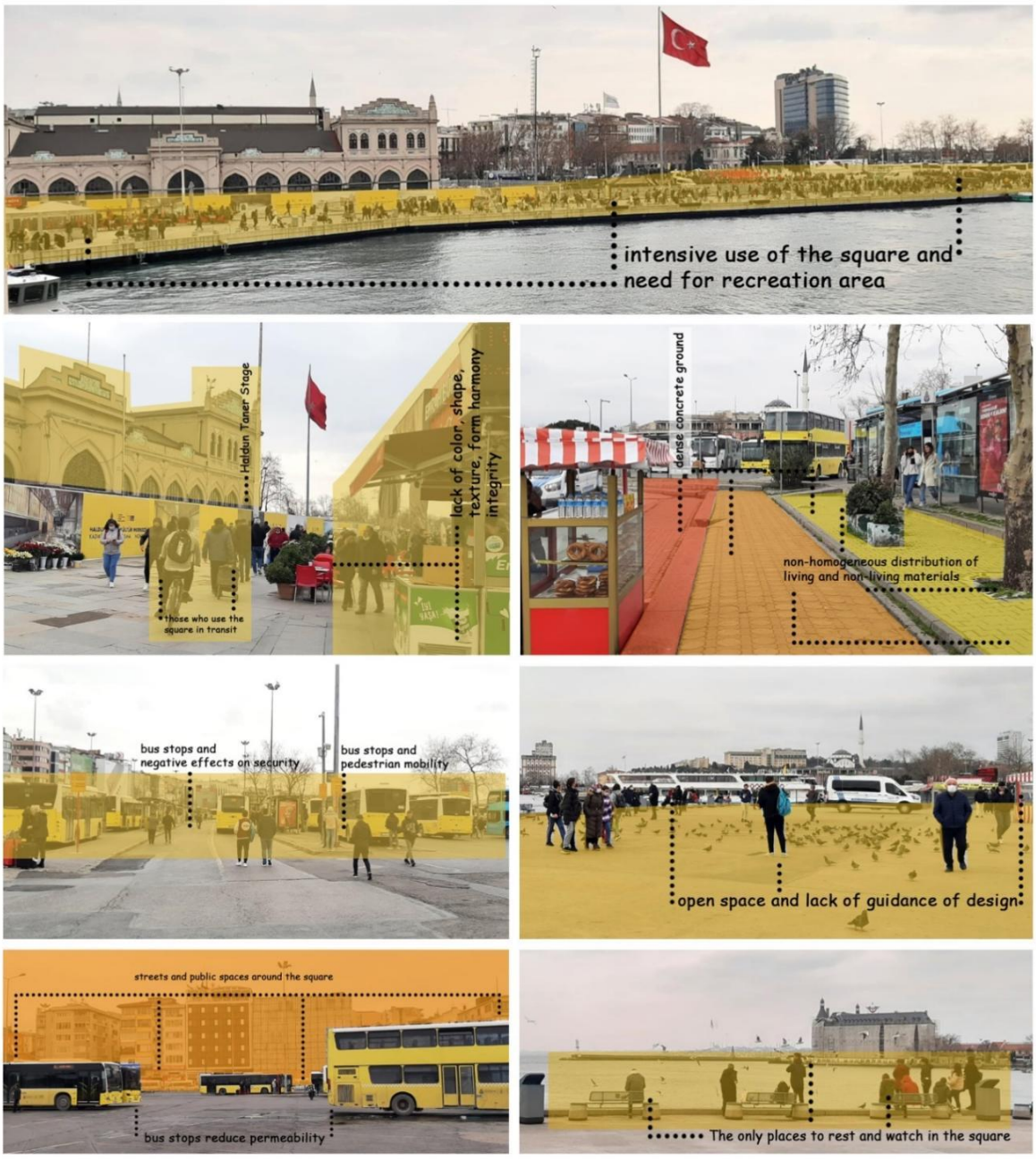

Fig. 4. Images from Kadıköy Square [created by authors]

Discussion and Conlusion

In line with the findings and approaches, the problems that need to be considered to adopt positive values and increase the quality of the square are given below. The criterion to which the specified problem is related is given next to it. With the solution to these problems, the negative feelings in the square will be reduced. The users' sense of belonging to the square will be strengthened.

- Irregularities (space use, transportation, orientation) in human-space interaction (harmony in the space, color, shape, texture, form).
- The vehicle road barrier, which is also associated with the square and between the Coastal – Kadıköy bazaar (definable, functionality, permeability, integrated design, harmony in space).
- Traffic density (sustainability, order, permeability).
- The division of the coastal zone by vehicle roads and parking area, (order, integrated design, harmony in space, direction finding).
- Unsafe pedestrian mobility at bus stops, (definable, functionality, integrated design, the problem of finding direction for the elderly and disabled person (direction finding, lack of lighting during dark hours (lighting, color effect, direction finding).

- The functional and physical disconnection of the areas can be explained as dysfunctional spaces (definable, functionality, integrated design, harmony in space).
- Undefined pedestrian paths (definable, direction finding, order).
- Heat island formation due to dense concrete floor (sustainability, order, permeability).
- Living and non-living materials that do not show homogeneous distribution (color effect, definable, harmony in space, order).

It is emphasized that the design criteria that emerged with the findings obtained in the study are effective and should be taken into account during the evaluation phase. The design approaches proposed in the study should focus on solving the identified priority problems and missing design criteria. Attention should be paid to human scale, spatial barriers, ecology, and climate-sensitive solutions for the sense of belonging to the square. The use of the square will increase and it will be preferable for the users in a square where urban design lines are located and guided, and a transportation system that is compatible with the environmental connections and integrated with the square is solved.

According to research on urban design, it is stated that the most important determinant of the quality of the space is the "use" factor. The main condition determining the use of a square is that it is easily accessible and includes functional diversity that can attract users from different segments and age groups [82; 83; 21; 47; 17; 42]. Main arteries and axes should be formed to shape well-defined squares physically and to ensure circulation in these spaces [32]. This situation was also found to be important for Kadıköy Square and it was emphasized in the design approaches. The potential of Kadıköy Rıhtım Square is not well defined physically. For this reason, the area should be redesigned with a holistic design approach rather than point arrangements and developments to be made in the square. The state of creating a sense of place and belonging in the users of the square is related to the physical condition of the square, namely its design. The sense of belonging to a "place" is a very important need of people, and the realization of this feeling depends on the character of the area, where the features surrounding the users of that place are formed [4; 39]. The purest expression of the "sense of place" in spatial terms is associated with the feeling of being surrounded. This approach can also be developed in Kadıköy Square. The presence and diversity of plants also support this feeling and add positive meanings to the squares [84; 85; 86].

In urban squares, components should be brought together in light of all these criteria. When the right balance is established between stimulating, simple, original, and order, it can have a positive value in space design. The important thing in a design is to achieve harmony thanks to the balanced combination of unity and diversity [76; 24; 11]. In line with the data obtained, establishing the balance of these criteria in Kadıköy Square should be one of the priority targets.

Another issue that needs to be balanced in public open spaces is color. When using colors, attention should be paid to the angle and direction of light, function and identity, cultural structure, climate and material selection. Along with colors, size, shape and texture also have the functions of perceptibility, emphasis, direction, diversity and depth effect in the space according to the usage areas. In addition, colors create unity, harmony and positive psychological effects on users [44; 63; 64; 30; 12; 54; 72; 36; 5]. The different colors, textures and forms in Kadıköy Square create a sense of confusion. This situation destroys the guiding effect of the design. Lighting is also an important criterion for the orientation effect in urban squares. In addition, lighting also has functions such as safety, visual comfort and amenity [66; 61; 52; 16]. The effect of the light in the square; depends on the seasons, the number of clouds in the sky, the time during the day, and the shadow effect created by another object and creates a different effect in the summer season and different in the winter season [30; 5]. This is not the case in Kadıköy Square. Lighting that creates different effects plays an important role in squares. It should make the sense of place feel by supporting the night use in the squares.

As a result, this study has defined the criteria and problems to be used in increasing human-space interaction. When all these criteria and results are used as a base in a new square design process, it will increase the quality of the space, users will be able to use the space with positive feeling to strengthen the human-space relationship, the perception scale between the natural-artificial elements in and surrounding the square should be evaluated in the context of human-space psychology, and the identity of the square should become a place where positive meanings.

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Kopsavilkums. Raksta mērķis ir sniegt vispusīgu perspektīvu pilsētas skvēru dizaina koncepcijai, kas vienlaikus pētījumā ir ainavu arhitektūras un ar to saistīto disciplīnu izpētes priekšmets, un atklāt kritērijus projektēšanas procesā. Pētījuma procesā apkopoti 40 dažādi dizaina kritēriji, kas izmantoti un pārbaudīti *Kadıköy* laukumam Stambulā. Pētījums tiek uztverts un parādīts kā mehānisms, kas izceļ pilsētas laukumu unikālās iezīmes projektēšanas procesā un to, kā skvēri, un laukumi būtu jāattīsta, lai tie kļūtu par kvalitatīvu, saistošu un interesantu funkcionālo zonu sabiedrībai kopumā.

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Understanding Heritage of Early Modernist Sanatorium Architecture: Salutogenic Design, Healing Effects of Nature, Memory, and Impact on the Spirit of Place

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Abstract. Patrimonialization of the 20th century modernist heritage has been gaining pace in recent decades. Modernist buildings of different typologies are being viewed and analyzed as heritage embodying the ideas and spirit of time of the modern movement. Healthcare facilities, including sanatorium buildings, are not an exception. However, understanding this recent heritage raises numerous complexities and contradictions, such as space vs/and particular place, international, universal vs/and local, personal memories vs/and collective memories, local place-related memories vs/and non-local memories. This article aims to contribute to the comprehensive understanding and interpretation of early modernist tuberculosis sanatoria buildings as cultural heritage by demonstrating valuable aspects of early modernist sanatoria architecture and their preservation and continuity pathways via memory and place and their interconnections.

Keywords: sanatoria architecture, tuberculosis sanatoria, modern movement, modernist architecture

Introduction

When sanatoria are the topic in architecture, most of the time, the first building which is mentioned is the Paimio Sanatorium of A. Alto. Although sanatoria were a widespread phenomenon in the 19th and early 20th centuries due to the spread of tuberculosis all over the world, this type of buildings is closely linked with the ideology and aesthetics of modernism and the modern movement in architecture. The view towards the modern movement and its architectural and urban legacy is shifting from strong criticism and directing the flaws to see it as heritage and as the expression of the spirit of time in recent decades. Patrimonialization of recent architectural legacy is gaining pace in different countries, and this encourages looking at the building typologies and the specific objects, which might have contradictory associations and sometimes negative images. The complexities and challenges related with the patrimonialization of the architectural legacy of the 20th century justify the relevance of the object of this research - heritage of early modernist tuberculosis sanatoria architecture. Several complexities and contradictions can be mentioned for revealing the need to better understand the heritage of the modernist tuberculosis sanatoria architecture. Sanatoria buildings can be seen as the expression of the ideas of modernist design and ideology; at the same time, this building type has influenced the development of the modernist design. Modernist sanatoria buildings are the expression of the internationalization of architecture, healing practices, lifestyle and at the same time, particular sanatoria are closely integrated with local history, community, and landscape. Sanatoria buildings can be seen as the legacy embodying the advances in design and healthcare. However, at the same time, specific tuberculosis sanatoria might be stigmatized by locals and shun off due to the nature of this disease as this illness has been stigmatized for a long time [7]; moreover, currently, tuberculosis is not a massive problem anymore, there are numerous instances of abandonment of former sanatoria.

The aim of the research is to contribute to the comprehensive understanding of early modernist sanatoria buildings as cultural heritage, which can lead to their further management strategies.

The methods applied in this research include literature analysis, case studies and theoretical conceptualization; they are applied in order to distinguish the most important aspects of early modernist sanatoria architecture, such as the advancements of design and healing approaches of the time, development of salutogenic architecture, tapping into the healing effects of nature and to trace the possible strategies of preservation and continuity of these valuable aspects in connection to the spirit of a particular place and in the realm of memory. Due to the aim to explore the above-mentioned complexities and contradictions, the case study objects – early modernist tuberculosis sanatoria located in Lithuania and Turkey were selected and analyzed. One of the reasons for choosing the particular sanatoria from these countries is related to the discrepancy of their characters. Lithuania and Turkey differ due to their demographic structure, culture, traditions, and climate. However, they both implemented

the ideals of modernism in the same type of buildings. In its discourse, modernism is an international style profoundly influenced by universality, functionality and rationality. Therefore, the comparison between these sanatoria from different geographies can assist in analyzing and understanding the impact of local dialects on the design of a building with a very specific purpose. Furthermore, it can influence the knowledge transfer for establishing new strategies towards modernist heritage since the structures are subject to different stages - while one has the continuity of function and currently functioning, the other one has the potential for refunctioning and is abandoned. In that regard, this research is in-depth qualitative research which is a pilot study to stimulate further research.

Literature review

The analysis of literature, first of all, focused on the sources about modernist architecture, the history of sanatoria architecture and its links with the modern movement. According to V. Migonytė [34], Inter-war period resorts developed in the interconnection between recreation, modernity and nature and the development of sanatoria architecture was an inseparable part of this process. Thus, in the course of literature analysis, several themes characterizing development and architecture of early modernist tuberculosis sanatoria had emerged: 1) history of sanatorium institution, treatment of illness, equipment, shape and layout of buildings; 2) evolution of the salutogenic design of buildings; 3) connection with nature and landscape of sanatoria buildings and tapping into healing effects of nature. These three distinguished aspects are analyzed below in greater detail. They are seen as essential themes to be considered in the patrimonialization, preservation and present day use of early modernist sanatoria buildings and building complexes.

History and features of modernist sanatoria architecture

At the beginning of the 20th century, tuberculosis overwhelmed the European continent, and it was the leading cause of mortality throughout Europe, which was even called the white plague [47]. Moreover, in the Inter-war period, tuberculosis was one of the most pressing problems of industrialized countries due to the boom in industrial sectors (factories, mines, etc.). Tubercle bacillus, which was discovered in 1882 by R. Koch, helped medical professionals to understand the importance of isolation in its prevention [5]. Therefore, a new type of building design was required to fulfil this specific function, which was a health facility, but at the same time, typologically different from a hospital.

According to the Cambridge dictionary, the definition of a sanatorium is “a special type of hospital, usually in the countryside, where people can have treatment and rest, especially when they need to get better after a long illness.” While a sanatorium can be for the treatment of an illness, it can also have recovery purposes, which mitigate the symptoms. Therefore, these facilities evolved over time and became multipurpose places where people also escaped existential dread, depression, and other anxieties. As a result, frequently, staying at a sanatorium was more of a choice of the patient due to the recommendation of a doctor rather than it was the only way to heal from the illness. In addition, the hospitalization was essentially caused by the need for isolation and not by the fact that the patient was unable to move. Consequently, these characteristics affected the design of the sanatoria buildings. In the late 19th and early 20th centuries, the corridor layout was widespread in sanatoria and hospitals. Beds in long corridors were separated by curtains to create a private space for the patient. Only in the early 20th century this type of ward was replaced in British sanatoria by separate pavilions with wards on either side of the corridor, with spacious balconies running around the perimeter of the façade. The construction and planning of sanatoria for the treatment of specific illnesses, such as tuberculosis reflected the ideology and aesthetics of the period: the need for cleanliness, health, hygiene, sunlight, clean air, and open spaces. It is interesting to note that when tuberculosis sanatoriums were built, the patients’ relatives often stayed in the vicinity of the sanatoriums, which led to the formation of new settlements, infrastructure, and business sectors to meet the needs of the settlers [33, 44].

Development of salutogenic architecture

Health institutions are primarily focused on healing the illness, which sometimes causes the issue that they are paying just secondary attention to the patient’s psychological, spiritual, and social needs. There are so many outer reasons that trigger the stress level of people, especially in a healthcare institution where the fear of deterioration of health is considered as well. However, the salutogenic design approach can assist in fulfilling the patient’s psychological, spiritual and social needs, as well as aiding the healing process. The development and features of early modernist sanatoria architecture can be seen as an important milestone in the evolution of salutogenic design.

The planning of the sanatoria required sufficient external areas so that the patients would have the possibility of having direct contact with the sun and access to clean air. However, these areas were also supposed to provide them with the possibility to have physical exercise and also should be used for leisure. As stated by A. R. A. Carvalho et al. [9], patients tend to get a prescription for sunbathing in sanatoria, which is called heliotherapy. Heliotherapy was seen as a cure which could heal the disease permanently. It was believed that if a patient was once healed, the occurrence of fresh air and sun, even in the future, would provide the protective powers for a successful fight against the causal organism [6]. Proto-modern and early modernist architecture quickly reflected this new environmental concern [7]. According to M. Campbell [7], Austrian architect Otto Wagner was commissioned

to design a clinic with large, decked terraces at Entwurf in 1908. Consequently, the balconies in the sanatoria, which were called cure balconies, were one of the main components, both in the architecture of the building and in the treatment. Furthermore, the existence of balconies also provided the possibility of constant ventilation. While in some examples, access to the balcony was only from individual rooms, it was common to have sun porches, which were along the whole façade and accessed by everyone as a communal space. The buildings also featured accessible flat roofs to be used as spaces for patient rehabilitation [49]. This type of tuberculosis treatment, where patients were housed in open spaces: balconies, terraces, and specially adapted wooden houses with movable walls, was particularly popular at that time [25]. D. Lüthi [30] stated that the principal characteristics of sanatoria, which were built at the beginning of the 20th century, were a rational layout, sober façades, and new and economical materials. They tend to have rooms on the southern side of the structure, while the corridors are located on the northern side. According to C. Robie [45], functionalist aesthetics of the era affected the design of the sanatorium building, and they were typically white with smooth surfaces, which represented and emphasized hygiene. According to B. Tranavičiūtė [49], as the exteriors of the sanatorium buildings were designed under the influence of architectural modernism, the interiors were linked to the principles of patient care: well-lit interiors, using large areas of glazing, were intended to free the spaces from darkness and possible bacterial growth. In his design of Paimio Sanatorium, A. Alto emphasized that the user's psychological and physical requirements should be acknowledged as the basis of the design [54]. He designed the rooms in a specific way by playing with the colours so that he could establish a peaceful environment for the lying-down patients' perspective. At the same time, even though some of the rooms were supposed to be used by more than one patient, he tried to create a personal space and a sense of individuality through his design.

On the other hand, not only modernism affected sanatoria, but the design and aesthetics of sanatoria affected modernist architecture and interior design as well. Architects of the time marketed the characteristics presented above of sanatoria buildings as both preventative and reactive cures, which they applied in other buildings, such as in the design of social housing. The intention of the modern movement was to cure the perceived physical and emotional ailments that occurred by living in crowded cities and resolve hygiene conditions [7]. P. Overy [44] stated that P. Behrens designed an apartment block in 1927 that "was directly inspired by the model of the sanatorium and provided every tenant with an open-air south-facing terrace." As M. Campbell [7] concludes, "It cannot be claimed that the introduction and use of the flat roof, balcony, summer house and recliner chair were the direct results of early treatment methods for tuberculosis, but the popularity of these modernist architectural features in the pursuit of good health and hygiene, placed them in the annals of a therapeutic lifestyle…"

Currently, it is widely acknowledged that changes in aesthetic design of healthcare settings can influence and improve patient health outcomes [38], including the psychologically supportive design used in the salutogenic design that can stimulate and engage people, both mentally and socially, and support an individual's sense of control [12]. In addition, the legacy of tuberculosis sanatoria design aimed at health restoration is an important reminder in the therapeutic context "overtaken by new drug therapies and treatment methods" [7].

Healing effects of nature

Even though the reason to have establishments of sanatoria in the countryside might seem like it is only because of the isolation possibilities, it is also possible to state that one of the reasons for it was due to the restorative effect of the natural environment on people's health. In the 19th and 20th centuries in Europe, the patients started to be treated in environments which are close to the sea and with pine tree forests since it was believed that climate has a direct impact on the healing process [58]. Sanatoria were built in mountainous areas as well. By the way, the first person to investigate the power of such sanatoria for the treatment of pulmonary tuberculosis was the physicist H. Brehmer, who, in 1854, visited the village of Gerbersdorf (now Sokolowski, Poland) in the Silesian mountains [33]. Especially for tuberculosis, an outdoor environment with access to clean and fresh air, ample sunlight, and a steady, moderate temperature is found as the best place for the treatment. When buildings were needed as sanatoria in the 1880s, mostly older existing buildings were transformed for this usage, which were not initially designed for air cures [30]. Therefore, these cures were performed by walking, which established the requirement of having some infrastructure and landscaping in the surroundings. Furthermore, since a good diet was also seen as one of the most important factors in the recovery process, most of these buildings required food production facilities and gardens. As a result, a particular architecture-environment relationship was formed at the beginning of the 20th century, which focused on the improvement of the living conditions for patients.

Currently, there is a large body of research demonstrating the positive effects of interactions with nature on people's physical and psychological health [20]. Natural environments can affect mental health and well-being since they are proven to have the ability to restore cognitive functions [43] and facilitate stress reduction [20, 50- 52]. Attention restoration theory, which is used in cognitive psychology, tries to explain whether depleted directed attention can be re-energized through the restorative experience of effortless soft fascination in nature [25, 26]. Growing research in this area supports

a significant link between spending time in a natural environment and reduced stress, improved attentional capacity and cognitive functioning, increased concentration and impulse control in children and adults with attention deficit hyperactivity disorder, reduced physical pain and faster healing, lifting mood, and reduced risk of morbidity [20]. The simple fact that healing gardens now exist in widely varying healthcare settings shows that they are allied with a broad conception of health [23]. It can be concluded that the early history of tuberculosis sanatoria has demonstrated that the outside environment is as crucial for the recovery process as the design of buildings. In that regard, sanatoria have a specific architecture-environment connection since while it is focused on healing, the way it attempts to heal is not only based on medication. In a sense, it can be stated that they are somewhere in between the salutogenic and healing effects of nature approaches.

Case studies

Two case study areas were selected and analyzed for a further understanding of the peculiarities of early modernist sanatoria architecture. Heybeliada sanatorium buildings in Turkey on the Heybeliada Island of Istanbul coast and Aukštoji Panemunė district of Kaunas (Lithuania) with three Inter-war period tuberculosis sanatoria (one for children and two for adults or mixed use) were selected. The choice of the case study objects was justified by the need to illustrate the previously mentioned complexities and contradictions. Furthermore, the aspects distinguished during the analysis of literature - history of the institution, treatment of illness, equipment, shape and layout of buildings, design of buildings, connection with nature and landscape of sanatoria buildings – were highlighted in the analysis of case studies as well.

Heybeliada sanatorium

When the idea of opening a sanatorium in Heybeliada was discussed, the first plan was to use the already existing building in Yesilburun, which was used by the refugees. The idea to convert the building, which was owned by the military, was accepted by the government, and the sanatorium opened in 1924. However, at the same time, also the construction work started in the plot for extensions to the existing building, and they continued until 1939. Finally, in 1945, a new building was decided to be built in a second location to expand the existing sanatorium and double its capacity. The construction of the new building was finished in 1946, and after this date, the sanatorium started to function as a health complex which is located in two separate places in the southern part of the island (Fig. 1).

The reason for choosing the southern part of the island is related to the main directions of the sun and the wind around this location [13]. Especially the pine forests, which are located in the northern part of the island, have the ability to block strong winds.

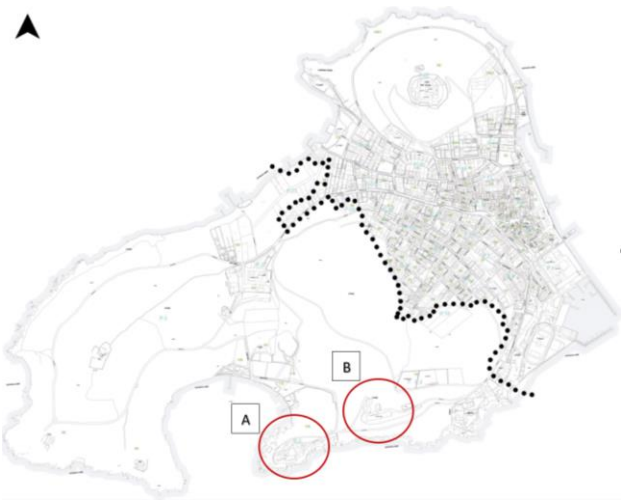

Fig. 1. Plan of the island with the first and second location of the health complex: A - first location, B - Second location [Prepared by the authors from the map demonstrated at A. Aydin [2]]

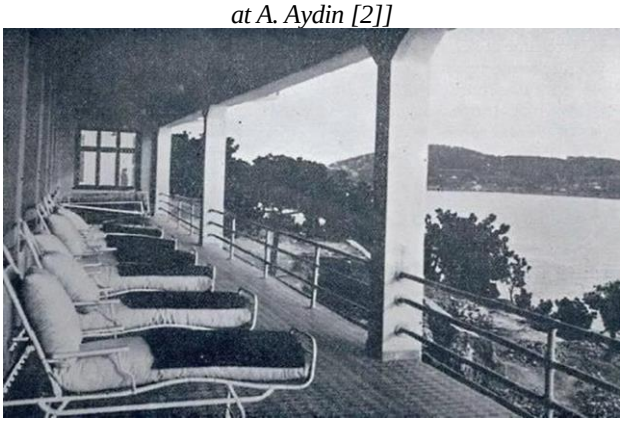

Fig. 2. Photograph of the façade long balconies of the main sanatorium building [27]

Furthermore, due to being an island and surrounded by the sea, the area has high-quality air, which is balanced with low humidity. Therefore, the air and the sun conditions of the area were found to be the best for tuberculosis patients.

According to T. I. Gökçe [19], at the first location, there were small buildings which were constructed in different stages due to economic reasons. The sanatorium at this location consists of administrative buildings, service buildings such as a laundry building, a large kitchen, a canteen, technical buildings such as laboratories, a building for surgery operations, a pharmacy, and separate buildings for male and female patients. The main sanatorium building contains façade long balconies, which were used in the treatment (Fig. 2).

Even though the construction of the buildings was spread over a fifteen-year period, architecturally, they had holistic design strategies, which created the impression that it is a whole complex [58]. The sanatorium in the first location has a dominant architectural language representing and following the modern movement era (Fig. 3).

Fig. 3. The Sanatorium in the first location - Location A on the map [21]

Fig. 4. The second sanatorium designed by R. Gorbon - Location B on the map [21]

The building group at the second location was designed by the famous architect R. Gorbon, and it consists of the new sanatorium building, a school for the education of the nurses, a kitchen, a water tower, a transformer station and an extension building that is connected by a bridge to the main building block. In this additional building, there is a pharmacy and a cinema. Furthermore, workshops were taking place for the patients in the main building.

The main building at the second location has an enormous façade which is approximately more than a hundred meters long. There are balconies on the front façade of the building that shape the design of the façade with its columns that are located every three meters. The balconies are continuous, and they were used as cure balconies, where all the patients can rest and at the same time have fresh air (Fig. 4). Both buildings' light colour rational geometric shapes clearly contrast with the dynamic green landscape of the island. From one point of view, landscape as a setting helps to highlight modernist architecture, although, especially in the case of the main building in the second location, the columns of the front façade harmoniously interplay with the trunks of the trees of surrounding forested areas.

The sanatorium itself was not only a place for health, but also a rehabilitation centre so that the patients could use their time there to join some activities and learn some skills. According to K. Yilmaz [57], the rehabilitation in the centre was based on various stages, such as medical treatment and rehabilitation. The stage of medical treatment focused on normalizing the health of the patient, which could bring the health to a level where the patient could return to work and skill treatment. The rehabilitation stage focused on supporting the patients by teaching them new skills, which would help them to return either to their previous jobs or help them find
a new job. In 1957, 98 of the 130 patients left the sanatorium only after finishing their courses to learn job skills. Therefore, it can be stated that one of the dominant characteristics of this sanatorium was its rehabilitation possibilities for the future.

Until 2005, even long after tuberculosis stopped being a massive problem for society, the sanatorium stayed operational. After the earthquake which happened in Istanbul in 1999, the sanatorium was damaged, and a detailed restoration was performed in 2001. However, in 2005, the buildings complex was emptied by the government due to not having enough patients and logistical issues of the islands. In 2020, it was allocated to the Presidency of Religious Affairs of Turkey with the intention of converting the complex into an Islamic Education Centre; however, it was cancelled by a court order in 2023. Nowadays, the buildings are empty and without a function. It is possible to summarize that the Heybeliada sanatorium complex well exemplifies the history and features of early modernist sanatoria buildings with numerous universal characteristics, such as the organization of treatment, straightforward minimalist design, the use of balconies and its connection to the unique nature of the island; the unique standing out feature was workshops with profession-oriented rehabilitation of persons, which helped them to return to social and economic life after the treatment. Therefore, an appropriate function for the building can be beneficial both for the physical and social continuity of this heritage.

Aukštoji Panemunė sanatoria

History of Aukštoji Panemunė and its development as a historic suburb and recreation and health restoration location attains increasing attention from Lithuanian researchers [11; 29, 33–36; 41]. According to the researchers, the development of the phenomenon of leisure, recreation, and health restoration culture intensified in the 1940s with the resulting establishment of the network of recreation and healing resorts around the city of Kaunas, then the temporary capital of Lithuania. In 1932, a law initiated by the Ministry of the Interior legally established the concept of a resort. The document also marks the symbolic beginning of a period of intensive modernization of resorts and the increasing attention of the state to hygiene, health, and recreation issues. The discussions of this period related to resorts were based on modernist rhetoric, using keywords such as hygiene, cleanliness, natural sunlight, an abundance of fresh air and open spaces [29; 34]. According to V. Migonytė [34], recreational places near the rivers have become one of the most important areas in Kaunas and its surroundings, where recreation, modernity and nature can be combined. Aukštoji Panemunė suburb, which until the 19th–20th centuries grew as an independent linear plan settlement more distant from the urban core [11], was one

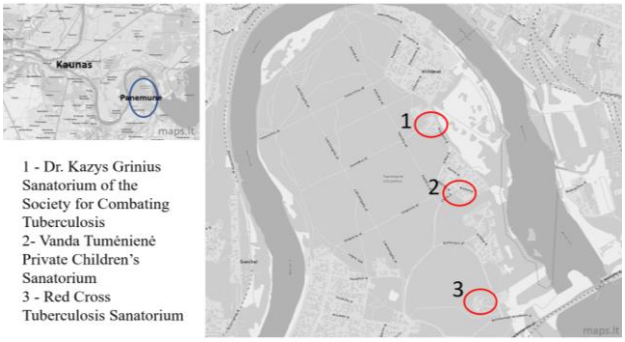

Fig. 5. Location and plan of Aukštoji Panemunė historic district and historic sanatoriums located in it [created by authors]

Fig. 6. Historic photograph of Dr. Kazys Grinius sanatorium of the Society for the Fight against Tuberculosis [36]

of such location. The pine forests of Aukštoji Panemunė and the two main beaches have become the basis for a new resort, officially declared in 1933. Consequently, the territory and its plots began to be managed more carefully, and more recreational and rehabilitation facilities were built [29; 34]. Growing awareness of the leisure culture, change of the legal status and resulting investments had transformed Aukštoji Panemunė from a small suburb into a busy recreational area in a little less than a decade. State and private investments in modern health care and health restoration were an inseparable part of this transformation. In order to combat the nationwide spread of tuberculosis, outpatient health facilities were developed in parallel in the forested area of Aukštoji Panemunė. Dr. Kazys Grinius sanatorium of the Society for the Fight against Tuberculosis, the private children's sanatorium of Prof. Vanda Tumėnienė, and the tuberculosis sanatorium of the Lithuanian Red Cross Society were established in the area [36] (Fig. 5). Similarly to other European countries, tuberculosis sanatoria built in Lithuania reflected modernist features [49]. The history and features of each historic sanatorium are presented below.

The sanatorium of the Society for the Fight against Tuberculosis was opened in 1930 on the outskirts of the Jonas Basanavičius Park, near the village of Vičiūnai. The speech of dr. K. Grinius's, president of the society, during the opening of the sanatorium revealed the concern about the spread of tuberculosis and the healthcare institutions. Moreover, his speech reveals that the sanatorium complex was built in stages in the 1-hectare parcel of land granted to the society by the state, including a homestead with an existing masonry house. In the first stage, the central part of the building was constructed, and later the right and left wings were added. The buildings were designed by the engineer V. Melejinas. In 1930, 50 patients were treated in the sanatorium, and in 1937 it already had 80 beds [34; 36]. The main building can be characterized as a rational modest architectural design example, the absence of ornamentation as well as the columned veranda clearly allows to attribute it to the category of early modernist sanatoria. Although, at the same time, the symmetry of the composition and the façade of the central block, which is visible from the forest area, creates a representative image of the institution (Fig. 6).

A special inter-war publication on the prevention of tuberculosis mentions that "the sanatorium is modernly equipped, with central heating, sewerage, electric light, alarm system, it has its own bookstore and a separate staff of 17 employees, serving children and adults. Patients are treated conservatively and actively. The conservative treatment is carried out according to B. Dettweiler's hygiene-dietetic system, providing the sick body with quiet, good, adequate food, fresh air and sunlight. Active treatment is used where conservative treatment is insufficient." [34; 36]. Further this publication of the period testifies both to the advanced medical system and rapidly developing infrastructure of the time, and to the ambitions of tuberculosis treatment in a modernizing local resort, taking into account the western trends in the architecture and planning of this type of sanatoriums: "The central part of the building and the right wing are used for adult tuberculosis patients. Almost all wards have a separate exit to a common open veranda. One shared, a completely isolated ward in the central block, on the second floor, is reserved for adult patients with bone tuberculosis. They have a separate exit to a solarium on the roof of the veranda, where patients are treated with sunlight. On the right wing, on the first floor, at the end of the corridor, there is an operating room, and on the north side, a wing with baths, toilets and an isolation room with a separate exit to the courtyard extends. The entire left wing of the sanatorium has three large wards for children with bone, glands and bronchi tuberculosis. All the wards have a separate exit to a large open veranda, and a solarium. The two-story brick building to the north contains the doctor's office, bathrooms, showers and toilets, as well as the doctor's and nurses' apartments, the housekeeper's office and flat, the kitchen and the cook's room. This house, with a completely separate entrance from the sanatorium courtyard, has an isolation room for children" [34].

The largest of the three tuberculosis sanatoriums in Aukštoji Panemunė is the sanatorium of the Lithuanian Red Cross (Fig. 7). One of the tasks of this society was to establish tuberculosis hospitals. This sanatorium was established in 1932 in the southern part of the Vičiūnai

Fig. 7. Historic photograph of tuberculosis sanatorium of the Lithuanian Red Cross Society [36]

Fig 8. Contemporary situation of historic sanatoria in Aukštoji Panemunė: 1 - former Dr. Kazys Grinius sanatorium of the Society for the Fight against Tuberculosis; 2 - former private children's sanatorium of Prof. Vanda Tumėnienė; 3 - former tuberculosis sanatorium of the Lithuanian Red Cross Society [photo by the authors]

village on a 1.75 hectares plot of land. The architect of the sanatorium was R. Steikūnas. This is a four-story brick masonry building of representative architectural character with some features of historicism, like elements of orders and decorated pediments. Like other sanatoria, the facades of the Red Cross building were filled with balconies and open terraces, where the patients were able to enjoy the sun. The interior of the building was organized in a corridor layout characteristic of the early sanatorium building. This sanatorium had the possibility to treat up to 150 patients [33; 36].

In 1933 the already operating sanatoria in Aukštoji Panemunė were supplemented by a third one – a tuberculosis sanatorium for children established by Prof. V. Tumėnienė at her personal expense designed by the architect G. Gumeniukas (Fig. 8, 2). The children's sanatorium could treat 50–60 children at a time, of which five beds were for babies. The two-story building of the sanatorium was wooden, with balconies and an open veranda. In 1937, the sanatorium was enlarged by another 30 beds. During the summer, children with bone tuberculosis were also accommodated on the balconies, which meant that the sanatorium was able to accommodate as many as 100 children during this season. A brick masonry extension of the sanatorium was built in 1940 designed by the engineer K. Sinkevičius, the first floor of which was equipped with a kitchen, garage, laundry and mortuary, and the second floor with two rooms for the nurse and the cook and maids. There was an X-ray room and a small laboratory in the sanatorium. In front of the building there was a garden and a white fence [35]. The wooden architecture of the building as well as balconies and veranda columns interplay with surrounding pine trees. Wood as a building material was characteristic of the residential architecture of Aukštoji Panemunė resort, thus sanatorium building harmoniously blends with the character of the local built-up structure.

According to the researcher of Lithuanian inter-war period resort architecture V. Migonytė [34, 36], the architecture, planning features, and interiors of Aukštoji Panemunė tuberculosis sanatoria buildings reflected the universal tendencies of modernization and the features of Western European modernism, based on the belief in the healing power of the sun, just as in other well-known modernist sanatoria. Aukštoji Panemunė, which, according to D. Dijokienė [11], has preserved its valuable natural conditions and historic wooden architecture, has a favourable situation for continuity of salutogenic design, healing effects of nature enriched with historical memories of interwar leisure and health restoration culture and early modernist architectural design. It is important to underline that all three historic sanatoria continue their therapeutic functions (Fig. 8). The former Dr. Kazys Grinius sanatorium of the Society for the Fight against Tuberculosis and the former tuberculosis sanatorium of the Lithuanian Red Cross Society currently function as subdivisions of nursing and palliative care hospitals. The former private children's sanatorium of Prof. Vanda Tumėnienė currently functions as a children rehabilitation centre.

Theoretical conceptualization

Taking into consideration the contradictions and complexities related to early modernist tuberculosis sanatorium architecture and the themes distinguished in the course of literature analysis, spirit of place and memory were selected for theoretical conceptualization as a means to link personal, collective, local and universal dimensions in the interpretation of early modernist sanatorium architecture heritage.

Spirit of place and modernist architecture

Modernism is one of the architectural movements which is argued on the most, both between the experts and also non-experts. This is because modernism, in its nature, focuses on new and experimental techniques not only in the design of architectural objects but also in the design of the city as well. As I. B. Whyte [56] states, the ideal of modern science was mastering the forces of nature and the idea of progress. Therefore, it can be possible to state that the modernist era changed the definition and the perception of place. It can be noted that place very often became replaced with space, which is more abstract and disconnected from a particular

locality. As a consequence, connecting with modernist architecture and the urban environment at the personal and locality level frequently began to require extra effort to spend. It can be hypothesized that the pure expression of the ideas and principles of modernism in architecture is more associated with the spirit of time and non-local phenomena than with a particular place.

Place and the identification of a place is a topic which is discussed by various disciplines for decades. According to D. Canter [8], 'place' is a combination of actions, conceptions and the physical environment. However, the term place extends the focus of attention beyond geographic space to the experience people have of being in a particular environment [3]. Therefore, the definition of place is not only related to its physical characteristics but also to the meaning it carries or the meaning attached to it. For example, in his speech at the CIAM 5 meeting in 1937, J. Hudnut stated that 'cities which are patterned not only by those intellectual forces which seek to bend natural law to human betterment but also by those spiritual forces which throughout human history also left repeated imprints upon human environment' [40]. However, when the urban environment of modernism is analyzed, the spirit of the place is relatively lost.

Spirit of place, which is also called *genius loci* by some scholars, is a concept which has existed since the Romans. Romans believed that the spirit existed outside of the object or a place and protected the place, but at the same time, it preserved the life characteristics of the place as well [55]. Therefore, the spirit of the place is the reflection of the identity of the location, and it is what makes the location different from any other place. Most of the time, the spirit of place is discussed through its connection with cultural memories, which create a sense of place. M. Harney [22] states that the term *genius loci* is not only the spirit of place, but it also involves the sense of place as well. Furthermore, some theorists use the terms spirit of place and sense of place as each other's synonyms; however, G. Holden [24] distinguished between these two terms. He stated that the spirit of the place is external quality, while the sense of place is the internal quality of the perceiver. As a result, whether they are synonyms or not, both of these terms explain the characteristics of the place, which can provoke memories, emotions and feelings in individuals that can change their perception of these places either in a positive or a negative way.

K. Ardakani and S. S. A. Oloonabadi [1] state that, even though the sense of place might be personal, it is the outcome of collective perception. The perception of people tends to be motivated by the way people deal with their physical environments in daily life, and places can significantly contribute to the creation and retention of memory. The more familiar the environment is, the more people will establish mental patterns for that environment, and consequently, people will feel more comfortable in that environment. According to C. Norberg-Schulz [42], one of the essential qualities of a place is to make man feel at home on Earth. Therefore, it requires triggering attachment and carrying intangible qualities, which would make this process easier. M. Vecco [53] identifies the spirit of a place as a meta-concept, which signifies that it has intangible qualities. She states that *genius loci* has a double character, which is intangibility and tangibility, and it is the nexus between these characters. Therefore, all these characteristics support the creation of associations with the places. M. Vecco [53] distinguishes three different layers - dimensions of significance of genius loci as meta-concept: the visible and tangible material layer; the invisible experience of the place created in the human mind; the underlying processes of human and natural activity with all interrelations between them.

However, when the modernist era in architecture and urban planning began, the intangible qualities started to fade [14]. As a result, it is believed that it might have affected the perception of architectural objects and built-up areas. F.M. Mazzola [32] states that the main limitation of urbanism and architecture in the modernist era was the presumption not to consider what happened before. Therefore, both the spirit of the place and the sense of the place have at least partially vanished. However, it is not only what happened which is essential. It can be argued that the associations that the place triggers in people and the emotions felt while being at that location can also affect the spirit and sense of the place. The associations towards every place cannot always be positive and make people feel comfortable. There can be negative associations towards some building types or particular buildings for various reasons, it can be stated that they have a negative image or negative charisma [48], both because of their designs or the function of these structures, which do not trigger any positive feelings. Hospitals and sanatoria can be regarded as one of these buildings. According to M. Campbell [7], in the middle of the 20th century, the scourge and stigma associated with tuberculosis were still prevalent throughout the developed world. However, despite being a type of health institution, sanatoria can be evaluated in another category since they can trigger mixed feelings due to their peaceful environmental qualities.

Memory and modernist architecture

The perception of a place, which directly affects the feeling towards this place, can be formed by various factors. It can be due to the physical characteristics of the place, but at the same time, it can be due to the emotions they trigger in individuals, which has an impact on their perception. Memory is one of the most important elements in the perception process. While some memories are individual, cultural memories can also change the perception of an object or a place. According to C. Ellard [16], even some characteristics of people's preferences regarding their living environments reflect 'genetic memories' from their ancestors. He states that

people prefer to see more than be seen in the environment due to the habits from prehistoric times since that kind of setting would have increased their likelihood of survival. As stated by A. Saidi [46], people's instantaneous interaction with and reaction to their environment is through their bodies with various sensorimotor capacities, as well as their memorized experiences, which are shaped by their prior perception of the world in different biological, psychological and cultural contexts.

As G. Debord [10] states, the environment affects the emotions and behaviours of individuals in an organised or unorganised way. The research on this subject is called psychogeography, and it argues that sites can tell stories about the past for people. This is the same for architecture and architectural objects as well. However, different architectural objects, both due to their language and their functions, can trigger different memories in different individuals as well. Remembering, which is constructed and at the same time constrained by both cultural and social forms, is still an individual mental process, and an intersubjective explanation of how people remember as well acknowledges that, despite the fact that memory is socially organised and mediated, individual memory is never entirely conventionalised and standardised. According to B. Misztal [37], the memories of people who have experienced the same event are never identical because, in each of them, a concrete memory evokes different associations and feelings. Associations and feelings are essential since they affect how people inspect, understand and respond to events. As A. Erll [17] states, some historical events or historical places might trigger different sensations in different people as well. Therefore, history and memory can be interpreted like a story, and have a close connection with people's perceptions.

Bachelard's [4] philosophy and topoanalysis of space, which is applied in this study, suggests that architecture is a space of memory that matters insofar as it is memorialized. By presenting poetic descriptions of spaces as the embodiment of the human inner world, architecture is given an ontological, personalized angle of approach by G. Bachelard [4]. G. Bachelard [4] maintains the superiority of particular location in memory process, as he notes, that it is only in space that people find the beautiful fossils of duration, hardened by long existence. Thus, architecture can be considered as a place of memory that creates and stores memories within itself. J. Malpas's [31] study 'Building Memory' further elaborates the connection between architecture and memory; it underlines that there is no place without memory and that there is no memory without place; and since there is no architecture that is not related to place, there is no architecture that is not related to memory. J. Malpas [31] argues that memory begins in a particular place, it is as if tied to it. The smell of a building, its surfaces, its shapes, the acoustic qualities of its spaces etc., all shape and make memories, and at the same time they are the carriers and triggers of memory. Accordingly, the memory always has a multiplicity of possibilities that correspond to the multiplicity of places in which it opens up, thus, one place can trigger memory related with another location etc. It can be stated that the place can trigger both personal and collective cultural memories as well as the memories that are related to this particular place and are related to similar places or non-local, such as scenes from fiction books, films etc. Thus, it is important to understand the connections between memory and place for a better understanding of early modernist sanatoria architecture.

However, there might be buildings and sites that cannot tell the story of memories directly, they might need an interpreter to demonstrate the cultural memories. This can be regarded as one of the most significant problems of the 20th century's architectural heritage. For example, M. Mostafavi and D. Leathbarrow [39] note that the abandonment of ornamentation in modernist architecture results in the loss of some of the sensory forms that J. Malpas [31] argues can be used to embed it in memory. According to J. Malpas [31], the architecture of the modernist narrative of progress does not seek to create a memory or to continue what has already been started. In his view, such architecture, because of its modern form and materiality, often disregards the memory of a place – a topographical memory – that was formed before the object was even built. He even argues that if memory is given and transmitted through the senses, i.e. the materiality of objects, materiality that has a surface effect and depth, then one of the aims of modern and contemporary architecture was to erase or lose this materiality, thereby suppressing memory. According to J. Malpas [31], the more formal a building becomes, the more it becomes an abstract 'idea' rather than a materialized 'thing' – an object. K. Lægring [28] argues that the widespread use of formalist exemplar aesthetics has led to severe criticism of the international style, brutalism, and structuralism for creating monotonous, self-referential, and meaningless architectural works, formalist architecture, or the architecture of examples. However, even these buildings can manage the establishment of different associations in perception, which can create a positive impact.

The literature analysis and case studies of sanatoria revealed that the early modernist sanatorium architecture, despite being the expression of ideas of progress and modernization, has the potential to build and trigger memories. It can be possible to state that, due to the focus on their rehabilitation function rather than the illness itself, the sanatorium has a more positive image rather than a negative one in most cases. Furthermore, the environment they are in and their direct connection with nature and their usage of nature as a healing element might also have affected their perception. In the example of Heybeliada sanatorium, even though it had a modernist language in its architecture, the perception was more related to its function, which provided new opportunities to the patients who spent time there and gained new skills for their future. On the other hand, in the examples of Kaunas, the close connection to the local natural landscape and the features of early modernist buildings, which contain some elements of historical styles as well they are expressed in local 'dialects' of modernism,

affected the perception of these modernist sanatoria. In that regard, it might be possible to state that it is not the only architectural language which affects perception, but the associations created by the image and the function. Therefore, since one of the main discourses of modern movement is that the form follows function, as long as the function can establish better memories and associations, it can be stated that even those buildings might be appreciated.

Discussion

The sanatorium movement [49], together with the general cultural movement of modernism, which involved the integration of form with a social purpose in architecture and design, attempted to create a new classless and hygienic lifestyle [7] that resulted in the architectural legacy of early modernist tuberculosis sanatorium buildings [18]. These buildings are the embodiments of universal values of modernism and the sanatorium movement and, at the same time, have close ties with the local landscape, history and communities.

The complexities and contradictions highlighted in the study (space vs/and particular place, international, universal vs/and local, personal memories vs/and collective memories, local place-related memories vs/and non-local memories) can be viewed as complementary contradictions and reconciled as well as highlighted when preserving heritage objects. For example, space vs/and particular place can be expressed as modernist architecture embedded in the local landscape. International, universal vs/and local can be expressed as local 'dialects' of modernist architecture [15]. Personal memories vs/and collective memories can be expressed as memories, stories of particular personalities related with the locality, sanatorium, treatment etc. and collective memories and stories attached to the place and revealed by heritage interpretation. Local place-related memories vs/and non-local memories can be expressed as personal and collective memories connected to a specific locality and specific sanatorium and non-local personal and collective memories engendered by fiction, films etc. triggered by the place.

Three themes relevant to the patrimonialization of early modernist tuberculosis sanatorium architecture related to modernity, health restoration and nature and their synthesis were distinguished and elaborated: history and features of modernist sanatorium architecture (modernity), development of salutogenic architecture (health restoration), tapping into the healing effects of nature (nature) (Fig. 9). These themes can be integrated in the development of scenarios for preservation of early modernist sanatorium buildings:

- *synergy of modernity, health restoration and nature* – continuity of function, similar functions. This situation is currently visible in the case of Aukstoji Panemune sanatoria, which continue their therapeutic functions. This continuity is complemented with the growing interest in Inter-war period history of Lithuania and Kaunas and in the local dialect of modernist architecture and related phenomena and personalities. Heybeliada sanatorium complex also maintained its original function until recent times; however, the present day abandonment situation raises the need for alternative solutions.

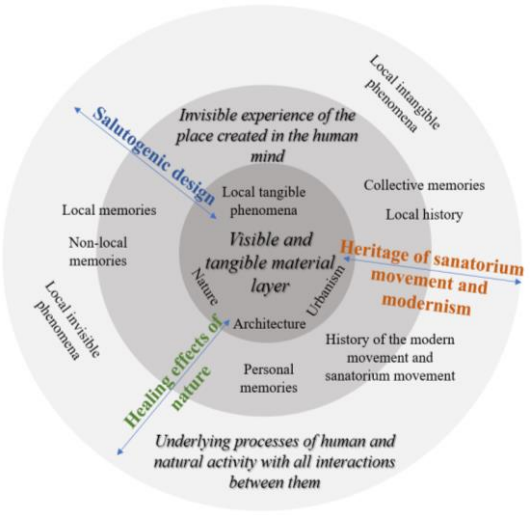

Fig. 9. Theoretical model of conceptualization of memory and place for interpretation and preservation of early modernist sanatorium buildings with reference to Vecco [53]

- *modernity and nature* – re-functioning the object, different functions simultaneously maintaining historical memories. This scenario could be a suitable scenario for Heybeliada sanatorium complex, which could house different therapeutic, leisure, and recreation of cultural functions at the same time illustrating the link between the tuberculosis sanatorium movement and the roots of modernist architecture mentioned by M. Campbell [7].
- *nature* – abandonment and decline of physical structures recording them and related memories in documents, re-naturalization of the place. Both case studies objects, especially Heybeliada sanatorium complex, sanatorium of the Lithuanian Red Cross Society and Dr. Kazys Grinius sanatorium of the Society for the Fight against Tuberculosis in Aukstoji Panemune have significant historical and architectural values and their abandonment and re-naturalization of the sites should be considered only as a last option.

Conclusions

The study allowed concluding that early modernist tuberculosis sanatoria can be viewed as a distinct type of heritage related with the roots of architectural modernism, embodying numerous complexities and contradictions at the same time having clear heritage preservation and continuity paths allowing to tap into healing effects of nature, represent different types of memories and highlighting the layer of early modernism heritage in the character of the locality.

In the course of this research, the complexities and contradictions related to early modernist tuberculosis sanatorium architecture mentioned in the introductory section were clarified after analysis of literature, case studies and theoretical concepts and include space vs/and particular place, international, universal vs/and local, personal memories vs/and collective memories, local place-related memories vs/and non-local memories.

Each analyzed case study object had its own history, salutogenic design features and unique connection with nature and the local landscape. Preservation and continuity of these themes depend on the individual situation of each case under consideration and variations in these themes, and their combinations in heritage preservation strategies depend on the character of the place, the condition of the buildings, the influence of the buildings on the spirit of place, relevance of the memories attached to these buildings. Nevertheless, during the research three themes relevant to the patrimonialization of early modernist tuberculosis sanatorium architecture related to modernity, health restoration and nature and their synthesis were distinguished and elaborated: history and features of modernist sanatorium architecture, development of salutogenic architecture, tapping into the healing effects of nature. These themes can be integrated while developing alternative scenarios for preservation of early modernist sanatorium buildings: synergy of modernity, health restoration and nature; modernity and nature; nature. The first scenario is recommended for Aukstoji Panemune sanatoria; meanwhile the second, aimed at re-functioning, could be a suitable scenario for Heybeliada sanatorium complex.

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Kopsavilkums. 20. gadsimta modernisma mantojuma izvērtēšana pēdējās desmitgadēs pieaug. Dažādu tipoloģiju modernisma ēkas tiek aplūkotas un analizētas kā mantojums, kas iemieso mūsdienu idejas un laika garu. Veselības aprūpes iestādes, tostarp sanatorijas ēkas, nav izņēmums. Tomēr, izprotot neseno mantojumu, rodas daudzas sarežģītības un pretrunas, piemēram, telpa pret konkrētu vietu, personīgās atmiņas un kolektīvās atmiņas, ar vietu saistītās atmiņas pret lokācijas vietu. Raksta mērķis ir veicināt agrīnā modernisma tuberkulozes sanatoriju ēku kā kultūras mantojuma visaptverošu izpratni un interpretāciju, demonstrējot vērtīgus agrīnā modernisma sanatoriju arhitektūras aspektus un to saglabāšanas un nepārtrauktības ceļus caur atmiņu un vietu savstarpējo saistību.

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Thoughtful paths of Nature Park „Ogres Zilie kalni”

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Abstract: In many countries around the world, urbanization has led to a disconnection from nature within major cities and this has prompted increased research into the significance of nature in the daily lives of urban residents. In the wake of COVID-19 pandemic, people began to visit the walking trails en masse and the habit has continued even after the COVID-19 pandemic. This study, which was conducted in July of 2023 is a part of a broader research initiative aimed at enhancing recreational opportunities and optimizing the physical and wellness benefits provided by walking paths.

The research is centered on the "Ogres Zilie kalni" nature park, which features recreational and activity trails. For a majority of residents, these walking paths and ski tracks are vital for recreation. The research's objective is to outline the planning principles for the nature park's trail network, drawing not only from landscape architecture but also from the field of environmental psychology. This holistic approach is expected to yield better recreational outcomes and subsequently improve human health.

The primary goal of this study is to investigate how different types of nature walking trails impact human attention dynamics. Using Schulte's Tables, a psychological method, the study assessed how various stimuli in trail planning and route selection influence human attention. The research results do not offer a definitive answer regarding the influence of path type on attention dynamics. However, the findings indicate that attention dynamics tend to improve after the second or third measurement, typically occurring at 20-30 minute intervals. This aligns with the theory that 20 minutes is sufficient for attention reset. Attention dynamics then diminish towards the end of the walk due to physical exhaustion. It was hypothesized that adequate rest could lead to improved dynamics.

In the modelling of the walking path network and route selection, cognitive factors such as the purpose of the walk, group participation, individual walks, social interactions, and the perception of the three-dimensional spatial environment serve as the foundation for designing the layout of walking paths. The study raises intriguing and complex research questions, further complicated by the diverse groups involved, including students, families, and the elderly. Social factors play a pivotal role in determining the optimal path for both fundamental research and practical applications. Understanding the mechanisms and information sources guiding decision-making in path selection should encompass not only psychological but also social aspects. This comprehensive approach will contribute to a better understanding of path planning for psychological wellness and the cultivation of emotionally positive behavioural patterns.

Keywords: urban forestry management, walking paths, environmental psychology, attention, COVID-19

Introduction

Nowadays, due to urbanization, the connection with nature has been lost in cities in many countries. The new generation, who have grown up in an era of computerization and digitization since early childhood, tend to have a stronger bond with digital tools than with nature. There is a growing trend among the new generation of completely disconnecting from nature, even in countries blessed with abundant green spaces [1].

In the administrative unit known as "Zilie kalni" (Blue Mountains), a network of walking paths, ski tracks, and cycling trails has been established, along with infrastructure for dog sledding and horseback riding. For most residents, walking paths and ski tracks are the primary means of recreation. In this study, we examined the structure of these walking paths, identified the most popular routes, and delved into the specific characteristics of individual routes. We also analysed the planning principles used in developing these paths, taking into account the need to protect natural habitats, avoid areas with protected plant species, assess landscape characteristics, consider expert opinions on improvement and landscaping requirements for preserving ground vegetation and soil, and prioritize psychological wellness. We observed how various stimuli and modifications to path and route layouts impact human attention. The quantity and diversity of stimuli play a pivotal role in influencing information flow, which is crucial in the planning of walking paths for assessing psychological comfort.

This study is part of a larger research effort aimed at facilitating more comprehensive recreation and ensuring that walking paths offer maximum physical and psych emotional comfort. The objective of this research is to illustrate the principles underlying the planning of a network of nature park paths, drawing not only from landscape architecture but also from findings in environmental psychology. This holistic approach is expected to yield superior recreational outcomes and subsequently contribute to positive effects on human health. THE RESEARCH OBJECTIVE: To investigate the influence of different types of nature walking trails on human attention dynamics. The research tasks are as follows: 1) Describe the theoretical framework of walking paths and its relationship with human

neurocognitive processes; 2) Design a quasi-experimental research methodology involving walking paths and attention measurement methods; 3) Analyse and interpret the obtained data. RESEARCH QUESTION: How does the type of nature path affect human attention?

Theoretical background

Walking paths and nature park "Ogres Zilie kalni"

Throughout history, people have consistently sought ways to lead comfortable and happy lives. The concept of happiness can take various interpretations, but in the context of urban environments, happiness has gained particular significance in recent decades. Urban social psychology defines happiness as an emotional state characterized by maximum attractiveness, where emotions are considered integral to the flow of information [12].

This definition has guided our study towards investigating the potential for achieving enhanced recreational outcomes in the "Ogres Zilie kalni" nature park, which is situated within the administrative unit of "Zilie kalni." Ogre, a city in Latvia, is located in close proximity to the "Ogres Zilie kalni" nature park. Notably, Latvia boasts ample green spaces within short distances of its cities and towns, with forests covering 53 % of the country's territory, and recreational areas making up eight percent of this total [13].

Andrew Przybylski, a professor at Oxford University, highlights that nature has the capacity to alleviate the negative aspects of social interactions that tend to alienate individuals from each other, particularly evident during the challenges posed by the COVID-19 pandemic [24].

Ogre, being easily accessible to the residents of Riga, transformed into a tranquil resort town during the first half of the 20th century. Following the Second World War, the adjacent pine forest area became part of Ogre's green belt. In 2003, the first nature protection plan was formulated for the urban forests of Ogre and Ikšķile, leading to the establishment of the specially protected nature territory known as the "Ogres Zilie kalni" nature park [11]. In 2010, an administrative unit was created to manage the territory efficiently, encompassing the "Ogres Zilie kalni" nature park, which constitutes 312 hectares of the administrative unit's territory [14]. Situated conveniently between Ogre and Ikšķile, the urban forests of the "Zilie kalni" administrative unit are not only ecologically valuable due to their biodiversity but also serve as crucial recreational resources. One notable feature of these extensive green areas is their suitability for modular and decentralized projects, offering operational flexibility. A primary responsibility of the administrative unit's management is the establishment and enhancement of environmentally friendly improvement and landscaping infrastructure, which includes optimizing the path network and developing path layouts.

It is essential to recognize that a nature park, or any park for that matter, cannot be fully utilized without an appropriate walking path structure, as paths serve as the lifeblood of a nature park. The goal is not only to ensure that visitors can traverse the territory but also to provide them with a sense of physical and emotional satisfaction and contentment. One of the traditional criteria for path use is the walking path's surface covering, which can be either comfortable or uncomfortable (even, covered in tree roots, bumpy, too wet, or too sandy), natural or artificial (gravel, woodchips, cobblestone, or concrete paving, concrete, asphalt, or other surface materials). In today's planning considerations, path network layout is equally crucial, taking into account the emotional perception of the path layout, where factors such as the number of stimuli and the flow of information are significant. The landscape view should incorporate "openings" and "closings" to achieve a sense of horizontal balance, with a recommendation for harmonious scale and proportions [15, *77*].

Within the administrative unit of "Zilie kalni," the path network extends for over 40 kilometers, gradually forming over time as people regularly visit the area. This territory is a favored destination for walkers, joggers, cyclists, skiers, and holidaymakers who gather at the Dubkalni Water-reservoir. Over an extended period, certain visitor groups, notably skiers and cyclists, have undertaken unauthorized efforts to enhance and landscape areas used for their fitness activities.

A ski track runs alongside the water-reservoir, offering skiers a captivating panoramic view of the reservoir and the picturesque forest landscape beyond it. Further along the track, it meanders into the forest. Through deliberate and incremental efforts spanning from 2014 to 2020, ski tracks were established, and maintenance activities were implemented during the winter months. Notably, approximately ten kilometres of these ski tracks are illuminated by lighting fixtures, contributing to both the physical and emotional safety of visitors and providing a sense of psychological comfort. Consequently, this well-maintained network attracts a significant number of visitors.

The appeal of a trail and the level of emotional comfort it offers are influenced not solely by landscaping efforts. Layers of the landscape or distance zones (foreground, middleground, and background) play a crucial role in landscape perception [15, *77*]. Along the trail adjacent to the Dubkalni Water-reservoir, for instance, visitors are presented with a distant view encompassing both the foreground and the midground (water) in addition to a varied and evocative background. This design principle, which incorporates at least two landscape layers, holds significance in organizing paths through forests as well, whether it involves an open landscape adjoining a forest, a forest with a panoramic view of a body of water, or other combinations. The planning of walking routes should also account for direct sensory diversity [18], providing distinct information and various stimuli, such as the linear view of a path extending straight ahead, alterations in the

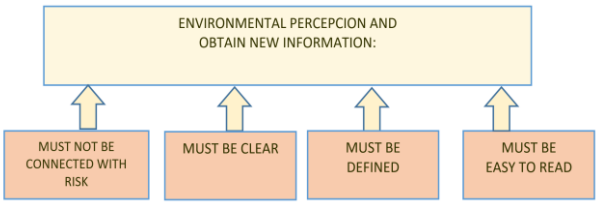

Fig. 1. The important for an individual to obtain new information [Ulrich, 1977]

viewing direction of the landscape, changes in path elevation, the utilization of diverse path surface materials, and more. Environmental diversity serves as a stimulus for cognitive development, as suggested by Zhang et al. (2018), who noted that "enriched environmental stimuli may affect neuromorphological structure and behavioural function" [26].

The nature park's unique characteristics impose significant constraints as it is situated within a specially protected natural territory. The Environmental Protection Plan for "Ogres Zilie kalni" Nature Park (2011-2026) [11] stipulates the need for optimizing the existing dense network of paths by eliminating redundant parallel routes. Therefore, a meticulous assessment is essential to determine which walking paths should be preserved and further developed.

Presently, the situation reveals that smaller paths are considerably widening due to the substantial anthropological foot traffic. This results in soil compaction, making it harder to traverse, with tree roots encroaching on the path, causing visitors to stray from the designated route, further widening it unintentionally. To counteract this spontaneous path expansion, improvements in path surface coverage are imperative to enhance comfort and walking path direction planning must be undertaken to strengthen the emotional connection. However, this task is complicated due to the nature park's management restrictions.

Creating panoramic views emerges as a pivotal factor in determining the desired walking path direction. Nevertheless, there are limitations on logging activities for the purpose of establishing open panoramic vistas or crafting new walking paths. Consequently, a comprehensive analysis of visitor behaviour patterns becomes essential.

Walking path impact on human wellness and attention

In the contemporary landscape, stress and the shift to remote work during the COVID-19 pandemic have opened up new avenues for the development of green spaces. According to information available on the website of the Centre for Disease Prevention and Control of Latvia (SPKC), "*the good mental health of an individual and society as a whole is a key prerequisite for shaping a stable, safe, and prosperous society [...]. It is crucial that an individual can reach their full potential, effectively manage the daily stresses of life, work productively, and contribute to society*" [16]. Drawing from studies in environmental psychology, it is evident that individuals benefit from exposure to diverse and abundant information, thereby ensuring psychological comfort and subsequent positive impacts on human health [22].

One study highlights seven overarching environmental aspects that enhance health and stimulate cognitive activity. These aspects include the necessity for a natural, aesthetically pleasing environment that is informative and comfortable. Furthermore, the environment should possess qualities such as being engaging, diverse, and dynamic, while also contributing to cognitive improvement across various dimensions, including the differentiation between cognitive phases, engagement of the five senses, and elicitation of a range of emotions [26]. Psychologist Roger Steffen Ulrich posits that throughout the course of human development, those who thrived were often the best-informed individuals, as situations allowing the acquisition of new, biologically rewarding information were favoured. It is vital that information acquisition does not involve undue risk. Therefore, the environment or landscape must remain clear, well-defined, and easy to navigate, devoid of hidden dangers – such as darkness in a forest or an incomprehensible walking path direction (Figure 1) [22].

A number of studies emphasize the significant role of nature, environmental conditions, and the infrastructure of natural territories in improving health [5; 21]. The primary attraction of this administrative unit lies in its captivating landscape relief, characterized by eskers and protected open pine forests interspersed with extensive stands of firs and deciduous trees. A prominent landscape and recreational feature is the Dubkalni Water-reservoir, which was formed in 2003 following the closure of a gravel pit.

The paths are used for walking by the elderly, families with children, as well as by groups of pupils and students. This is associated with the natural need to maintain a connection with nature and to be in a scenic environment that stimulates all five senses. On the other hand, Chinese-born American geographer Yi-Fu Tuan and interior architect Heinrich Hermann emphasize that spatial order [4], where stimuli do not disturb but create inner silence, diverts the visitor's thoughts from the external to reflection and contemplation [15, *78*]. This becomes increasingly necessary every year in today's fast-paced life.

The key role played by the landscape in developmental psychology must also be taken into account from childhood to old age. Considering the choice of environments to promote the development of children's neural plasticity and cognitive abilities as much as possible, as well as to fundamentally facilitate their physical and mental health, the landscape must be stimulating. This stimulation can be achieved through diversity, among other factors. Specific sections designed for children may be included in the layout of walking paths, with additional signs pointing out environmental objects, panoramic views, and major focal points in the

landscape to capture a child's attention and develop their observational skills. When creating a network of walking routes, researchers emphasize the importance of a green, clean, and cheerful infrastructure that fosters imagination [17]. Outdoor activities can significantly enhance the physical and mental health of children. The results of a Canadian and Norwegian study show that activities in the forest or garden can improve attention focusing and self-regulation skills in preschool-age children and help prevent symptoms of attention deficit hyperactivity disorder [23].

The same aspects are equally important for other age groups with a high incidence of cardiovascular diseases. When planning trail directions, it should be taken into account that in the "Ogres Zilie kalni" nature park, eskers alternate with the so-called 'ice pits' – deep, crater-like pits with high sides formed in places where buried icebergs melted [3]. Here, on hot summer days with temperatures above 25-27°C, a zone of oxygen depletion can form, which may cause breathing difficulties for certain groups of senior citizens. Simultaneously, we must consider the mental health of the elderly, which is especially relevant today, as the number of people affected by dementia is on the rise. Recent studies have found that the period from 2020 to 2022 [2] has led to new habits among visitors to natural territories. This process of improvement and landscaping has prompted the idea of developing a larger number of small local recreational sites [10]. This approach is highly beneficial for the elderly, ensuring safe and enjoyable outdoor activities. Creating resting places next to walking paths encourages greater involvement of the elderly in longer walks, which can slow down the progression of dementia symptoms. Being active for just 20 minutes outdoors can stimulate the brain, releasing hormones that create an environment suitable for the growth of new cells. Outdoor activities also promote neural neuroplasticity, stimulating new connections among cells in the areas of the cerebral cortex responsible for speech, information processing, interpretation of sensory stimuli, coordination, and complex reasoning.

One of the ways in which these benefits manifest is through human attention. Attention is the means by which humans actively process a limited number of incoming stimuli [20]. When people are stressed, fail to take breaks, and actively try to focus on more than one thing at a time (multitasking), they expend their mental resources, further fatiguing their attention and other cognitive processes [19]. The way people focus their attention determines their neural pathways, and in turn, it affects their wellness [7]. If humans focus on negative, critical aspects, they develop negative thought habits (automatically), which in turn diminishes their mental wellness [6; 19]. When people allow themselves to focus on only one thing at a time, allow their attention to wander, and generally relax, their mental resources renew, and their ability to focus, attention span, switch attention from one object to another, and overall attention dynamics improve [8]. The issue is that our neurons can't switch off as quickly as people would like, and humans need an external method to facilitate this process. One effective method, as proven in experimental research designs, is walking in nature. This approach is also proposed by the attention restoration theory. Walks in nature stimulate the flow of oxygen to the brain, reduce stress, and promote wellness among trees. By developing these as habits, overall mental and physical health improves [25].

Materials and Methods

DATA OBTAINING METHOD: In order to obtain data about attention dynamics, Schulte Tables test electronic version was used. Schulte Tables test originally is a per-and-pencil test placed in a 5x5 matrix which has random numbers from 1 to 25 and usually the researcher asks to find consecutive numbers from 1 to 25. Usually, the researcher asks to identify and point with a pencil or pen at the numbers from 1 to 25 arranged in a jumbled sequence, recording the time for each table with a stopwatch before moving on to the next table that the researcher presents to the respondent. Due to the conditions of the research, this test would be difficult to administer in a group in this per-and-pencil format. Thus, the test is readily available as a mobile application. Each of the respondents downloaded the application in their phone, then instructed what to do and then they began the test. Respondents were asked to find consecutive numbers from 1 to 25 in a table by pressing with their finger in the mobile phone application. They had to fulfil five tables in each test. The time to complete each table was electronically recorded. In total the measurement was taken 55-times

RESPONDENTS: A total of 18 respondents, aged between 25 and 73, took part in the study. It is important to notice that all of the respondents are not residents of Ogre and does not visit the hiking trails on a regular basis, thus the trails were relatively unknown to them. The participation was voluntary, and respondents could leave the procedure at any moment they wanted to.

PROCEDURE: In order to be able to assess the layout of the nature park paths on the dynamics of attention, an analysis of cartographic material and a topographic analysis of the path plan were carried out, as well as an assessment of the situation in the nature park. The intensity of the use of the paths that had been designed in different ways and the effect on the dynamics of attention were analysed and compared. After a face analysis of the mood of visitors and their choice of routes, principles of planning on the basis of environmental psychology have been proposed that are aimed at providing a higher level of psychological comfort. During the development of the strategy, findings of studies were used that show the impact of aesthetic informational stimuli, as well as landscape arrangement, proxemics, and landscape structure stimuli on sensor receptors [15].

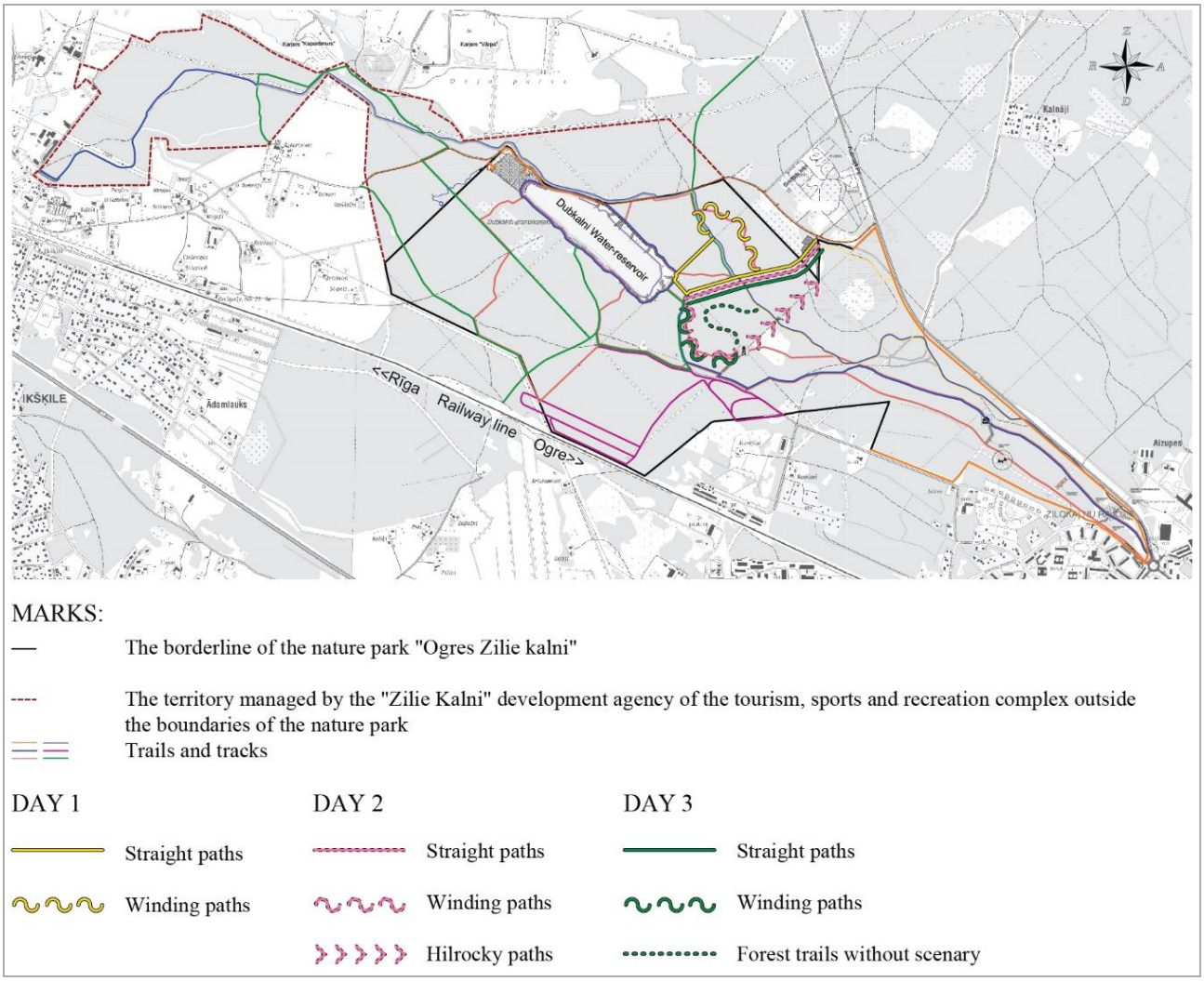

Fig. 2. The routes of the analysed paths of Nature Park „Ogres Zilie kalni" (Day 1, 2 & 3) [Created by I. Kraukle]

After assessing respondents' readiness, they completed a series of 5 Schulte Tables test. Different types of paths were chosen – (A path), with a simplified, straighter route (less stimuli) and (B path) a winding, calmer and remote reflection-inducing paths (Figure 2). Respondents completed a series of 5 tables before starting the walk, then completed a series of tables completing the A path, and at the end of the walk completing the B path, totalling three measurements that were then compared with each other. Measurements were made several times, slightly changing the route. The total average length of the walk is 2 km, the average walking time is 40 min. The average length of each trail is 1 km, time – 20 minutes.

Results and Discussion

To study the influence of different pathway structures, total of 55 measurements were performed, using the Schulte Tables. Both simpler and more complex layouts of walking paths were chosen for the measurements. The measurements (Mr) were compared, and their ratio expressed as a percentage (Tab. 1).

The results demonstrates that on Day 1 and Day 2, the attention is most effective after winding paths which was

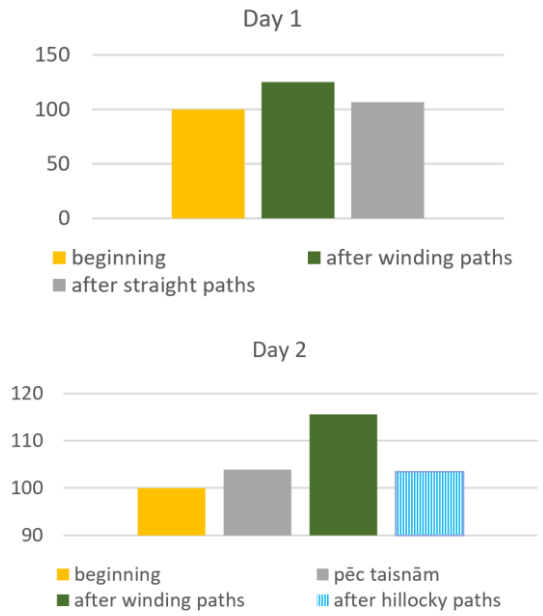

Fig. 3., Fig. 4. Summary results on the dynamics of attention (Day 1 and Day 2) [Created by R. Čaupale]

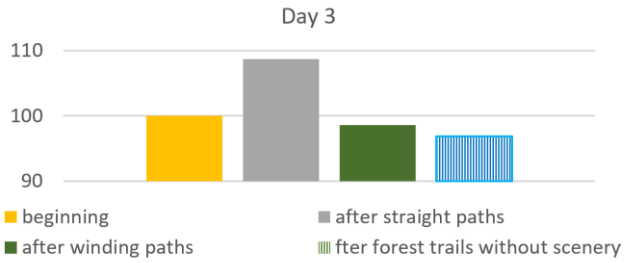

Fig. 5. Summary results on the dynamics of attention (Day 3) [Created by R. Čaupale]

TABLE 1

Improvement of the dynamics of attention (IDA), where Mr1 – measurement at the start of the trail section, Mr2 – measurement after the outlet trail section [Created by R. Čaupale]

Characteristics of the operation	Improvement of the dynamics of attention (IDA) IDA = Mr1/Mr2
Day 1	
Beginning.	**100 %**
Average Mr after winding paths.	**125.3 %**
Closing. Average Mr after straight paths.	**106.6 %**
Day 2	
Beginning.	**100 %**
Average Mr after straight paths.	**103.90 %**
Average Mr after winding paths.	**115.56 %**
Closing. Average Mr after hillocky paths.	**103.40 %**
Day 3	
Beginning	**100 %**
Average Mr after straight paths.	**108.7 %**
Average Mr after winding paths	**98.6 %**
Closing. Average Mr after forest trails without scenery.	**96.9 %**

the 2nd measurement on Day 1 and 3rd measurement on Day 2. On the Day 3 results indicated the same, attention peaked after winding paths, which was the 3rd measurement. Attention dynamics subsided at the end of the walk due to physical fatigue. Since the measurements were taken at different intervals time wise in each day, the attention dynamic peaked either on 3rd or 2nd measurement. On Day 3 the attention dynamics decreased at the end because this was the longest of walks and the physical fatigue impacted it. The aggregated results show distinct improvements in attentional dynamics, well-illustrated by the graphs (Fig. 3, 4, 5).

Observations over the last couple of years, especially during the COVID-19 pandemic, show that nature park visitors prefer paths that lead mainly towards remote contemplative routes. Even small bends that form organically in the forest reduce the impression of the walking path being a straight line. A trend of avoiding distinctly wide and dusty paths that are too straight if their route is oriented in a single direction only. As the small paths were not comfortable enough (possibly due to the characteristics of the surface covering), the large paths saw a concentration of an influx of visitors, and it was difficult to achieve the desired distancing, which goes against the principles of proxemics when attempting to provide psychological comfort.

Conclusion

The obtained research results do not provide an unequivocal answer about the influence of the type of path on the dynamics of attention. Results indicate that attention dynamic improves after 2nd or 3rd measurement, which was usually 20-30 minutes. This is consistent with theory that 20 minutes is just enough to reset attention. Attention dynamics diminished again at the end of the walk due to physical exhaustion. It was be hypothesized that after appropriate rest, the dynamics would improve. It can also be speculated that the results were impacted by the fact that respondents were communication amongst one another, thus disturbing them to focus on the environment and rather kept their attention engaged in social interaction. It would be beneficial to further research attention dynamics when people have less interaction and pay more attention to the paths and environment. In order to obtain more qualitative measurements, the research needs to be expanded, by performing the task on a larger number of respondents, supplemented with other methods, and taking into consideration 20–30-minute time limit per walk. In the next study, it is planned to evaluate whether the improvement of emotional wellness, which is also related to the quality of the dynamics of attention, is associated only with walking or is associated with different types of external stimuli, and what type of planning improvements (changes in the linear planning of trails, diversity of landscape layers, etc.) would be more successful.

When modelling the walking path network and path route, cognitive factors such as the goals of the walk, participation in a group or walking alone, social relations, as well as the perception of the three-dimensional spatial structure of the environment, which serves as a basis for creating the structure of the walking path layout. The study raises a number of interesting yet complex research issues, which are made more complex by the characteristics of the interacting groups of individuals – pupils and students, families, the elderly. Social factors play a key role in setting the right path both for fundamental studies and practical applications. Understanding of the mechanisms and information sources that drive decision-making in the choice of a walking path must include not only psychological but also social aspects, which would provide a more comprehensive understanding of path planning to create psychological wellness and an emotionally positive behavioural model.

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Kopsavilkums. Šodien daudzās pasaules valstīs urbanizācijas dēļ lielpilsētās ir zudusi saikne ar dabu. Tas aktualizē pētījumus par dabas nozīmi pilsētas iedzīvotāju ikdienā, it sevišķi pēc COVID-19. Esošais pētījums ir daļa no plašākas pētnieciskās ieceres, kā nodrošināt pilnvērtīgāku atpūtu, lai takas maksimāli sniegtu gan fizisku, gan psihoemocionālu komfortu. Izpētes teritorija – dabas parks "Ogres Zilie kalni", kur ir iekārtotas atpūtas un aktivitāšu takas. Lielākai daļai iedzīvotāju atpūtai svarīgākas ir pastaigu takas un slēpošanas trases. Pētījumu mērķis ir parādīt dabas parka taku tīkla plānošanas principus, kas balstīti ne tikai uz ainavu arhitektūru, bet arī uz vides psiholoģijas zinātni. Tādejādi var sagaidīt labāku rezultātu rekreācijai un secīgi labvēlīgi ietekmēt cilvēku veselību. Pētījuma mērķis: noskaidrot dažāda veida dabas pastaigu taku ietekmi uz cilvēka uzmanības dinamiku. Pētījumā, izmantojot psiholoģijas metodi *Šultes tabulas*, tika vērtēts, kā atšķirīgi stimuli taku un maršruta plānojumā, kā dabas taku veids ietekmē cilvēka uzmanību.

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Transformation of the historical heritage and spatial perception of Ilūkste

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Abstract. The development plan of the Upper Daugava Region (2022-2027) identifies Ilūkste as a potentially strong development centre of regional importance. The plan is designed to improve the quality of roads of regional importance infrastructure development and tourism in the Ilūkste area.

This document encourages the initiation of serious cultural landscape research for Ilūkste. The scale of the existing Daugavpils development, the visibility and proximity of the city do not weaken and create strong competition for Ilūkste, but on the contrary - strengthen the revival of Ilūkste as a historic centre alongside a large-scale settlement. That means that on opposite banks of the Daugava there are two different urban spaces with different cultural and historical layers and scales.

The preservation of cultural heritage is increasingly being discussed in the forums of the European Union, highlighting the values that are being lost in warfare and in the wastefulness of national economic policies. The problem of heritage conservation is also present in areas where there is no war, but where mistakes have been made due to the ineptitude of the political authorities. This is also true of the Latvian Awakening in the 1990s, when, after the occupation, "business as usual" still continued. With the collapse of collectivisation and the development of private enterprise, no attention was paid to the concepts of landscape, viewpoints, silhouettes, landmarks, climaxes, etc. The smaller the scale of the cultural landscape, the deeper the cracks of neglect that are left in the cultural landscape. The small town of Ilūkste is one example in Latvia.

The loss of the intrinsic spatiality of a historic small town risks transforming not only the perception of place and people at a local level, but also at a regional and national level, thereby changing the character and uniqueness of a nation's living space.

Natural and man-made elements are constantly changing, seeking to adapt. Biological processes, economic and political power, generational change, rapid technological development can all influence the development of an area. As one changes, another is subjected to change, resulting in a complete or partial transformation. This is most evident in small towns, which have long been subject to political change and the outflow of the younger generation to the metropolises. Historical space is thus also surrounded by indifference and neglect. The current municipality of Ilūkste has energetically set to work to recover the historic identity of the settlement, conscious of both the revival of the former Jesuit church and convent and the dismantling or renovation of aesthetically poor-quality buildings.

Keywords: building silhouette, wooden heritage, sacral architecture

Introduction

The Livonian Order's Selija, bordered to the south by Lithuania and to the north by the Daugava River, was able to attract people who travelled both downriver and overland, creating new settlements. One of these was Ilūkste, first mentioned in ancient records in 1559 as a town on the land of Count Kasper Sieberg, owner of the Pilskalne (*Šlosberg*) manor, on the left bank of the Ilūkste River – at the crossroads – or at the ford of the Ilūkste River [5]. Here the land routes of central Selenia, Lithuania, Belarus and Daugavpils converged and Ilūkste began to develop as a trade centre [6]. The land roads were mainly built along the river banks to prevent travellers from getting lost. After the eastern part of the Duchy of Courland and Semigallia came under Polish rule in 1561, or under the rule of Polish nobles, the territories developed as trade and craft centres typical of Poland, serving a wider area. The second type of settlement was the manorial centre with a church, mills, taverns. The third was the farmstead. The town of Ilūkste became the economic, cultural and educational centre of Selenia thanks to its favourable location [5; 6]. Ilūkste's geographical location next to the Ilūkste River has contributed to the strong development of a roadside settlement, which was enhanced by its proximity to the Grand Duchy of Lithuania, the Russian province and Poland. The economic development of Ilūkste was

Fig. 1. Spatial axes - east/west (Līksna-Ilūkste-Šlosberga) and north/south (Subāte-Lithuania) [author's diagram, 2023]

ensured by trade crossroads and the movement of people down the Daugava: Old Believers, Orthodox, Jewish merchants, Lithuanian Catholics. A very diverse mix of denominations, which has contributed to the development of churches of different denominations at the crossroads (4). Due to its location - at the crossroads of roads from Selenia, Lithuania, Belarus and Daugavpils - Ilūkste began to develop as a trade centre and, after joining the Russian Empire in 1798, was the centre of the Ilūkste Castle Court (*Hauptmannschaft Illuxt*). This is especially true when serfdom was abolished in the territory of the Kurzeme province in 1819. The St. Petersburg-Warsaw highway (1840), the construction of the Dinaburg – Tilzite or Daugavpils – Königsberg railway (1873).

The front line of the First World War passed through the town without leaving a single house [8]. This started the destruction of the town.

The cultural space of Ilūkste was given a positive multicoloured character at the beginning of the 17th century, with the development of the German-Baltic culture of the Reformation and the Duchy of Courland-Semigallia, and the conservative-Catholic layering of identity: the farming skills, language, mental peculiarities, traditions of different ethnic groups. Each denomination had its own churches, which were located in one place and formed the centre of the settlement.

The aim of the study: to reflect the features of the cultural and historical buildings of Ilūkste and the impact of spatial transformation.

Research objectives:

- to survey the historic wooden heritage of the small town, its scale and perception along the Ilūkste River;
- to assess the viewpoints of the historic centre – alongside the 1970s–1980s typical high-rise residential buildings;
- assess the aspects that cause a loss of place identity and visual expression in the landscape.

The Ilūkste cultural landscape from the historical centre is marked by the A-R transversal axis with its dominant features: on the left bank of the Daugava – the former Daugava River. On the right bank of the Daugava – the Līksna church with the verticality of the bell towers. The other axis of the cultural landscape, or the cross axis in the N-S direction, is formed by the natural substrate or the beds of the Daugava and Ilūkste rivers. In the silhouette of the landscape in the early 20th century, the two spatial axes were united by several dominant features: Bell towers of the Catholic church in Līksna, Ilūkste, ex. The bell towers of the Jesuit church, the spires of the Lutheran and Catholic churches in Ilūkste. On the other hand, the former ensemble of the Schlosberg manor completed the spatial axis with a picturesque natural base.

The collection of historical materials about Ilūkste shows the character of the construction of the small town. A settlement whose historical centre was made up of churches of various denominations with high bell towers on an impressive scale, grouped around a single church square, forming the so-called sacral centre. At the back of the churches, on the other hand, were the dirt roads of the 1890s, driven in by ox carts. Along the roadsides, small one-storey wooden houses, a small arable land and pastures Wooden buildings have one chimney – the only element of the building that does not use wood, but boulders and clay. A meagre existence in a conservative Catholic tradition also created a contrast in the landscape.

The carriageways or roads were made wide so that the fire disaster would not spread to the opposite side of the development with its wooden houses and cattle sheds. Rows of trees were planted on both sides of the road to keep out dust and provide shade. Several larch trees can be seen along the roads in Ilūkste, which testified to the presence of a White German identity in the town.

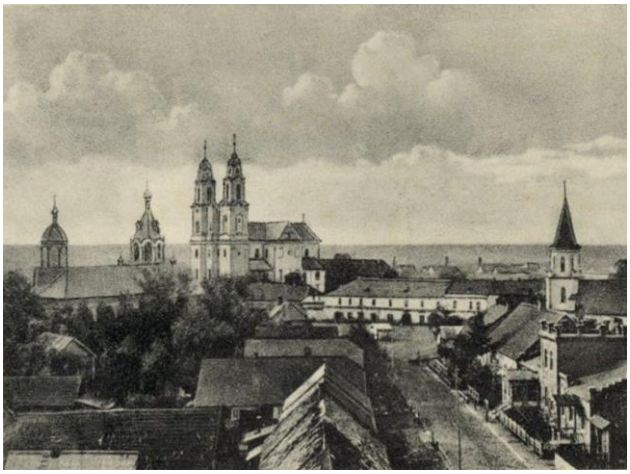

Fig. 2. Historical Jesuit Cathedral [research material of SIA "AIG"; arch. I.Dirveiks, 2021]

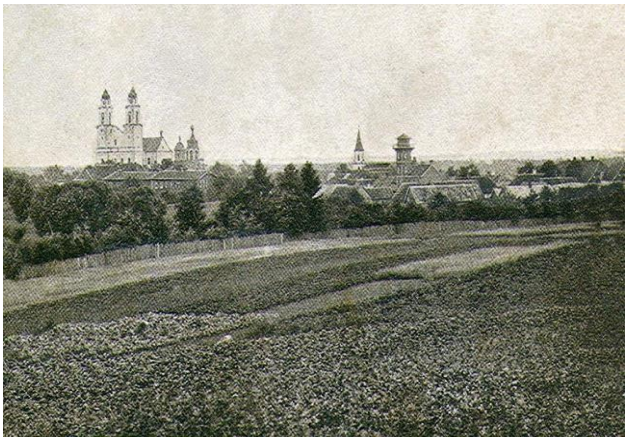

Fig. 3. Ilūkste from the north [Ilūkste Local History Museum]

Between the church square and the Ilūkste River is the former Jesuit church and convent, where a spectacular orchard was planted. It is possible to reconstruct the site of the orchard, recovering its historic scale in the landscape along the left bank of the river. Between 1754 and 1769 the Jesuits built a church with two high towers in Ilūkste. The Jesuit mission in Ilūkste was elevated to a residence of the order. The church was destroyed during the First World War. At present, its foundations have been cleared and conservation is possible, developing a spatial museum-like renovation.

The monastery (Fig. 2) – designed by Jesuit architect Jakob Ruoff. The corridors and the monks' living quarters are covered with high cross vaulted ceilings. Ilūkste was one of the most important Jesuit centres in the Duchy of Courland and Semigallia. The building has preserved its original layout and is one of the few monastic complexes that exist in Latvia from the 18th century [7].

The Jesuit church and convent were a very strong visual dominant, clearly showing not only the architectural culmination of the form, but also conveying the spiritual values of the cultural space. In 1917, Ilūkste was granted the right to become a town, but it did not regain its former importance. All the churches were destroyed, including the large Catholic church, which was not rebuilt after the war, but in 1955 the ruins were blown up.

Materials and Methods

The two world wars and the economic and political pressure from Russia in the 1950s-1980s have contributed to the destruction of the cultural space of a historically rich sacral centre in Latvia.

Methods used in the study:

Comparative method – architectural-historical research - historical buildings and their context in the rural landscape, scale, perception, identity research;

Cartographic method – assessment of the structure and development of Ilūkste;

Photo-fixation method – valuation of photographic material for cultural heritage;

Monographic or descriptive method and development of a rationale.

The identity of the landscape can be read in the characteristics of the watercourses – the width and serenity of the Daugava and the meandering of the Ilūkste. Until the 19th century, the river Ilūga. The spires of the churches in Ilūkste and Līksna were visible in distant vistas (Fig. 3). At the turn of the 19th/20th century, economic activity, crafts and trade began to shape the socio-economic development and the spatial and landscape order of the area, with the historic centre and surrounding residential areas, with increasing certainty. This led to clearly defined spatial axes and their intersections between the natural substrate elements (riverbeds, hills along the riverbanks, estate valley) and the historic trade routes (Fig. 4). In the course of the 20th century, Latvia's changing economic and political conditions have profoundly transformed the cultural and historical values of the place - the economic prosperity of the area and the spiritual values of the community.

Fig. 4. Šlosberga - Ilūkste - Līksna as an axis of the cultural and historical landscape [author's scheme, 2023]

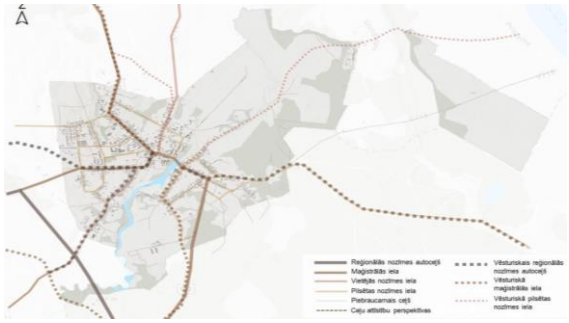

Fig. 5. Ilūkste street and rural road network at the beginning of the 21st century [A. Ločmele scheme, 2023]

Fig. 6. "The location of the 'gate' for the entrance road with the lane leading through the lane to the dwellings. Symbol of the blessing of the place [photo by the author, 2023]

Fig. 7. Boulder pavement of the old highway to Pristanj [photo by the author, 2023]

Results and Discussion

At the beginning of the development of measures to preserve and protect the cultural and historical image of Ilūkste, it is necessary to identify landscapes whose spatial structure and character of elements are particularly important for the perception of the silhouette and urban image, selecting certain areas for which the primary objective is to create a sense of place. One of the conditions for the recovery and integration of the historic image of Ilūkste is the creation of a cultural landscape protection or connecting network, which includes planning solutions, the location of place-specific elements and the incorporation of Ilūkste's most characteristic structural elements within the cultural landscapes.

For the identification of cultural landscapes in Ilūkste, the study is based on an initial assessment of historic sites and characteristic elements, as well as on the identification of the contemporary situation, determining the form, features and boundaries of potentially protected elements of the currently preserved historic areas. The identification of the character of the areas is not only based on an assessment of the physical condition of the actual site, but also on the role of local people in selecting spatial elements, natural features, built character, street pattern and individual objects that are key to the perception of the place and serve as symbols of Ilūkste among residents, visitors and people

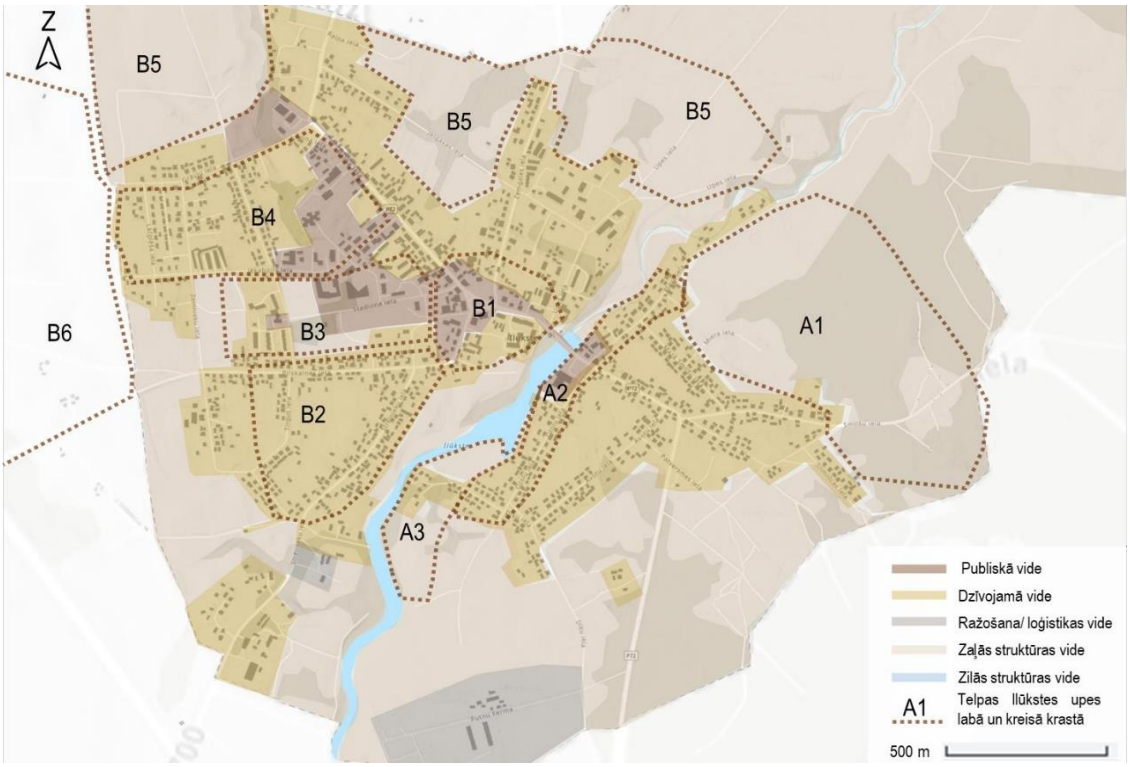

Fig. 8. Compositional and spatial structure of Ilūkste urban plan [A.Ločmele scheme, 2023]

A: The right bank of the Ilūkste river: 1. The eastern part is forest landscape; 2. Low-rise wooden heritage - residential buildings - 19th/20th centuries; 3. Floodplain meadows. B: The left bank of the Ilūkste river: 1. Sacred heritage zone (18th/19th century) - historic centre; 2. Low-rise residential buildings between the river and Pilskalnes Street (1960s-1980s); 3. Large-scale buildings between Pilskalnes and Jēkabpils streets (20th/21st century); 4. Low-rise residential buildings between Jēkabpils and Gravju streets (20th/21st century); 5. Agro landscape (1970s); 6. Landscape space of Šlosberga Manor

connected with the small town. The built fabric of Ilūkste can be divided into 9 smaller scale landscape spaces, defined by transparent boundaries - different building character and land use, roads, woodland border, river, agro landscape. The boundary lines are not unambiguous, but there are clearly readable smaller- scale parts of the urban areas that form the central spatial structure of Ilūkste.

The south-eastern part of the city, or the **GOOD bank of the river**, consists of a distinct natural base with floodplain meadows, woodland and landforms. The coast is characterised by a high proportion of biodiversity, a defined spatial composition of roads and buildings. The forest road leads eastwards to the historic site of the *Pristanj* (ferry) over the Daugava opposite the majestic Līksna Church. It is a cultural and historical link that led from the province of Courland on the left bank of the Daugava to the province of Vidzeme on the right bank of the Daugava. This maintains a very strong cultural and historical intrigue. The impressive bell towers of the Līksna Church can be seen in the distant view from the Ilūkste country road.

The right bank of the Ilūkste River is spatially most strongly influenced by the landscape, which is made up of a wooden heritage of low-rise buildings with outbuildings and plots of land with root gardens. Behind the gardens are pastures for livestock. The herds have disappeared, but the meadows remain, a testimony to the former nature of farming. The spatial scale of the landscape has not been lost.

In turn, the longitudinal axis of the street is repeated in succession - a row of street trees, a belt of shrubbery, the rhythm of the residential buildings, the courtyard area with the outbuildings that close the courtyard. To the rear of the outbuildings, a root garden, a potato and beetroot field with the most fertile topsoil, because manure was dumped on it. Behind the garden land is pasture. This is most clearly read along Oak, Spring and Sand Streets, forming an iconic cultural landscape that should be noted as a museum of the economic life of the 1940s-1970s. The above vividly describes the historical economic pulsation of Latvia (Fig. 9). The low-rise housing with gardens and pastures ends with a wide wooded landscape. The floodplain on the right bank of the river protects the natural substrate from the intensity of development and keeps open distant views along the banks of the river, ensuring the sustainability of the natural substrate. This applies to both banks. The view lines to the former monastery are particularly picturesque.

Fig. 9. The right bank of the river. Wooden heritage for low-rise housing. Plot subdivision with strips of pasture,
root gardens, outbuildings and dwellings [author's scheme]

The north-western part of the city, or the **bank of the river KREISAIS**, includes the historic centre of the city, which is characterised by a central building composition. The historic centre has suffered in both wars. The burning of part of the wooden buildings in the Second World War created large areas which were filled in with standard high-rise housing in the 1960s and 1970s, bringing an alien scale and architectural form. This is the case for the wedge-shaped development between Jēkabpils Street and Pilskalnes Street. The low-rise buildings between the river and Pilskalnes Street have been preserved, dating from the 1950s-1960s and with historic building heights.

The historic centre consists of a sacred heritage zone with a forecourt of churches and a circular movement around it. The visual expression of the churches is obscured by overgrown giant trees in the sightlines.

The low-rise development on the right bank of the river ends with a wooded area, while the development area on the left bank has a more pronounced relief and ends with an agrarian landscape extending to the wooded park of Schlosberg Manor.

The landscape of the left bank of the river is completed by the **ensemble of the Šlosberga manor** with elements of the natural base – an old valley, a millpond, a watercourse, a park. The site of the manor is one of the points of the studied landscape, which forms the compositional axis of the cultural space. It is oriented in the west-east direction and connects the two banks of the Daugava: Šlosberga – Ilūkste – Līksna. The old country roads are a distinctive tapestry, starting in Leishmalė, crossing the former Lüksberg and the former Lüksberg. It begins in the Duchy of Courland and extends across the Daugava into the former Livonia. A spatial axis characterised by a dense layering of sacred landscapes.

Fig. 10. Giant tree branches cover wooden buildings [photo by the author, 2023]

Fig. 11. View from the pasture to the street. The scale and character of the wooden heritage elements
[photo by the author, 2023]

Fig. 12. The lightest ground at the back of the barn, where manure was dumped for the root garden, potatoes and beetroot [photo by the author, 2023]

Figure 13. Log hull exposed after removing the poplar from the window [photo by the author, 2023]

Fig. 14. Behind the shutters of a luxurious residential building - the inner courtyard pulsates with economic life
[photo by the author, 2023]

Fig. 15. Historical form of the street frontage along the long axis of the street - shrubbery strip, longitudinal frontage [photo by the author, 2023]

Fig. 16. Framing decorations and shutters of Ilūkste buildings. The skills of local Latgale woodworkers [photo by the author, 2023]

Fig. 17. Historical gate of the former Šlosberga (Pilskalne) manor [photo by the author, 2023]

Fig. 18. New building ex. Schlosberg Manor Park near the central bay [photo by the author, 2023]

The transformation of the cultural landscape was hit hardest by the *political conjuncture after the Soviet occupation in 1940, which demanded adaptation to the requirements of Sovietisation* [3]. Large farms, typical multi-storey residential buildings, machinery hangars. Much of this is currently being dismantled because of the mass livestock farming and the primitivism of mechanisation has lost its relevance today. The transformation of functional activity is a ious turning point in the cultural landscape, promoting reconstruction, restoration, renewal.

Conclusion

The different scales, dominants, culminating points, sightline lengths, viewpoint backdrops, depth plan and foreground of the perception of the landscapes together provide a very dense information material characterising the cultural space in question. On the other hand, a more detailed view provides a more accurate assessment of the architectural and artistic solutions of the historic site and the colouring of the elements of the natural substrate.

For more than 100 years, Ilūkste has managed to preserve the historic farming character of the settlement without changing the scale and style of its buildings. This is not a spatially fragmented but a spatially dominant characteristic of the place:

- preservation of the historic residential area, based on its wooden heritage and craft traditions;
- the preservation of the wooden heritage and the economic zones creates the opportunity to shape the landscape of the reserve museum together with the natural substrate (watercourse, floodplain, woodland, topography);
- Christian values are closely inherited and continued, creating a context for urban space and church gardens;
- Awareness of the large-scale spatial axes provides an opportunity for the development of the eastern part of Selija and cross-border tourism infrastructure (Subāte, Zarasai); preservation of the pristine landscape and natural substrate of both banks of the Identity River;

- floodplain meadows on both banks of the river protect from the intensity of development and keep distant views open, while also ensuring the sustainability of the natural substrate;
- The change in the economic and political structure of the country has given the opportunity to dismantle the Soviet-era slums and, with EU funding, to develop reconstruction, restoration and conservation in the cultural space;
- In the last five years, with the intensification of economic development in Latvia and the centralisation of education, health and business institutions, an avalanche of young people has started to leave small towns. This is a trend that is neglecting cultural and historical values.
- The opposite of this is also true: re-emigration. A new generation is returning to the cultural environment, investing in it and starting businesses based on organic farming trends.

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Kopsavilkums. Augšdaugavas teritorijas attīstības plānā (2022.–2027.g.) Ilūkste ir ievērtēta kā potenciāli spēcīgs reģionālas nozīmes attīstības centrs. Izaugsmes plāns ir veidots ar ieceri, uzlabot reģionālas nozīmes ceļu kvalitāti un Ilūkstes apkaimes tūrisma infrastruktūras attīstību. Dokumentā minētais rosina aizsākt nopietnu kultūrainavas izpētes darbu Ilūkstei. Līdzās Ilūkstei – Daugavpils apbūves mērogs, pilsētas atpazīstamība un tuvums nevis vājina un rada spēcīgu konkurenci Ilūkstei, bet gluži pretēji – stiprina Ilūkstes – kā vēsturiskā centra atdzimšanu līdzās lielmēroga apdzīvotai vietai. Tātad – pretējos Daugavas krastos – divas atšķirīgas pilsēttelpas ar dažādu kultūrvēsturisko uzslāņojumu un mērogu.

Aizvien intensīvāk kultūrvēsturiskā mantojuma saglabāšanā tiek runāts Eiropas Savienības forumos, akcentējot vērtības, kas zūd kara darbībā vai valstu ekonomiskās politikas ietekmē. Zaudējot mazpilsētas vēsturisko telpiskumu, ir risks transformēt ne tikai vietu un cilvēku uztveri lokālā līmenī, bet arī reģionālā un valstiskā nozīmē, tādējādi izmainot nācijas dzīves telpas raksturu un unikalitātes iezīmes.

Dabas un cilvēku radīti elementi spēj nemitīgi mainīties, meklējot pielāgošanos. Teritorijas attīstību var ietekmēt – bioloģiskie procesi, ekonomiski politiskā vara, paaudžu maiņa, strauja tehnoloģiskā attīstība. Mainoties vienam, pārmaiņām tiek pakļauts cits, rodot pilnīgu vai daļēju transformāciju. Visspilgtāk tas ir attiecināms uz apdzīvotām vietām, kuras ir ieguvušas uzplaukumu 18./19.gs., un tad seko politiski notikumi, kas ir izpostījuši un apturējuši kultūrtelpas attīstības gaitu. Savukārt, 21.gs. sāk. posms spilgti iezīmē jaunās paaudzes aizplūšanu no mazpilsētām uz metropolēm. Līdz ar to arī vēsturiskā telpa nonāk aizmirstības ietekmē. Patreizējā Ilūkstes pašvaldība ir enerģiski ķērusies pie darba, lai atgūtu apdzīvotās vietas vēsturisko identitāti, apzinoties gan bij. jezuītu dievnama un klostera būvapjomu atdzimšanu, gan koka apbūves mantojuma vērtības.

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Symbolic significance and cognitive dimension of the Latvian landscape

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Abstract: As well as physical reality, the landscape is also an emotionally symbolic structure that closely intertwines with human cognitive perception, self-identification, with the perception of the homeland, as well as affects our daily habits. The landscape, as a cultural expression, forms a close connection with historical and political events, with traditions and customs, with each individual and with the nation as a whole, all of this manifests itself in a symbolic sense of the landscape, often used as a national recognition, for marketing purposes, but the symbols of the landscape are also a close connection between each individual and their native place and ancestors. The research analyses various aspects and phenomena that influence the symbolic importance of the landscape and relate to both cognitive aspects of each individual or community, nation, and collective memory and other expressions of identity and self-awareness. The landscape has a holistic nature that explains the close connection of several processes, both physical changes in landscape and changes in perception of each individual, according to the political and social situation of the country. Not least importance has the history of the development of the landscape perception of each country, which has been formed relatively recently in Latvia and art, photograms and the systematic division of the landscape created by researchers also play a big role in it. The regional context and cultural and historical division of Latvia should also be noted in the creation of landscape symbols. Cognitive processes are therefore associated with such concepts – Genius Locci, memory and event landscapes, landscape identity, place names, landscape biographies, etc. As a result, the author's model for the development and operation of the symbolic meaning of the landscape is presented, reflecting the structure and specificity of the symbolic creation of the landscape, as well as related processes that influence the symbolic meaning of the landscape.

Keywords: landscape symbols, cognitive landscape, model of the symbolic meaning of the landscape

Introduction

Landscape is not only a set of physical elements, but also an emotional, symbolic and ideological dimension, as well as a link between all parties, reflected in the process of cultural landscaping creation, which is consistent with the concept of landscape established in the European Convention [11]. Every day we call the set of emotional, symbolic and ideological dimensions as a "homeland" that accurately reflects the form of human-landscape relationships. The concept of "homeland" involves expressing of human-natural relationships through symbols, attitudes that forms like the storage and processing of events and symbols that are important in the past, present and even future through the physical and mental dimensions of the landscape. Through the concept of "homeland," the phenomenon of collective memory or consciousness is most strongly reflected, as a fixed and visualized set of symbols [27]. In such a cut, the landscape is like a depository that stores events important to the nation on one side, and inspires or gives a ground, a connection to the past on the other.

In Latvia, the understanding of the landscape was developed under the influence to different traditions, political events and other factors, which are closely related to people's daily life, developing in parallel and of the same time at the close root with landscape science. Latvian **residents' understanding of "special landscapes"** is relatively conservative, because in surveys conducted in research the public, as visually more prominent and attractive, highlights rural landscapes, even without signs of building and economic nature – such as "untouched rural landscapes". In general, the paradox arises here and the link between nature, traditions and culture, which manifests itself directly in traditional construction and economic activity, disappears [5; 6; 14]. As cultural connection and layer disappear, the identity as well as connection to a nation or region are harder to read, because of the similar natural landscapes and views can be found in nearby countries. Admittedly, the nature of the building and economic activity may be contradictory and not always acceptable, as well as vary very narrowly directly at local level. On the other hand, the structure of the building is a very strong cognitive part of the landscape, linking "the prettiest scenery" to childhood, when a lot of time is spent in the countryside, forming a sort of peculiar "symbol of a beautiful landscape," but also a misleading emotional "picture of memories."

Latvian landscapes as a symbol of beauty, along with printed literature and magazines, already entered in the 1960's as a popular type of photobooks. For example, the book published in 1937, "Amber Land Homeland" (*Natural and Cultural Observations of Latvia*), which was also published in later periods, also included landscape views. Later there were also published maps of landscaped areas and cultural and historical objects. The book "The nature and landscapes of Latvia"

Fig. 1. Latvian publications dedicated to the landscapes [created bu author]

by Kamil Raman published in 1971, is also rich in illustrations of outstanding landscapes. Such publications, on the one hand, promoted the Latvian landscape and, on the other hand, formed a symbolic image of the landscape in humans.

Later on, a number of publications were published about individual areas, national parks and coasts, which were rich in illustrations and supplemented by more detailed descriptions of landscaping, vegetation, cultural and historical and aesthetic values, such as book "Gauja National Park" by Aija Meluma published in 1977 with the photos by Aivars Āķis, describing the history, characterisation, zoning, etc. of the national park. Also, the book published in 1979 "The Ancient Valley of Gauja" *(by Āboltiņš O., Eniņš G.)* provides a broad description of the landscape of Gauja Ancient Valley, its structure, and is rich in colourful photographs from picturesque landscapes of Gauja. There were several such kinds of publications (*Figure 1*), later even a series about natural values in which the landscape was an integral part.

The popularisation of the Latvian landscape through maps, picture books and research had influenced the human visual perception of the landscape and had strengthened the symbolic image of the "attractive landscape" subconsciously, creating collective memory and understanding of the values of the landscape. Such images and printed materials also helped to strengthen the base of landscape identity, because almost every house had books or maps of this kind.

Within each national framework, the symbolic role of the landscape is also created by the **phenomenon of collective memory** [12]. On merging the collective memory and mythology together, a close connection with identity is created, which is manifested in both cognitive and physical symbols in the landscape as well. In the process of creation of the symbolic importance of the landscape, inter-relationships and links between the different social and ethnic groups of the territory are also important, which is often also studied by landscape researchers in order to explore the population structure of the particular area and the development trends of the spatial structure, distinguishing distinct stages of landscape development, which are also marked by political and social processes as well as economic development. Such processes also explain new symbols of landscape identity, which are often also reflected in the landscape [22].

On analysing the performance of several scientists and the importance of the landscape in everyday reality, the symbolic importance of the landscape is a phenomenon that, on the one hand, is abstract and, on the other hand, is vividly marked in the physical shape of the landscape and important at both individual and national level as a whole. Complex structure and impact of this phenomenon is the purpose of this research.

Materials and Methods

The research is based on analysing and structuring, or systematization of different sources to get a clear path and process – how the symbolic meaning and nature of the landscape is created and how it depends, how the cognitive dimension of landscape symbols forms. There was used a comparative analysis method in the research in the process of developing the scientific basis of the research, as well as interpreting and comparing the obtained results.

The following materials were used in the research:

- Scientific literature that reflects the cognitive side of the landscape and associated phenomena and regularities;
- Various archival materials reflecting the path of development of the symbolic significance of Latvian landscapes – images, books, paintings and research by scientists;
- Materials of the Latvian cultural Canon and the project "The Landscape Treasures";
- Interviews with industry experts on landscapes of national importance, where we also talked about the symbolic importance of the landscape *(interview results are not included in the Article, but influenced the amount and diversity of information obtained by the author)*.

As the result of the research there were defined groups of factors that influence the symbolic shape of the landscape and how the link to the cognitive landscape perception dimension is formed. In the research there was created a model for the development and operation of the symbolic significance of the landscape adopted for Latvian landscapes.

Result and Discussion

The results section describes, by thematic group, various aspects that influence the symbolic importance of the landscape and are related to cognitive landscape perception processes. In conclusion, as the unifying part of the results, the author's created model for the development and operation of the symbolic meaning of the landscape is presented.

The holistic nature of the landscape

Landscape research is closely linked to the understanding and perception of the landscape as such, as the landscape has a holistic nature (a comprehensive nature). The landscape includes both of nature created elements, human created structures, and emotionally social connections. Consequently, the question of exploring and evaluating the landscape as a comprehensive phenomenon becomes relevant, which scientists actively began to use in their work at the beginning of the century, recognising that landscape research is not the sum of the results of individual landscape elements or phenomenon, but that there are much more complex regularities between the changes in individual elements or indicators, where a directly holistic approach is required [29,3, 24,25]. In general, the method of the holistic approach was born already at the beginning of the 19th century, when Alexander von Humboldt, one of the founders of geography, claimed that the landscape is a comprehensive description of a region/place *(Landschaft ist das Totalcharacter einer Erdgegend)* [3]. At the end of the 19th century, the holistic understanding of the landscape in geographical sciences actively developed in parallel with the understanding of holistic aspects also in landscape ecology, landscape planning and management, combining the opinions of scientists and creating a new direction in science, where the landscape was explored not as separate parts, but as a whole or totality, replacing the linear thinking with systems thinking. In his book "Landscape Ecology. Theory and Application" Zev Naveh and Artūrs Lieberman provide an explanation of the new systematic approach and understanding of landscape ecology [23, 25]. Developing the necessity for a holistic approach it necessitates a multidisciplinary approach, where the landscape is viewed not in terms of single science, but by searching for relationships between several branches of science, intersecting or interfacing. Scientists are trying to use methods of both natural sciences, social sciences and humanities and arts techniques in landscape research, creating new methodologies for landscape research, where one of the challenges is not only to combine different methods, but to create a deeper connection with society as a whole, perceiving it as an integral part and cognitive process.

Five dimensions can be selected in landscape research:

- spatial structure – reflects the reality of a part of the physical landscape that was for a long time the only focus of landscape description and exploration, as it accurately defines the material sphere of abiotic, biotic and artifacts that are closely related to each other;
- mental dimension – a human-oriented/ centred dimension based on the mental perception of the landscape, which reflects the emotions and memories acquired by an individual coming in contact with the physical landscape dimension. It's not just about the visual perception of the landscape here, it's about the holistic perception of the landscape, which is different for each individual;
- temporal dimension – both spatial and mental dimensions submit to this dimension, explaining the dynamic nature of the landscape because the landscape is never static, both the physical – spatial structure of the landscape changes, as well as the vegetation and the animal world change, the hydrological regime changes and everything is closely connected. It should be noted that the mental dimension of the landscape is also dynamic and constantly subjected to dynamic change processes;
- the connection between nature and culture – this dimension, therefore, is like a reflection of the process of interaction between the physical, mental and temporal dimensions, which can be physically read in each ethnically distinct region, such as interaction of human and nature in the temporal dimension – hence physical changes that reflect which specific cultural characteristics through land usage, architecture and other physical activities. A frequently used paradigm in landscape research, is also called “landscape biography”;
- landscape as a complex system – system thinking is an important step that took place in science in understanding the principle of the construction of non-linear and complex things. Landscape as a complex system includes geological, biological and neo spheric subsystems and their development in the temporal dimension. This approach enables to see and understand the complex interaction processes of landscape elements, as well as to realize the consequences that changes created in one element of the landscape can impress other elements in the temporal dimension – this dimension most accurately defines the nature of holistic thinking [36].

The development of the nature of the landscape concept in the Middle Ages (landscape as a painting) created a dual nature of the landscape, which is still

one of the biggest debates in science – the real and physical world against mental perception. The emergence of the very term of the landscape in science at the end of the 17th century/ beginning of the 18th century connects with such scientists like Alexander von Humboldt, Johann Wolfgang Goethe, Karl Ritter, Henrik Steffens. During this period, landscape was defined as a physical reality, as a collection of characteristics for a given region. Later, as the "revolution" of science took place, the research methods used by scientists also gradually changed and a new era of landscape research began, where the landscape was no longer a separate part of it but a single whole. Carl Troll, in his research, explained the landscape as a complex process of interrelated factors, as well as in the research, the landscape was seen as a set of natural and human-made elements. But until the end of the 20th century, there was no mental dimension and subjective assessment criteria in landscape research. Later, multidisciplinary research had been applied to find out the landscape by interweaving environmental sciences, social and economic sciences with aesthetic issues and cultural research [36].

The dual essence or phenomenon of interaction between human and nature can be highlighted separately – on the one hand, a human is a part of the physical world of nature, the same as other living organisms, which are exposed to all the influences of nature – climatic conditions, on having physiological needs (eat, breathe), human is physically vulnerable, etc., but on the other hand, a human, as a thinking and acting individual, or a group of individuals, creates himself the landscape around him, directly influencing the physical environment around him – building buildings, roads and other infrastructure, farming or forestry, etc. [36].

In order to more clearly define the nature of landscape holism, the prerequisites for a holistic concept of multifunctional landscape are summarized:

- landscape perception as a dynamic self-organising/self-developing system/structure – this prerequisite is based on changing the paradigms of science. The basis is a view from a multidisciplinary perspective, as a multifunctional dimension of nature and culture. These theories are based on the laws of energy inviolability and the exchange of energy within the system, as well as theories such as "fluctuation order" and "chaos order." The theory of a self-developing system describes not only the landscape as a system, but also the model of societal/human development [19];
- understanding the landscape as a whole rather than the sum of individual parts – this prerequisite is based on the Gestalt theory of landscape perception as a spatial model/matrix, as a living space for living organisms, including humans and ecosystems, as well as an emphasis on the fact that the landscape is not a mathematical sum of their components, but which appears more in not only quantitative but also qualitative measurements;
- a hierarchical approach related to understanding of global ecology – by developing the Gestalt theory that emerged / arose in the approach of hierarchical landscape structure, the landscape is a multi-level open natural system, where the lower levels are filled by physical elements, while the upper levels display mental elements that form as cluster systems, in the sense of the globe and space [18];
- understanding that the landscape is a complex and interconnected system of human and nature – characterized as a continuous structural and functional interaction of diverse biotic and abiotic as well as cultural components with many variables, in several dimensions [37];
- the landscape has a multidimensional nature, which is reflected not only through physical but also temporal and cognitive factors – interactions between all these dimensions are essential;
- the possibility to measure both ecological and cultural diversity and economic factors that generate the total of landscape diversity rather than they being assessed separately – measurements can be used when analysing the impact of landscape ecological and cultural factors on landscape functionality;
- in a landscape, relationships are not always direct, they are often hidden and layered — because of multidimensional and multilevel nature of the landscape not all connections are direct, but many operate only in the temporal dimension and are visible after a certain period, other relationships are layered and gradually change the structure of the landscape or the perception of the landscape, which may again lead to a change in structure in the future, creating kind of a cyclical regularity [25].

Perception/sence of place as the concept appeared already at the end of the seventies of the last century and several scientists through this definition explored place affiliation, landscape usage, identity and other physically intangible and landscape and place-related aspects, explaining the relationship between the individual and the landscape. Later, the concept grew into the space soul/aura concept *(Genius Locci)* accentuating that the place is not just a physical expression, but it has the emotional side that creates the cognitive connection with a human. Both of these concepts are closely linked to the cognitive perception of the landscape, which is reflected in the characteristics of

the overall perception of the landscape and, together with physical factors, forms a common image of the landscape. It is the synergy of physical and emotional factors that creates the aura of space. The appearance of this concept in research triggered a kind of "revolution" in quantitative research, exposing the physically "invisible" part of the landscape [10, 4, 30] .

It should be noted that the aura of the area consists of several groups of elements:

- physical elements – landscape elements and structures (building, vegetation, terrain, water objects, etc.), physical sensations of people through sensory organs (smell and taste, temperature, lighting, etc.);
- social elements – presence of other people and communication with them, social contacts (liked or disliked, amount of people, bustle or freedom, loneliness);
- psycho emotional elements – aura of place, soul made up of two prior groups, as well as history of the area, events, associative connections, personal experience of each individual, feelings and other factors [10].

On continuing the topic of "landscape aura/soul," it is necessary to pay attention to such term as **"event landscapes" and "memory landscapes"**, which is a particular phenomenon – part of the symbolic perception of the landscape and bases on both the national and the personal or ancestral experiences of each individual. These adventures are often associated with specific landscapes, but sometimes are symbolized in abstract terms only in elements of the landscape. The determination of such landscape symbols would require research and analysis of extensive interviews, surveys, ancient descriptions, monographs and cultural and historical events, revealing the emotional connection of individual landscapes to former events. In several research there is noted the different perceptions of the landscape for local residents and visitors of the landscape, who do not know the background of the place [7].

Latvian memory landscape, event landscape and landscape stories. Anthropologist Vieda Skultans conducted major research in 1992, 1993 and 1999, interviewing a large number of Latvian residents to "read landscape stories" in people's memories and historical events for the period around 1920-1930. Exploring the historical events, the author highlighted a close connection with changes in the countryside – rural landscape and transformation during collectivization time, which also strongly influenced people's memories, as childhood memories for most respondents were associated to idyllic countryside – rural landscapes and rural works, marking the landscape of Latvia as a distinct agricultural state. Art also reflects rural

Fig. 2. The paintings with landscapes by V. Purvītis [from author private archive]

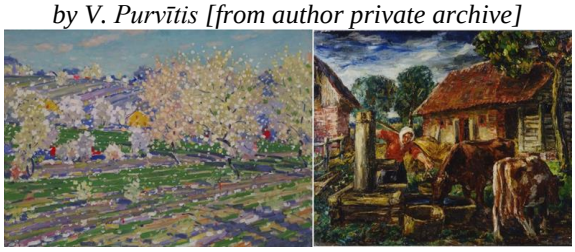

Fig. 3. The paintings by Ģ. Eliass [from author private archive]

landscapes through works by landscape painter Vilhelms Purvītis – like childhood memories – such "soft, smoky and somewhat dreamy". By the words of Jānis Silins, this period was described as "sleeping silence in social life, literature and other arts" [32]. The paintings by V.Purvītis *(Figure 2)* and Ģ.Eliass *(Figure 3)* are included in the Canon of Latvian Culture and highlight the landscape of the beginning of the last century

In people's memories, landscapes are reflected through individual elements – meadows, trees, alleys, forests, gardens – they are very small elements of the landscape and very personal memories intertwined not only with the visual image of the landscape but also through flavours and smells (cow's milk, bread, forest berries, grass, hay, etc.). Landscape memories also relate to events, such as migration / resettlement, expatriation / deportation, festivities etc. The distinctly dual nature of the landscape is formed – physical and symbolic, which is on the one hand the common history of the entire country, and on the other hand the personal biography of each individual – all of which is reflected together in the landscape, and the landscape evokes in people, their memories. V.Skultans called the landscapes "the depositories of experience, with essential "baggage" of the past and future of the country and each individual". A fine line arises here when we perceive the landscape as an objective reality, and when a particular landscape or landscape type gets a hue of personal memories or events [32].

The identity of the landscape and the development of the territory are closely linked to each other, as evidenced by the link between tourism and the identity of the place. For the purposes of development of the territory, landscape identity often becomes a business product in the tourism sphere, on the one hand allowing the territory to attract financial support and create new jobs, but on

the other hand the final "tourism product" of marketing pressure may be interpreted and adapted for sale, creating a false, simplified or modified identity of the place. In such a process and under the pressure of globalisation, the mental symbols of landscape or place turn into a commodity typical of the age of capitalism [16, 33, 35]. The concept of landscape identity itself encompasses many of the symbolic meanings and expressions of the landscape, so it can be concluded that the symbolic meaning of the landscape is a part of the concept of landscape identity, where cognitive aspects play an equally important role as cultural-historical and physical aspects of the landscape [26,28].

Regional context. Landscape can also be a reflection in a regional context, most often through architecture, culture, the spatial structure of nature or individual elements of the landscape. This link can be defined as two different directions: one with a very clear and prominent dominance of human or nature created elements – castles, manors or other buildings, even buildings of a technical or engineering nature (roads, bridges, railways, hydropower plants, etc.), as well as very prominent elements of nature and clusters of elements – steep banks, caves, river valleys, other prominent forms of terrain, rock outcrops, prominent vegetation, water bodies or water flows, etc. The other direction is the intangible overall structure of the landscape, which consists of many nuances, layers, both visible and emotional connections and layers, often referred to as the aura of place, belonging *(Sence of Place/ Genius Locci)*, it can also be called the identity of place/landscape. These feelings are closely related to the individual's subjective perception, belonging to a certain country, nation, culture and traditions, even emotional state, season and weather conditions – creating a kind of mosaic-like "pattern" of emotions and physical matters through which a person perceives the landscape, remembers it, and further creates its own, highly intimate associations and symbols since childhood. The combination of different factors and aspects demonstrates that emotional – symbolic reflection of the landscape cannot be fixed very statically – rather, it is a variable and dynamic set of factors [13; 33; 9; 34; 31].

Regional landscape spaces had been traditionally developed in Latvia, which were related to the cultural and historical districts of Latvia – Zemgale, Kurzeme, Vidzeme and Latgale, which had a very symbolic visual image, understandable and recognisable to all residents of Latvia and related to the identity of each district. In addition, "functional" regions can be distributed – coast, river valleys, lake landscapes, agricultural landscapes, Pierīga Region, etc. [2]. Both historical regions and functional landscapes together form a set of mental landscape symbols that we can call iconic landscapes or symbolic landscapes. A bill draft and a map of historic districts (*Figure 1.14.)* "Law of historic lands of Latvia" has now been prepared, also supported by the President of Latvia Egils Levits, raising the conviction that this document will help to strengthen the common identity of the population and draw attention to the preservation of the cultural and historical environment with characteristic and varied features of each region, which manifest directly through small cultural premises and local communities [21]. The bill draft itself is created as a part of the Law of administrative territories and settlements, which mostly focuses on the existence, management of economic and social areas and less on the identity and cultural and historical belonging of local communities. The Saeima points to the necessity for the development of a separate state policy, which would be the basis for cultural and historical preservation of the environment and ensuring of sustainable development of the territory with the provision of support to local communities, which is the key to preservation of the cultural space. This initiative promotes the implementation and introduction of the UNESCO Conventions "Convention concerning the Protection of the World Cultural and Natural Heritage", "Convention for the Safeguarding of the Intangible Cultural Heritage", "Convention on the Protection and Promotion of the Diversity of Cultural Expressions". Implementation of this bill draft also supports the UN Declaration on the Rights of Indigenous Peoples and Protected Values.

The symbols of the landscape of the historical districts of Latvia, on the one hand, are the identity carriers of each district, but on the other hand, allow the recognition of traditional landscapes and may be a part of the cultural Canon of Latvia. Several of the symbolic elements of the landscape are the entanglement of physical and cognitive elements, which were arisen as a result from both natural conditions and traditional management, through the nature and human interaction. Traditional cultural landscape is a part of the symbolism of the landscape as it is considered to be a valuable carrier of tradition. Landscape researcher Anita Zarina emphasizes in her article that cultural landscapes can be called iconic landscapes because there are concentrated both values recognized by society and they are linked to the peculiarities of collective memory, and to national identity as a whole. Regional-scale cultural landscapes are also a reflection of defined natural conditions and events for each region. In order to know and understand the landscape, one must take the view that a story or message that we can "read" on learning about the origins of the landscape, historical events that form

multiple layers, bringing changes to the landscape from feudalism times, through manor times, the Soviet period to the present day – these are "landscape biographies". The author also distributes cultural landscape regions – the Seashore of Kurzeme, West Kursa, Ventava, East Kursa, Zemgale, Rigava, Lower Daugava, Selija, North Vidzeme, Gaujava, Vidzeme Hillocks, Maliena, Eastern Plains, Latgalian Lake District, Upper Daugava. The distribution of cultural landscape regions is a conceptual division and is based on the specific nature of natural conditions, traditions and historical events [38].

One of the symbols is also **the names of places** that mark specific landscapes in our memories and associations, creating a close connection between the real landscape and its cognitive image. The names cover historical events or the specific or assigned meanings of the landscape. An interesting connection is how people, knowing the symbolic meaning of the place, submit to the given characterisation and form a landscape/area image by name and no longer being able to perceive the place freely. Conversely, if we read the name of the place in a foreign language and don't understand its meaning, we have no expectations about the symbolism of the place, which partially destroys the connection to the identity of the place. The "special" or symbolic names of the landscape have a very strong influence on our perception and create the contextuality, emotional background and character of the identity of the place [13]. The name of the place may create a coherent and harmonious connection to the physical expression of the landscape, but may also show disharmony and even conflict, which is explained by the historical transformation of the territory and what we once called "great," "big," "little," "new" these days no longer corresponds to reality.

Edmunds Bunkše noted in his research **the symbols of the rural landscape** as a strong foundation of identity, which helped to preserve Latvia's identity also during the years of Soviet rule. He named as the symbolic elements of the landscape or landscape spaces of the rural landscape:

- a farmyard with its own farm buildings, garden and agricultural land, pastures, fallows, surrounded by a forest or located on the seashore;
- meadows full of flowers where bees buzz;
- trees or clusters of trees — oak or birch groves;
- castles with an ancient history;
- seashore – both steep banks, dunes and rocky sea shores;
- river valleys - the valleys of the largest rivers in Latvia – Daugava, Gauja, Lielupe, Venta [8].

E.Bunkše called all these landscapes an icons, which have exactly the associative power and symbolic meaning that were particularly important during the period of revival and the war. With the changing in highlights of the era, the understanding, demand and place of the symbolic importance of the rural landscape in the shape of each individual's identity and also in the shape of national identity also changed [8]. The beauty and nobility of the landscape were analysed by E.Bunkše through the prism of several paradigms, when both everyday perception and world pressure were able to reduce the aesthetic value of the rural landscape. On analysing the lyrics of the Latvian Dainas – songs, the events of both the world and Latvia and transformation of consciousness, the author showed "the beauty of landscapes" like a dynamic and variable quantity – through the prism of art, through ethical paradigms, through traditions and also through personal experience [7]. Such a research model relatively accurately demonstrates the changing nature of landscape perception, which is difficult to be settled within any bounds or captured in full size.

Landscapes, as the value, is included in the **Cultural Canon of Latvia**. Work is still underway to define the 8 landscapes to be included in the canon, but however the consciousness that landscapes are and will be the part of the culture has already been established. Definition proposed by experts is: "The cultural and historical landscape is formed by interaction between different factors of human activity and nature. It illustrates the evolution of humanity in time and space, has acquired a recognised value in society and reflects certain traditions, historical events or their representation in literary and artistic work through physical testimony in the landscape" [20]. Latvian Culture Canon includes:

- Abava Primeval Valley Landscape;
- The Daugava River Landscape;
- The Landscape of Zemgale Lowland;
- Gauja Primeval Valley Landscape;
- The Latgalian Lake District Landscape;
- The Landscape of Latvian Forests;
- The Seacoast Landscape;
- The Landscape of Vidzeme Hillocks.

The cultural and historical value of each landscape, which refers to the prepared document of the Cultural resolution and confirms the foundation of Latvian culture and traditions, is the main criteria for the nomination of the landscape in the cultural Canon [17].

The project **"The Landscape Treasures"** – as an attempt to involve the society in the assessment of landscapes by nominating "important and significant" landscapes for themselves in each region. Electronic voting lists (*43-50 units per planning region*) had been established, which were created from the landscapes sent in by the

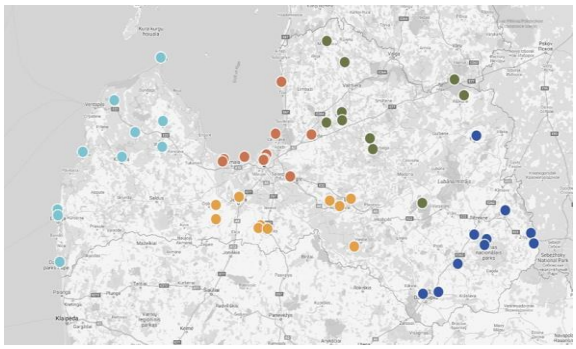

Fig.4. Landscape treasures – cartographic representation [15, 20]

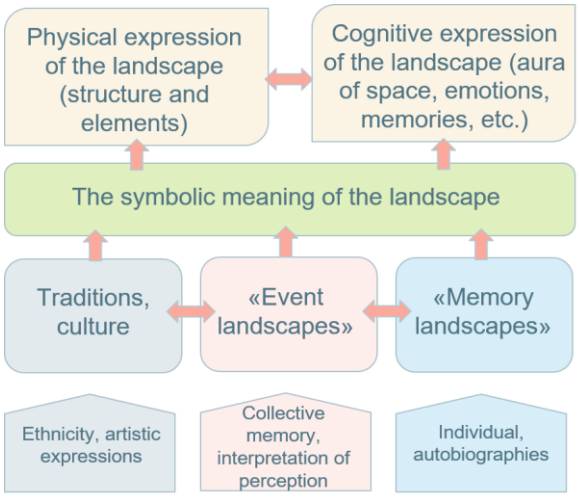

Fig. 5. Model for the development and operation of the symbolic meaning of the landscape [diagram created by author]

population by the Council of landscape experts, along with planning regions that well describe the landscape values of each region from the perspective of the population. A map of these precious landscapes had also been created [1] *(Figure 4).* As well as the Ministry of Environmental Protection and Regional Development sent this information to local governments, with an invitation to include these landscapes as values in planning documents.

It should be noted that the landscapes nominated within the framework of the project are different in their scale – mental landscapes, large-scale landscapes or landscape areas, large-scale landscapes or panoramas of urban areas, individual urban objects with cultural and historical value, individual rural landscape objects and territories. Such a wide variety of landscape types and scales proves that landscape symbols are perceived much more widely than one element of the landscape – they can be both extensive rural and urban landscapes or their parts, individual small-scale landscapes, cultural historic objects or individual elements of the landscape, as well as mental landscapes.

Model for the development and operation of the symbolic meaning of the landscape. On summarizing the various symbolic meanings of the landscape, it can be concluded that the symbols are related to several aspects or their groups – ethnicity, collective memory of a certain group of people or all the people of the country, historical events and also biography of each individual *(Figure 5).*

The symbolic meaning of the landscape, like the landscape itself, has a dual nature – on the one hand, the landscape is a physical reality – all elements of the landscape and a common structure are clearly the essential part of the symbolism of the landscape. On the other hand, the cognitive expression of the landscape is powerful and is formed over several generations, intertwining traditions, culture, daily events and important national events associated with the memories of both each individual and Community. All together resonates through culture and art, creating a kind of dialogue and reflecting in the interpretation of landscape perception, both for each individual and varying regionally and narrowly influencing the course of each individual's life and connection to their landscape – with their homeland.

Conclusions

In Latvia, the symbolic importance of the landscape was easily and self-evidently accepted long ago, because the close connection of Latvians with nature is reflected both in beliefs, culture and traditions, and is in everyday life of every individual inherited from ancient generations. Consequently, that close connection with the landscape has also significantly formed the symbols of the landscape, which are readable both in a national, regional and local context and even at the level of each individual. Over time, not only beliefs and traditions created the perception and symbolic meaning of the landscape, a major role for both literature, art, and published photo books and other publications that were popular in the last century. Here, a two-sided, or dialogue-style connection is formed: landscape influences and inspires artists and artists through their works form the perception and contemporary context of the population.

At the same time, it is important to understand the context of landscape perception, where the landscape has a holistic nature and there are several dimensions of perception – spatial structure, mental dimension, temporal dimension, link between nature and culture, landscape as a complex system. Also, when the perception of the landscape is formed, it is important to note such factors: dynamic self-organising/self-developing systems/structures; Gestalt theory on landscape perception as a spatial model/matrix; a hierarchical approach connected

with understanding of global ecology; understanding that the landscape is a complex and interconnected human and natural system; the landscape has a multidimensional nature that reflects not only through physical but also temporal and cognitive factors; the regularities in the landscape are not always direct, but often hidden and layered.

In Latvia, landscape symbols are often used, also for commercial purposes, or as a promotional brand, attaching importance to research related to landscape identity and local symbols. By understanding the specificities of both the country and the region, even the links between individual generations and even individuals and the landscape and landscape elements, one can make better use of them in the development and attractiveness of the area, not only for tourists but directly for local communities – by making this cognitive connection closer and stronger. Taking into account that the symbolic importance of the landscape is both physical and mental, as well as by studying the events of each place, the special features of culture and traditions, it is possible to more fully discover the symbols of each landscape and their context, connection with people in the memories of individuals.

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Kopsavilkums. Latvijas ainavas simboliskā nozīme un kognitīvā dimensija ir viena no ainavas būtiskām sastāvdaļām ainavas koptēla izpratnei. Ainava ir ne tikai fiziskā realitāte, bet arī emocionāli – simboliskā struktūra, kas cieši savija ar cilvēka kognitīvo uztveri, sevis identificēšanu, ar dzimtenes uztveri, kā arī ietekmē mūsu ikdienas paradumus. Ainava, ka kultūras izpausme veido ciešu saikni ar vēsturiskiem un politiskiem notikumiem, ar tradīcijām un paražām, ar katru indivīdu un ar nāciju kopumā – tas viss izpaužas ainavas simboliskā nozīmē, ko bieži izmanto, ka valsts atpazīstamību, marketinga vajadzībām, bet ainavas simboli ir arī katra indivīda cieša saikne ar savu dzimto vietu un senčiem. Pētījumā ir analizēti dažādi aspekti un fenomeni, kas ietekme ainavas simbolisko nozīmi un ir saistīti gan ar katra indivīda vai kopienas, nācijas kognitīviem aspektiem, gan ar kolektīvo atmiņu un citiem identitātes un pašapziņas izpausmēm. Ainavai piemīt holistiskā būtība, kas izskaidro vairāku procesu ciešu sasaisti – gan fiziskās ainavas izmaiņas, gan katra indivīda uztveres izmaiņas, atbilstoši valsts politiskai un sociālai situācijai. Ne mazāk svarīga arī katrs valsts ainavas uztveres attīstības vēsture, kas Latvijā veidojusies samērā nesen un tajā lielu lomu spēlē arī māksla, fotogramatas un pētnieku veidotas ainavas sistemātiskais iedalījums. Jāatzīmē arī ainavas simbolu veidošanā reģionālais konteksts un kultūrvēsturiskais Latvijas iedalījums. Kognitīvie procesi ir savukārt saistīti ar tādiem konceptiem – Genius Locci, atmiņu un notikumu ainavas, ainavas identitāte, vietas nosaukumi, ainavas biogrāfijas utt. Rezultātā ir attēlots autora veidots ainavas simboliskās nozīmes attīstības un darbības modelis, kas atspoguļo ainavas simboliskas veidošanas struktūru un specifiku, kā arī saistītus procesus, kas ietekme ainavas simbolisko nozīmi.

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The profile of Lithuanian architects in relation to the professional generations active today

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Abstract. The research focuses on the professional profile of architects by analyzing their identity and creative principles. The aim is to explore the professional community of Lithuanian architects who are currently shaping the built environment, to identify their heterogeneity in terms of professional generations.

The problem of the research is shaped by the current controversies in the field of architecture concerning the changing status, activities, and responsibilities of the architect. The relevance of the study lies in several aspects: the lack of in-depth sociological research on the professional community of Lithuanian architects; the attempt to verify and clarify the results of the semi-structured interview study Lithuanian Architects on Architecture, and the reflection on the global architectural situation and the new agenda for architectural design towards a high quality built environment.

The study adopted a mixed methods research design. This involved the collection, analysis, and interpretation of both quantitative and qualitative data. This methodology is chosen because the research requires a complex and multifaceted approach to the phenomenon of architecture and the problems of architectural practice. It also allowed a larger group of research participants to be reached (450 respondents).

The questionnaire contains 13 questions, each is structured in a multiple-choice format, with one option being an open-ended question. The questions are grouped under several themes: 1) the nature and fields of architectural practice and the concept of architecture; 2) the scope of practice and the allocation of professional time; 3) self-determination and professional loyalty; and 4) creative principles. Descriptive statistical methods were used to process the survey data. Content analysis and, to some extent, thematic analysis were used to analyze quantitative data from open-ended questions.

The study highlights that the professional generations of architects analyzed follow the general trend of architecture, refuting the hypothesis that the approach of each generation is significantly different. However, it has been observed that the representatives of each generation show a particular attitude in a specific area, which indicates the dynamics of an attitude or predicts a change in the architectural community as a whole. The youngest generation of architects is an indicator of change. It is characterized by seeing a great diversity of aspects in architecture and architectural practice.

Keywords: architects' community, sociological survey, questionnaire, architectural practice

Introduction

The problem and relevance of the study arise from a range of causes and backgrounds.

The study is driven by the lack of thorough sociological research on the professional community of Lithuanian architects. To date, no comprehensive quantitative surveys have been completed to determine the attitudes, expectations, and satisfaction of members of the professional community of Lithuanian architects. The professional organizations of Lithuanian architects – the Union of Architects, and the Architects' Chamber – conduct only episodic targeted questionnaires to find out the reactions of their members to practical concerns of the time. The *Architects' Council of Europe* is carrying out the *ACE Sector Study* – a survey that collects and analyses statistical, sociological, and economic data on European architects, the architectural market, and architectural practices on a biennial basis, but regrettably, Lithuanian architects are scarcely represented in it [3]. Based on interviews with selected architects, the professional community of Lithuanian architects at certain historical stages is reviewed in J. V. Maciuika and M. Drėmaitė's book *Lithuanian architects assess the Soviet era: the 1992 oral history tapes* [24], and in the book by T. Grunskis and J. Reklaitė *The Architecture of Freedom* [19]. The interviews presented in the latter were also used by other researchers to review the attitudes of Lithuanian architects in specific aspects [8; 18]. The above-mentioned studies are fragmented, focused on a specific historical period or issue. In the field of investigative journalism, interviews with people from the architectural community are becoming more popular, but this is more a consequence of the interest in environmental quality than a scholarly investigation of the approach of those who are shaping the environment. Initiatives are also emerging among architects themselves, but these are only sporadic cases when architects themselves are looking for the answers to the Hamletian question: who is an architect [34]? In the absence of substantial qualitative and quantitative studies of the wider professional

community, the authors of this article have taken this initiative.

This study also aims to verify and clarify the results and insights of the semi-structured interview-based study *Lithuanian Architects on Architecture*, as well as the hypotheses formulated based on these findings. The qualitative research highlighted that Lithuanian architects of different ages and experiences have an uneven perception of architecture and the role of the architect. The attitudes of more distant professional generations (older and younger) in some cases are much more controversial, even contradictory [12; 13].

Another strand of the relevance of this article stems from global developments. Over the last 20 years, both internationally and in the European Union, there has been an increasing focus on the quality of the built environment. Several recent international documents and initiatives like Davos Baukultur Quality System (2021) [10]; Towards a Shared Culture of Architecture – Investing in a High-Quality Living Environment for Everyone (2021) [16]; New European Bauhaus (2020) [17] and The New Leipzig Charter (2020) [29] have been dedicated to this subject, and have identified the criteria that should guide towards a high-quality built environment. The study also aims to find out what is the situation in Lithuania in light of this transition, how Lithuanian architects are ready and motivated to act in the direction outlined in the doctrinal documents, and how this leads to quality architecture. To get a complete picture of the architect of today, the study includes questions that help to understand what an architect considers to be a quality architectural result and what design principles guide their work.

The problem of the research is shaped by the current controversies in the field of architecture about the changes in the professional status, activities, responsibilities, and powers of the architect. Therefore, to reveal the reasons for such a situation, it would be useful to study the professional profile of architects, analyzing the identity and creative principles of the professional generations of architects currently working in Lithuania. The subject of the study is the contemporary Lithuanian architectural community. It is not homogeneous in its approach to the profession and its attitudes to practice. The aim is to explore the professional community of Lithuanian architects currently shaping the built environment, and its heterogeneity in terms of generations, and to determine their professional identity and the principles of their creative work.

The tasks of the study are: 1) to determine the nature of architects' activities, fields of practice, and the concept of architecture; 2) to determine the scope of architects' practice and allocation of their professional time; 3) to clarify architects' self-determination, professional loyalty and attitudes towards their status change; 4) to identify the attitudes of architects towards the architectural quality criteria and the creative principles.

Mixed methods (quantitative and qualitative) research strategy is used to test the insights and hypotheses derived from the study of interviews. The survey population, which includes currently active Lithuanian architects, and its large sample (450 respondents) enable the verification of the qualitative research results.

Methods and Data

Combining a positivist and interpretive approach, the study adopted a mixed methods research design [22]. It involves the collection, analysis, and interpretation of quantitative and qualitative data [20; 30]. The approach assumes that qualitative and quantitative data are closely linked: all quantitative data are based on qualitative judgments and all qualitative data can be described in numerical terms [32]. The mixed methods perspective is appropriate because the research requires a complex and multifaceted approach to the phenomenon of architecture and the problems in architectural practice. It enables clarification and strengthens already existing qualitative results with quantitative ones and allows to reach wider groups of research participants [2].

The aim is to survey as large a part of the Lithuanian architects' population as possible and to identify commonalities and differences in the attitudes and characteristics of professional generations of architects. For this purpose, an online method of questionnaire data collection was used, with respondents being reached by e-mail and online information.

As the architectural community as a social phenomenon is not widely studied and there is a lack of sufficiently standardized, purified, and sound knowledge for a statistical study, mixed data collection was carried out. The questionnaire is structured in a multiple-choice format (a series of alternative answers) and provides quantitative data. One of the response options is the possibility to provide an individual answer to an open-ended question. The qualitative data obtained in such a way allows for the refinement and adjustment of the results obtained from the choices of alternative answers.

The questionnaire contains 13 questions. The classification information is derived from the question on professional generations, which are identified by the time when the respondents graduated from architecture studies. The other questions relate to obtaining the main information for the survey and are grouped under several themes:

1) the nature of the architect's activities, fields of practice, and the concept of architecture; 2) the scope of practice and the allocation of professional time; 3) self-determination and professional loyalty; and 4) the creative principles. This grouping corresponds to the objectives of the study.

The size of the population of architects working in Lithuania is not precisely known and its determination is problematic. Therefore, to determine the sample for the study, the population of the study was defined as the members of the *Lithuanian Association of Architects* (LAS) and the *Lithuanian Chamber of Architects* (LAR), the academic community of architectural schools, and other active architects reached through the above-mentioned dissemination channels. Within the defined population, the sample was drawn using a non-probability sampling technique based on the principle of chance. 450 respondents participated in the survey. It was conducted in December 2021.

Several descriptive statistical methods [31] were used to process the survey data. The univariate analysis included clustering, classification, distribution, calculation of central tendency, and interpretation of results. Data from open-ended questions were analyzed using content analysis [21] and to some extent thematic analysis [5].

Results

The architectural community and the professional generations

The four generations were formally distinguished from the sample of 450 respondents according to the period of graduating professional studies: the eldest generation (1950–1969), the senior generation (1970–1989), the younger generation (1990–2009), and the youngest generation (2010–2021).

Only 4 responses were received from the eldest generation (1950–1969), so they have been merged with the data from the adjacent generation (1970–1989). In this way, three professional generations of architects of different sizes were formed in the research sample: more than half of the sample consists of representatives of the younger generation (52%), and the other half is shared by the senior generation (29%) and the youngest generation (19%). This confirms that the post-war Lithuanian architects, who gained their profession in 1950–1969 and created modernist architecture, are not in practice anymore.

The research sample adequately represents the Lithuanian community of architects and the division by professional generations becomes a reference to the structure of the currently active group of Lithuanian architects in terms of age and experience. The most active and the largest is the 'younger' generation that graduated from architecture studies in 1990–2009 (52 %). The 'senior' generation of 1970–1989 (29 %) has already matured and reached the peak of its activity and fame, and the 'youngest' generation of architects (2010–2021) just starting their careers (19 %).

The sample is dominated by male architects (56 %), while female architects make up 44 %. This ratio of the number of men and women in the field of architecture is a direct reference for the description of the Lithuanian architectural community as a whole in this respect. The tendency of the increasing number of female architects (39 %, 42 %, 55 %) is visible in different professional generations.

The nature and fields of architect's activity and their concept of architecture

In collecting the main data for the study, the first aim was to find out what architects do, what fields they work in, and what their perception of architecture is. The first question reveals what and how architects practice, while the second question highlights the breadth of their activities and the nature or scope of the problems they solve. The third question aims to define the attitude of shapers of the built environment towards the object of their activity – architecture.

The study has shown that the professional nature of the architect is exclusively associated with the 'designer' (89%), while 8% of designing architects also act as teachers (designer-teacher), i.e. contribute to architectural education. Only 3% of the architects surveyed have a profile other than that of a designer and act as administrators, experts, researchers, etc. It should be noted that activities are often described under the combined headings of 'designer and expert', 'designer and manager', and 'designer and researcher', reflecting the inevitably complex nature of architects' activities.

Across generations of architects, 'designer' remains the dominant occupation, but older generations have more architects working as more than designers. This could be logically explained by a higher level of professional experience. The greater experience allows the architect to act in a variety of roles (teaching, expertise, management, administration). It is interesting to note that 'designers and teachers' are present in all generations, but more so in the older generation (11%, 7%, 3%). The study identified a very clear and dominant type of activity of Lithuanian architects – design, which shapers of built environment tend to combine with other activities and to implement a more complex and diverse performance. A similar structure of activity persists across professional generations, but the older architects are, the more multidisciplinary they tend to be and act as universally as possible.

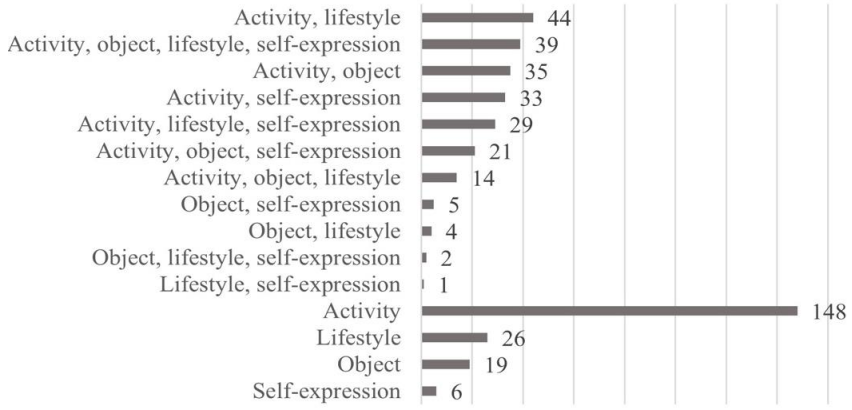

Fig. 1. The concept of architecture. Combinations of answers selected by respondents [created by authors]

Of the four fields of activity in the questionnaire, 'building design' (74%) is by far the dominant one, while 'urban planning' (8%) and 'interior design' (4%) could be considered as the architect's minor areas of activity. The 'landscape design' does not seem to be a field of activity for the architect. The alternative answers showed that just over one-tenth of architects (11%) carry out other activities in addition to the design of buildings. The category 'other' covers a variety of activities and combinations of activities not mentioned so far (e.g. heritage, spatial planning, administration, training, social activities...) and represents only 3% of the sample. The open-ended responses highlighted the tendency for architects to work in a wide variety of fields, often described as "everything". This clearly shows the architect's self-understanding as a versatile professional.

The structure of the activities of the different generations of professionals is quite similar, with one field dominating: building design (72%; 82%; 76%). Differences can be observed in the positioning of the smaller fields of activity: the younger the architects, the more they work in interior design, while urban planning is more common among the senior generation. 'Other' activities are rarely carried out by architects, only slightly more so by the senior generation (5%) than by the younger generations (2%, 3%).

Respondents describe architecture in terms of the four categories given, with a clear preference for 'activity' (45%) and a fairly even distribution of importance for the other categories: architecture is perceived as 'object' (18%), 'lifestyle' (20%), and 'self-expression' (17%). It is important to note that just under half (45%) of the respondents from the architectural community describe architecture in terms of only one of the possible categories. The concept of architecture as an 'activity' is predominant (74%), while the other categories were quite varied in choice: lifestyle (13 %), object (10 %), and self-expression (3 %) (Figure 1).

More than half of the respondents (55 %) defined architecture in terms of a diverse set of categories. The majority includes 'activity', and there is a wide range of other categories. All four categories proposed were covered by 9% of respondents, with one-tenth of respondents selecting the set 'activity, lifestyle' (10 %), 8% – 'activity, object', and 7 % – 'activity, self-expression' (Figure 1). The open-ended question was answered by 5 % of all respondents and described architecture from several perspectives: pragmatic (work, livelihood), negative or controversial metaphorical expressions (dinner of woe, splendor and poverty), and principled descriptions close to the definition of architecture (service to society and the environment; perceiving the world, way of thinking; the art of shaping the environment in a social context; expression of ideas in forms; helping people to shape and understand their environment).

All generations of architects agree that architecture is above all an 'activity'. This conviction becomes stronger as the generations get younger (77 %, 88 %, 92 %). Architecture is increasingly perceived as a multifaceted process. The generations are very similar in their identification of the three categories of architecture (object, lifestyle, and self-expression). However, it can be noted that the senior generation (1970–1989) puts a little more emphasis on architecture as a 'lifestyle'.

The scope of the architect's activity and the distribution of professional time

By asking for opinions on the scope of an architect's activity, we aim to find out how the architectural community perceives the breadth and limits of its activity. The question "What do you have to spend most of your time on in your professional life?" aims to find out how the architect's professional powers and competencies are implemented in reality and in what field of control he or she operates.

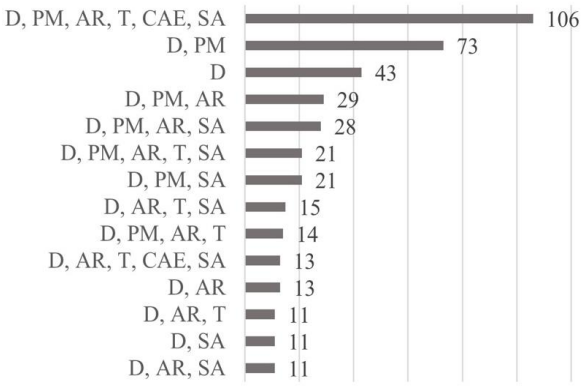

Fig. 2. Scope of architect's activity. Combinations of answers selected by respondents [created by authors]

Of the six areas of the architect's professional activity presented, the research highlighted 'design' (D, 27%) as the essence of the architect's activity. 'Curating architectural exhibitions and events' (CAE, 9%) was only a peripheral activity, or simply not an architect's business. In addition to 'design', 'project management' (PM, 20%), 'architectural research' (AR, 17%), and 'social activities in the field of architecture' (SA, 16%) are inextricably linked to the architect's activity. 'Teaching architecture students' (T, 12%) seems to be an important, but still autonomous activity for architects.

One-tenth of the total sample thinks that architects are only involved in design (D). However, the field of architectural practice is complex, heterogeneous, and involves more than design, as the vast majority of respondents agree. A quarter of the respondents (24%) see the activity of the architect as a combination of all six categories. A very similar view is shared by 5% of respondents who exclude 'curating architectural exhibitions and events'. The activities of architects are often (16 %) associated with design and project management. A wide range of architectural activities was reported by the remaining respondents (45%) (Figure 2). The perception of architects is quite diverse. It can be assumed that this diversity arises from the different sectors and types of practice in which the surveyed architects work, or perhaps from experience and age. There is a common view that design is at the heart of what an architect does, although there is no complete agreement on the scope of architectural practice.

While only 10 percent of respondents limit the work of the architect to 'design', others see it as much broader, more varied, and more complex. A quarter of respondents have the most complex view of the architect's professional activities, while more than 60% indicate various combinations of activities. However, a certain pattern of architectural activity emerges, with 'design' at the center, ‘project management’ (PM), ‘architectural research’ (AR), and ‘social activities in the field of architecture’ (SA) at the core.

The architect's professional activities (D, PM, AR, T, CAE, SA) can be supplemented with data from open-ended responses (5%). It is suggested that the architect's horizon of activity should include politics, law, psychology, sociology, economics, real estate analysis, education, public relations, communication (social sciences); engineering, environmental protection (technological sciences); health, and social welfare (medical sciences).

The definition of the profession of architect is quite similar across the generations. The activities are fairly evenly distributed in descending order: D, PM, AR, SA, T, CAE. In all generations, the primacy of 'design' is unquestioned, with 'project management' and 'architectural research' being the second most important and the second most frequent, and in the youngest generation, 'social activities in the field of architecture' are included in this group. It should be noted that the youngest generation's perception of architectural activities is most evenly a combination of all 6 categories. 'Curating architectural exhibitions and events' is considered by all to be the least characteristic of an architect. However, older architects are much more likely to ignore this activity. There is a small but equal amount of attention (12–14%) for 'teaching architecture students' across the generations. This stability and low percentage may indicate that education is perceived as a peripheral activity of the architect or as an autonomous, highly specific activity of the architect.

Architects identified their situation by choosing from four positions in response to the question "Where do you spend most of your professional time?”: 1) creating and designing; 2) management, administration, and bureaucracy; 3) communicating with clients, contractors, and communities; 4) other activities. Half of the architects (53%) are mainly involved in managing, one-third are most focused and involved in creating and designing (32%), and one-tenth spend most of their professional time communicating (11%). This suggests that architects are more managers than creators, and still a bit of a communicator.

The individual responses only confirm and explain the information given in the structured question that more than half of architects spend most of their professional time on management. The open-ended responses reflect a regret that architects would like to devote more time, attention, and energy to creating and designing. They feel frustrated and disappointed by the pervasiveness of management activities in architecture and the pointless legal and bureaucratic interference.

The allocation of time in the architects' professional routine is organized somewhat differently in the different generations. While all generations spend most of their professional time on

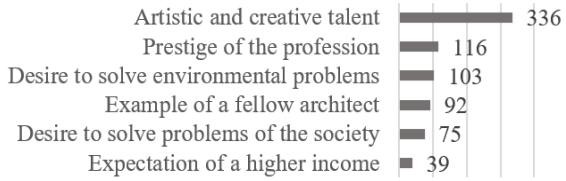

Fig. 3. Motives for choosing the profession. Mentions by respondents [created by authors]

two types of activities – 'creative' and 'managerial' – the senior and younger generations allocate almost the same amount of time to 'creative' and 'managerial' (41 % and 47 %; 38 % and 40 %), while the younger generation allocates most of their professional time to 'managerial' (61 %), leaving only 24 % for 'creative'.

All professional generations spend the least time on 'communication' and 'other' activities, but it should be noted that the youngest generation is the most evenly distributed in terms of professional time, concentrating more on 'communication' than the others.

The career path: commitment, satisfaction, and loyalty

Satisfaction with the career path: expectations and their fulfillment, public recognition, and professional loyalty were measured by another set of questions. Firstly, the reasons for choosing architecture as a career are explored as a basis for professional expectations and personal aspirations. Among the motives offered in the structured questionnaire for choosing architecture, the vast majority of respondents (82 %) mentioned 'artistic and creative talent', which is almost three times more important than the second most important incentive. This was followed by 'prestige of the profession' (28 %), 'desire to solve environmental problems' (25 %), 'example of a fellow architect' (22 %), 'desire to solve problems of the society' (19 %) and 'expectation of a higher income' (10 %) (Figure 3). As multiple choices were available, the most frequently mentioned was 'artistic and creative talent' alone (26 %), followed by combinations of this incentive with 'prestige of the profession' (9 %), 'example of a fellow architect' (8 %) and 'desire to solve environmental problems' (7 %). Almost every fifth architect (18 %) stated that they had no artistic or creative talent, but that they had chosen the architectural career because of the ‘example of a fellow architect’ (5 %), the ‘prestige of the profession’ (4 %), or the responsibility to solve problems of the environment and/or the society (4 %). A purely pragmatic intention, such as ‘prestige of the profession’ and/or ‘expectation of a higher income’, is a rare motivator (5 %). In open-ended answers, some respondents elaborated on the reasons or circumstances that led them to the profession. Two-thirds of those who did highlight an inner drive for architecture (desire to create, to fulfill oneself, to pursue a dream) or relevant experience gained already. Some of them were encouraged by people close to them who saw their interests and inner drives. Every sixth respondent justified their choice logically, being attracted by an interesting and prestigious profession with a combination of artistic and technical characteristics. One-eighth got into the field by chance due to circumstances.

Comparing the professional generations, the younger the generation, the more incentives to choose a profession they indicate. The younger the entrants, the more complex they see the profession, not only as an art field, and therefore the more important other aspirations and expectations become. With younger generations, the prestige of the profession (24 %, 29 %, 33 %) and the expectation of a higher income (3 %, 11 %, 16 %) are becoming more and more important. The youngest generation distinguishes itself by having slightly less artistic and creative talent (81 %, 84 %, 77 %) and being less inspired by the example of a fellow architect (21 %, 25 %, 16 %). However, it is more open to taking responsibility, declaring its commitment to solving problems in the environment (24 %, 24 %, 30 %) and society (19 %, 16 %, 24 %).

How much satisfaction does public recognition bring as a reward and fulfillment of expectation is explored in the question: “How the professional status of an architect changed during the course of your career?” There is no unanimous answer from the surveyed architectural community about changes in the professional status of architects. More architects think that their status has declined (43 %) than that it has increased (24 %). One-third of architects do not support either of these views, stating that their status has remained almost stable (31 %) or changed in both directions (2 %). The majority of respondents who commented in the open-ended answers were disappointed to witness a drastic decline in professional status, attributing this either to the attitude of the authorities (state institutions or regional administration) or to the existing bureaucracy, where decision-making power has been taken over by project managers, who are more appreciated by the public. The other part of the respondents sees contradictory processes in the professional status dynamics: the rising respect for the creative professional and social capital, and at the same time the disrespect of the society and business people, and the impact of the economic crisis. Some respondents argue that professional status should not be generalized to the professional community as a whole, as it is individual to each professional.

It is observed that the longer the career path of a generation, the more it shapes the prevailingopinion. The senior generation is an experienced one, having worked both in the Soviet times and in independent Lithuania. Being able to compare different socio-cultural contexts, they are most

Fig. 4. Importance of architectural quality criteria. Mentions by respondents [created by authors]

affected by the decline in their professional status (52 %). However, 16% of this generation also feel that their status has increased and 30 % feel that their status has remained stable. The younger generation, who have been active only in independent Lithuania, feel that status in society has declined (39 %) rather than increased (26 %); 32 % feel that it has remained the same. In the youngest generation, which has been active briefly and has not yet experienced longer-term dynamics, opinions are almost evenly divided (36 %, 31 %, 31 %).

Satisfaction with the chosen career path, the adequacy of expectations and professional practice, and loyalty to the profession are revealed by the answer to the question: "If you had the opportunity, would you choose the profession of architect again?" It showed that the majority of architects were satisfied with their choice of profession and would repeat it without hesitation (70 %) or with some hesitation or a condition (75 %). One-fifth of respondents are not satisfied with their decision and would not choose the profession of architect (18 %), or would not / might not choose it (19 %). Only a small proportion (7 %) are undecided or not sure.

In response to the open-ended question of why they would or would not choose a profession again, they mainly wanted to explain hesitation or mixed feelings. The thematic analysis of the open-ended responses revealed the advantages of the architectural profession as its universal nature, an engaging creative process, and the enjoyable study period; at the same time, the respondents regret that they are missing the joy of creativity and the time they spend on it, as it is overshadowed by the pragmatic, practical matters. The disadvantages of the architectural profession include the vastly increased amount of paperwork, the increased need for management and marketing, the lowering of design prices due to competition, the excessive stress, and the devaluation of the architect. The hope is expressed that studying and/or working abroad will be more successful. There is a slight difference in attitude between professional generations. The senior generation, with the greatest professional experience, including that during the Soviet times, is the most determined to be architects: 83 % would choose the same profession again, 14 % would not choose it, and 4 % are undecided. The younger generation is the least positive and the most doubtful: 64 % would choose to be an architect, 20 % would not, and even 16 % have reservations and doubts. The youngest generation is slightly more positive: 70 % would choose the same profession again, 21 % would not choose it, and 9 % have doubts.

Towards quality architecture

To evaluate how the political agreements are implemented in the actual practice of Lithuanian architects, the survey includes three questions on the design of quality architecture. Following the European Union regulations at the time [15], the *Law on Architecture of the Republic of Lithuania* [23] was adopted in 2017, which established 10 criteria for the quality of architecture. The first question asks, which of the criteria listed in the *Law* is the most important for architects to create quality architecture? The second question asked for the specification of which context issues are most important in design. The third question asked what creative principles architects use most in their architectural practice.

All the architectural quality criteria listed received the attention of architects participating in the survey. The most significant criterion was 'urban integrity', which was mentioned by 74 % of respondents. Another 5 criteria were considered by more than half of the respondents: 'aesthetics' (65 %), 'integral architectural idea' (64 %), 'quality of the construction and the built environment (ergonomics), durability' (62 %), 'creation of a functional building structure' (61 %), 'preservation of cultural heritage' (54 %). Fewer architects identified the other 3 criteria as important: 'adaptability of the environment to all members of society' (46 %), 'compliance with the principle of sustainable development' (38 %), and 'innovativeness' (36 %). The least important was "rationality of solutions" (28 %) (Figure 4). In an open-ended question, several architects were annoyed by the establishment of quality criteria by law, describing the situation as the addition of unnecessary constraints.

Considering the generational attitudes, it is evident that 'urban integrity' dominates the responses of all generations, and that the importance of this criterion increases as the architects get younger (71 %, 76 %, 82 %). Professional generations are more divided on the relevance of the other 5 criteria. 'Aesthetics' is significant for the younger (70 %) and youngest (69 %) generations and less significant for the senior one (58 %). The second most important criterion for the senior generation is 'integral architectural idea' (68 %), which is the fifth or fourth most important criterion for the two younger generations (63 % and 65 %). 'Quality of the construction and the built environment (ergonomics), durability' is the more important for the youngest generation (53 %, 65 %, 73 %), while 'creation of a functional building structure' is the more important for the youngest one (52 %, 68 %, 62 %). It is perhaps logical that 'preservation of cultural heritage' is most important to the senior generation (60 %), while the others are less concerned (54 % and 51 %). Several tendencies also emerge in the identification of the importance of criteria that have received less attention. For the younger generations, the criteria of 'making the environment suitable for all members of society' (35 %, 48 % 62 %) and 'rationality of decisions' (22 %, 29 %, 33 %) are becoming increasingly important. There is an inexplicable decline in the 'compliance with the principle of sustainable development' criterion, with more respondents in the senior and youngest generations and fewer in the younger generation (40 %, 36 %, 45 %). The criterion of 'innovativeness' is perceived similarly across generations (35 %, 37 %, 38 %) and there is no change of attitude in this respect.

Among the quality criteria established at present, 'urban integrity' is one that incorporates contextual aspects the most. When asked "Which contextual issues are most important to you when you design?", 5 possible answers were offered to the respondents: nature, urban environment, architecture, history, and society. 'Urban environment' was the dominant answer (92 %), with the importance of this aspect increasing throughout the professional generations (91 %, 94 %, 95 %). The second most important aspect is 'architecture' (70 %) and the third is 'nature' (65 %). The professional generations are divided, and the older the architects, the more they care about 'architecture' as an attribute of context (74 %, 72 %, 64 %). On the contrary, the younger the architects, the more importance they give to 'nature' in context (62 %, 64 %, 75 %). A little less than half of the respondents (46 %) identified 'history' as an important aspect in understanding the context of the project. The professional generations share a similar concern for historical context (51 %, 41 %, 53 %), with the younger generation being less concerned about it. The most controversial aspect of the context was 'society'. It was the least significant (30 %), but its change in attitudes across professional generations was the strongest (23 %, 28 %, 47 %). Several architects, in open-ended responses to the question about context, mentioned that all of the issues listed were of equal importance, but some believed that none of the aspects suggested were relevant to the design.

The third question asked what creative principles architects mostly apply in their architectural practice, and gave the following options: to express an artistic idea, to listen and respond to the client's needs, to understand and take into account the context, and to consider the public interest. As in the previous questions, the answer 'to understand and take into account the context' received the greatest support (88 %). The senior and younger generations voted equally (87 %), while the youngest one emphasized the importance of this creative principle (94 %). 'To listen and respond to the client's needs' was the second most important principle (74 %). Although there is a slight generational dynamics, no significant difference in attitudes is recorded (71 %, 77 %, 73 %). More than half of the respondents selected the principle 'to express an artistic idea' (58%), but in terms of generational change, it seems to be gradually losing its relevance (67 %, 59 %, 48 %). The principle of considering the public interest not only received the least support (26%) but also provoked irritation among several architects, who said it was not clear what the public interest was and how it should be represented. However, it is noticeable that in the youngest generation, there is an increasing number of those who believe that this principle is also important in design (34 %).

Discussions and Conclusions

The study highlighted that the Lithuanian architect is a designer who combines his main activity with other activities. The proportion of architects who do not 'design' is very small and this is rather an exception.

Architects are most often and predominantly active in the field of building design, with interior design and urban design as minor fields of activity. An important part of the architect's identity is that one-tenth of building designers work in other fields, fulfilling the mission of the universal architect. Burr and Jones, in their study of the role of the architect, noted: "The successful architect of the future may be one who strives to reclaim lost responsibilities of developer and builder, explores new alternative services, and promotes a higher level of collaboration with the building team" [6].

Architects who describe architecture have placed an unquestionable emphasis on the category of 'activity'. This choice could be explained by the

complex and comprehensive nature of this concept. It encompasses creative, artistic, scientific, social, technical, political, etc. activities. For architects, architecture is undoubtedly the most interconnected of all processes. The architects surveyed also paid the same amount of attention to the other three categories (approximately 20% each). Those who have a perception of architecture as an object have a more traditional view of architecture as a product. Those who identified architecture as a lifestyle were more self-identified and fully in touch with the phenomenon of architecture. Saint describes this as a belief system, a quasi-religion [27, p. 8]. Those who assign the category of self-expression to architecture see it as a field for expressing and realizing the architect's skills, ideas, and aspirations. Half of those interviewed could not describe the essence of architecture using just one category, but used various combinations of them. This is an indication that for most architects, architecture is a complex, multifaceted phenomenon. The diversity of ideas about architecture also suggests that each member of the community has a unique view of architecture, perhaps even a unique understanding of the profession. One might even think of a diversified concept of architecture. There are no major differences between the professional generations of architects, but some differences or trends have emerged. The senior generation tends to be more versatile than the youngest. Urban planning is more popular with the senior generation, while the youngest architects tend to be more involved in interior design.

In their perceptions of architecture, the professional generations of architects are fairly consistent. Older architects describe architecture in one of the given categories more often than younger ones. This may be an indication that older architects have a clearer, more defined, more categorical approach to architecture. The younger the architects are, the less categorical and the more complex the approach is. Younger architects are less likely to see architecture as a lifestyle or as an object. In contrast, the category 'self-expression' is chosen to describe architecture to a small but stable extent across generations. This suggests that architects' need for self-expression is constant and unchanging. It can be observed that the senior generation emphasizes lifestyle slightly more than object or self-expression, which could be interpreted as a kind of legacy or a reflection of the previous generation (1950–1969), which very strongly identified itself as creators of the world, designers of life, decision-makers and politicians [24].

One-tenth of the architectural community restricts the activity of the architect to 'design', while the others have a surprisingly diverse perception of the scope and structure of the architect's activity. However, a certain picture of architectural activity emerges: design is the axis, with project management, architectural research, and social activities at the core. Teaching is a very specific, autonomous activity. Curating exhibitions and events is considered to be outside the scope of an architect.

In recognition of the complexity and multifaceted nature of architecture, design is prioritized as a creative activity [35, p. 107–108], with project management in the second place. Meanwhile, in actual practice, the distribution of professional time is in reverse order, with project management and administration far outweighing creative activity and communication with stakeholders. The discrepancy between the image of the architect as an artist, which has been in place since the *Ecole Beaux Arts*, and actual practice explains architects' dissatisfaction with changes in the field and direction of the profession, and their disillusionment with the profession itself. The change in the profession is confirmed by respondents' open-ended questions, suggesting that the architect's professional activity should be complemented and extended by a wide range of social science interests. The broadening of the activities shows the need for knowledge and expertise that have so far been unusual for architects. The discussion of the architect as a "social designer", where he or she takes on the responsibilities of a sociologist, anthropologist, psychologist, manager, or another social professional, raised by other researchers [25], is worth mentioning here.

Each generation organizes their professional time in a slightly different way. All architects balance their professional attention between creativity and management, but the younger generation (the most numerous and active) spends much more time on management than on creativity. This tends to make them managers rather than creating designers. The youngest generation has a more even distribution of their professional time and a greater focus on communication than other generations. This trend could be an indication of the socialization of the architect and architecture and a move towards more inclusive design. An analogy can be drawn with Samuel's research, according to which social architects are those for whom the process and the community are more important than the buildings themselves, their artistry, or their aesthetics [28, p. 119-142].

The study revealed that most Lithuanian architects come to the profession because of their desire to use artistic and creative talent, and not because of pragmatic considerations; this is also

reflected in the results of similar studies in other countries [1]. The selection of this motivation as an essential one reveals the treatment of architecture as art. While it is believed that the architectural field is concentrated around aesthetics and form, artistic skills and creative abilities are crucial for a successful professional career. Secondary motives (the prestige of the profession, the desire to solve environmental and societal problems, the example of a fellow architect, higher income) are equal to the importance of the stimulus of artistic creativity only when all of them are considered together. The identified priority sequence of incentives confirms the persistence of established stereotypes attributed to architecture (artistry, individualism, prestige), although this is only partially confirmed in real practice [33; 28].

To summarise the dynamics of motivation for choosing a profession, over all three generations, there is a tendency towards a more pragmatic approach, with the prestige of the profession and the expectation of higher income becoming increasingly important. The youngest generation is slightly less artistic and less influenced. Although more and more architects are being identified as taking responsibility for solving societal and environmental problems, the low number and its slow growth among ones who are entering the profession is not in line with Western trends. For example, at the end of the last century, Carnegie Report recorded that in North America, 40% of students surveyed said that their motivation for going to architecture school was not money, but rather the wish to improve communities and the built environment [4].

Although there is more disappointment than positivity in the architects' community's responses on how the professional status of architects is changing, there is no unanimity on this issue. It demonstrates the importance and differences of the public respect each architect experiences personally for his or her work as a professional, the significance of the objects he or she has designed, the feedback and the rewards from the public. More unified disappointment of the professional generation is influenced by many years of experience in different environments, especially when compared to the Soviet times. Erman, Altay, and Altay, who have studied the relationship of Turkish architects with clients and users, relate this to the higher expectations of the elder generation for their authority than the younger generation [14]; de Graaf relates these generational differences to the modernist ideology that prevailed in architecture at that time and labels the generations as heroic and post-heroic [11, p. 286]. Both when discussing the distribution of professional time and the dynamics of the architect's status in society, respondents expressed growing frustration that instead of the socially respected creator's role, they were pushed into unprestigious managerial and administrative matters against their will. In this way, their creative abilities are underrealized, the expectations of their career paths are not met, and as a result, professionals feel frustrated.

Paradoxically, despite the disappointments, most architects would not change their professional path. The senior generation is the most determined to be architects. The two generations that received their professional education during the independence years have a similar, slightly less positive view of the choice of architecture as a profession.

One can observe a dramatic contradiction between the abundance of complaints about the professional routine (the entrenched bureaucracy, the managerial issues that overshadow the joy of creativity, the disrespect of the government and society) and the ultimately positive answer to the question of whether he or she would choose to become an architect again. On the one hand, it shows that alternative career paths are not being sought (or found) according to their abilities, aspirations, and expectations. On the other hand, it reveals a disproportionately high level of loyalty to the profession despite its shortcomings, and the resilience of the profession, with its community being able to compensate the grievances in other ways. Saint calls such limitless devotion to the profession a “belief system, a quasi-religion in which architecture becomes an obsession, an encompassing attitude of life” [27, p. 8].

All professional generations of Lithuanian architects who are currently in practice care about the quality of architecture. Although 10 architectural quality criteria [23] are not of equal importance in the minds of architects, all of them are relevant. All generations have agreed that 'urban integrity' is a key criterion. In the question of understanding the context, the answer that is directly related to 'urban integrity' – the urban environment – also stands out. The other insight is that the senior generation prioritizes 'architecture' and the youngest one – 'nature' in their context awareness. Taking into account the urgency of the effects of climate change, it could be predicted that 'nature' will surely become more and more important in the understanding of the context within which the object is designed. Also, another significant shift in architects' approach is a turn toward society and the recognition that it is an important participant in the design process – this shift in attitude is evident in the youngest generation of architects in the market. All the professional generations of architects surveyed agreed that the basic and most important principle of their work is 'to understand and respect the context'. Listening and responding to the needs of the client is also a significant factor in design. Although architecture

is a field of art, the expression of artistic ideas is becoming less important to architects, especially in the youngest generation. The attitude of Lithuanian architects active in practice is changing, although slowly, in the same direction as outlined in the doctrinal documents and initiatives mentioned in the introduction to the article [10; 16; 17; 29], as well as in recent literature that addresses the quality and resilience of the built environment [9; 26; 7].

Even though in previous studies it was hypothesized that the current professional generations of architects have different attitudes, the results of this survey did not highlight their obvious differences, nor did they provide a basis for the formulation of an identity for each professional generation. The similarity of attitudes and opinions between professional generations could be explained by the transmissibility, the influence of the previous ones – the process that is perceived in the general structure of society [36].

We observe that the three generations surveyed follow the general evolution of mindset in architecture, but the representatives of each generation feature certain differences in specific areas, indicating the dynamics of an attitude or predicting a transformation in the whole architectural community. In this way, the differences identified among the generations surveyed enable us to observe a shift from architecture as a lifestyle to a multifaceted practice; from a focus on creativity to the inclusion of management and other activities; from the importance of the architect's creative artistic abilities to the reputation of the profession and the emphasis on responsibility towards the environment and humanity; from the principle of an artistic idea to the principle of the quality of the environment; from the importance of architecture in the context of design to the priority of the natural and social context.

The youngest generation of architects acts as an indicator of change. It is characterized by accepting a diversity of architecture, in architectural practice, and even in the incentives to become an architect. This generation predicts a balanced and liberal approach to future architectural practices.

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Kopsavilkums. Pētījumā galvenā uzmanība pievērsta arhitektu profesionālajam profilam, analizējot viņu identitāti un radošos principus. Mērķis ir izpētīt Lietuvas arhitektu profesionālo kopienu, kas šobrīd veido apbūvēto vidi, apzināt to neviendabīgumu profesionālo paaudžu izteiksmē.

Pētījuma problēmu veido pašreizējās pretrunas arhitektūras jomā par mainīgo arhitekta statusu, darbību un pienākumiem. Pētījuma aktualitāte slēpjas vairākos aspektos: padziļinātu socioloģisko pētījumu trūkums par Lietuvas arhitektu profesionālo kopienu, pārdomas par globālo arhitektūras situāciju un jauno arhitektūras projektēšanas programmu virzību un attīstību kvalitatīvai apbūves struktūrai un videi.

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Green Infrastructure Development within Urban Environment provided by Privately Owned Public Spaces

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Abstract. Since the industrialisation era, there has been a trend towards radial sprawl, rapid development and concentration of people in the largest cities. Historically, people needed space outside their homes to interact and communicate to each other. In the city it was provided by public open space, forming the centres of social life. The conditions and opportunities for people to use outdoor space have also changed with changing eras and political power settings, along with the scale of development, security concerns and ownership of space in the city. The aim of the study is to explore the nature of Privately Owned Publicly – Accessible Spaces (POPS) and their potential development contribution to urban green infrastructure, developing design and planning recommendations for the development of Privately Owned Publicly – Accessible Spaces in the urban environment. The research carried out during the literature review and analysis of city plans of the cities introduced POPS program shows the relevance of the topic of private ownership of public open space in the world's major metropolises, but that it is conceptually possible to adapt it to smaller-scale urban planning, for example by applying it to private investors and developers in their requirements for new buildings and sites development.

Keywords: Privately Owned Publicly – Accessible Spaces, Privately Owned Public Spaces, POPS

Introduction

Historically, people needed space outside the home to interact and communicate, which in the city was provided by public open space, creating centres of social life. But after the 19th century, public space, insofar as it was open and sociable, declined. It was influenced by various social, political and economic factors, which led to the privatisation of people's public life. In turn, the need for security led to the emergence of maintained, closed and controlled spaces [7]. In the further development within the modernist era, the focus of cities, human and social life was replaced by the built environment and machinery, with only small areas allocated for public outdoor space. An inverted and misguided planning principle “buildings – spaces – life” was introduced, even though in traditional planning the city grew out of the rhythms of everyday life and the urban spaces within it [5; 14].

The definition of public open space has been changed over the time - in terms of ownership, management and accessibility. Privately owned public space, which is perceived as publicly accessible open space but with a private owner, is an important part of the city, both visually and functionally, directly affecting the quality of life and well-being of the community.

Quality public space is primarily about the variety of urban spaces that are the hallmark of any vibrant and sustainable urban environment. The green infrastructure and publicly accessible space of a city are one of the key determinants of the quality of life of its inhabitants. Although the concept of 'public open space' itself is a broad one, more focused on sociology and not spatially defined, it is difficult not to associate it with the urban environment. Public open space simultaneously brings significant economic, social and environmental benefits to local society and its communities. Users of a city outdoor space are diverse and each unique in their own way; depending on their daily needs they all leave their homes and use outdoor space to reach their pinned destinations, that’s why public outdoor space shared by these diverse personalities needs to be flexible and adaptable [11]. Public space often serves as a basis for social life activities and can also create a unique sense of belonging for everyone depending on identification himself with a certain public space or part of it. Due to various factors, a broad typology of outdoor spaces has developed, which makes it increasingly difficult to separate private from public outdoor spaces, thus creating also hybrid outdoor spaces, such as privately-owned public spaces [9].

The development of the idea of privately-owned public space can be traced back to the 1960s in New York, USA, as an incentive tool for planning, development and use of land. New York in the late 1800s and early 1900s experienced rapid technical development, reflected in the construction of skyscrapers on any size of plot that designers and developers could find, which naturally reduced the city's resources of light, air, green and open space [8; 1].

The idea of a public private outdoor space came about naturally, as people used to congregate and gather in one particular place next to the building,

Fig. 1. The public open space values of private property [construction by authors]

with the busiest times being at lunchtime. This first Privately-Owned Public Space (also known by the acronym POPS) area took place in the forecourt of the Seagram Building. The building itself was built in 1958 and its forecourt was not planned as a public outdoor space at that time, but organically it became one. In good conditions, up to 150 people a day used the outdoor space to sit, sunbathe, eat and have light conversations [14].

Along with general global development, increase in the number of people and economic growth, the urban landscape in the world's major cities began to become too dense, built-up and technical in the early 20th century. With this growing trend, the demand for well-maintained, accessible and high quality public open space is becoming more and more urgent, which private property can provide alongside public open space. It was not until 1961, the last time New York's zoning was significantly changed, that the Privately-Owned Public Spaces programme, an initiative that has proven its worth over the decades, was established. When POPS was first used as a tool in spatial planning, the programme allowed developers to build more storeys or receive special benefits if they included plazas or passageways in the development that were accessible to the public. While the programme started with the requirement to improve outdoor spaces by allowing light and air flow at street level, over time public outdoor spaces were also enhanced with amenities and elements found in a park - seating, greenery, trees, lighting, accessibility for people with disabilities, and signage - universal design - to make the place understandable and accessible to all [8].

Privately owned public spaces include both indoor and outdoor spaces that are freely accessible and open for public visit and use. They are owned by a private owner - business, office or residential building owner, developer or others - who maintains them, ensures free access and promotes the place in accordance with municipal regulations. Outdoor spaces are primarily intended to be freely accessible at all times or with access restrictions, but by law they should be accessible to the public [12]. Privately owned public space is usually developed where it is offered by a private developer in return for a development fee that allows for the construction of a taller and larger building, or where public space is identified as a necessity and a condition of development approval. Their use is determined and regulated by the local authority by design, but the public is also encouraged to engage in monitoring through public reporting on the adequacy, maintenance and quality of the site [9]. The creation of privately-owned public open space is an urban zoning regulation that aims to provide public open space and green structures in the densest areas of the city that complement, extend or integrate with the city's overall green infrastructure, in addition to providing a variety of socio-economic benefits (see Figure 1). They are not intended to replace parks and other public spaces, but to prioritise the interests of users by providing suitable places for work and leisure [6].

Figure 1. The public open space values of private property [Source: construction by authors]

To this day, New York's POPS programme has evolved with human and technological growth, without limiting public outdoor space to the creation of plazas or arcades. Private public space has kept pace with trends, changing design requirements, incorporating the needs of the public and respecting their changing tastes [12]. For almost 100 years, the solution to the problem has been developed over a long process, looking at different aspects of the urban environment with the main idea of improving the environment and the quality of human life.

The main reasons why the private property approach to public realm planning has gained wide acceptance in major cities in many parts of the world are:

- a cost-effective, free way to get public open space without the city having to spend its own money;
- an efficient use of land and space;
- benefits citizens by providing recreational and social spaces [9; 1].

Privately owned public outdoor spaces play an important role in the city's network of public outdoor spaces and function well when connected to other urban spaces - streets, parks, squares and other public outdoor spaces. They should function as a layer of the city's public open spaces, filling gaps where needed, creating new points of attraction and focus, protecting views and the uniqueness of spaces, and contributing to the revitalisation of the public realm.

There is no one specific type of privately owned public open space, as they can be combined or integrated in different ways, but the main unifying feature is the ownership of the property by a private owner and its aim to provide a complement to the public open space and green infrastructure in the

city. The ways in which privately owned public open spaces can be subdivided are varied, with four of the most common being listed below (see Table 1).

When new public spaces are developed on private property, their type and form will always be adapted to the character and context of the place, creating new hybrid spaces, such as a town square that will serve as a forecourt, or a courtyard that will serve as a stopping point and be walkable. The general classification includes the following types of spatial outdoor spaces:

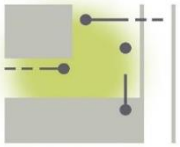
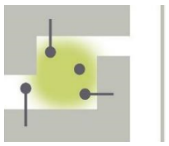
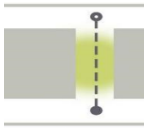
- Courtyards - landscaped open space, contained within a building block, limited or with direct street frontage connection;
- Town squares (plazas) - a gathering place connected to the street, predominantly hard surfaced, intended for a wider range of activities;
- Gardens - landscaped space of intimate scale, open to the street space, providing maximum sunlight during the day;
- Walkways and mid-block connections - exterior of the pavement at street level;
- Forecourts - landscaped open space between the public sidewalk and the main building entrance;
- Landscaped setbacks or pocket space - landscaped, small-scale open space between building frontages and the street - an extension of the pavement;
- Promenade - linear space providing passive recreation and pedestrian transit [1; 2].

In addition to the above, the outdoor space of privately-owned property accessible to the public includes supermarket car parks, hotel surroundings, the outdoor space of commercial buildings and other components of the urban environment that are not owned by the state or the municipality but are used on a daily basis by residents, visitors or employees and are owned by a private owner.

The development and value of public open spaces is also widely debated at the global level, where SDG 11 of the UN Development Agenda, "Sustainable Cities and Communities", states that by 2030, cities and human settlements should be made inclusive, safe, adaptable and sustainable, with the aim of ensuring the availability of safe, inclusive and accessible green and public spaces, especially for women, children, seniors and people with disabilities [13]. The objective brings to the fore sustainable and inclusive urban planning models to address and contain the rapid urbanisation process in major cities. The strategy highlights the need for the future development of a functionally connected and distributed network of green public open spaces. Within its framework, the Global Public Space Programme has been established to focus attention on the importance of public open space as a fundamental element in creating sustainable urban environments, ensuring a high quality of life for all.

TABLE 1

Types of private outdoor spaces to be used by public open access [construction by authors based on Kayden [8]]

Typology	Pattern	Characteristics
Destination space		Place attracts visitors from outside the immediate area who are not regular visitors, the space is usually designed for a larger number of people and is attractive in its own right.
Neighbourhood space		The site is mainly visited by residents and/or employees from the local area and is most often closely linked to the adjacent street and/or development it serves or includes. These types of premises are of high quality and include a range of amenities.
Circulation space		An aesthetic and high-quality space used by the person to move from point A to point B.
Hiatus space		Place serves as a stopping place for a passing or travelling visitor to sit down or provide other amenities, intended for a short period of time.

Over the years, the programme has evolved to the development of methodologies, assessments and approaches that include both normative and design tools for the development of high quality, safe, inclusive, accessible and green public spaces- [10].

A good and even coverage of green spaces in urban areas is an essential tool to balance the grey structure, in addition to providing ecological functions such as creating green connections to restore ecological, environmental connectivity and ensure biodiversity. The role of public open space in providing ecological services is important for global challenges such as climate change mitigation and adaptation strategies. Most cities have already gone a step further in developing green urban spaces - renaturalizing previously deprived and built-up areas, creating new knowledge and experiences to bring ecosystems back into everyday lives [4].

One of the indicators for a sustainable urban environment is the proportion of public and green space in a city. Urban green spaces create an enjoyable living environment and an attractive urban image, which is an integral part of everyday life and an aesthetic component of the environment. It is part of a wider green infrastructure with an important role in improving the quality of the public realm:

- Urban biodiversity maintained and protected;
- Reduced environmental hazards such as noise and air pollution;
- Reduced adverse impacts of extreme weather events on human health;
- Increased overall urban quality of life and health and well-being of the population [15].

The "greenness" of European cities has increased by 38% over the last 25 years. Around 44% of Europe's urban population now lives within 300 m of a public park, demonstrating that landscaped public and green spaces can have many benefits – improved overall air quality, safety, social inclusion, health and microclimate regulation. The World Health Organisation recommends 9 m2 of public green space per capita. While other cities find it difficult to meet this minimum, others such as Italy set a minimum of 18 m 2 of public green space per person for new developments. In Latvia, the average amount of public green space per inhabitant is 27.3 m2 [3].

Results and Discussions

A well-designed, condition-appropriate public realm is not enough to contribute to a quality living environment. The maintenance of outdoor spaces is crucial, which in many cases is neglected due to financial constraints. The cost of maintaining open space must be fixed and reserved from the moment it is created. Following recommendations of management and maintenance requirements are offered for local governments to deal with the public open spaces in private properties:

- Ensure accessibility – define the range of activities allowed in the open space – from everyday social activities such as strolling, temporary recreation, which is a non-negotiable requirement, to the commercial conditions that are allowed;
- Depending on the intended use, the type, size and significant characteristics of the outdoor space, create a programme, similar to the San Francisco the "1% Art Programme", allocating 1% of the construction costs to the introduction of art, environmental or any other urban elements in the public outdoor space – contributing to its identity and uniqueness;
- Quality control and penalties system introduction – every year or season, the municipality carries out a quality control of the outdoor space, recording its compliance with the quality requirements and conditions;
- Attracting investors – rewards, discounts for creating, enhancing and maintaining public open spaces. The municipality can co-finance the project at the time of design and construction, covering a share of the costs, in return for the investor's commitment (in a contract) to maintain the public open space on private property.

Based on the literature research carried out during the study, thematic models for private public outdoor spaces are proposed, based on real-life situations in urban outdoor spaces. It proposes to design optimal public outdoor spaces, incorporating best practices in design and layout development, and emphasising the inclusion of green structures. As already indicated above, the types of public open spaces on private property are distinguished, which are also the most frequent in urban open spaces.

Destination space

The type of outdoor space of the destination space corresponds to the type of outdoor space of gardens and squares, which would be privately owned and publicly accessible. Such outdoor space is characterised by its main attractions, which define the uniqueness of the place and are the reason why people go there in the first place and not just to pass through. The model of the type of outdoor space of a destination space was conceptualised based on the existing situation of similar areas of such use (see Figure 2).

For the type of destination's space, it is important to create its uniqueness or attraction, which creates a certain sense of place. This can be an artistic or environmental landmark or element that dominates the place, or a service, or an atmosphere, something that will distinguish the outdoor space from others and attract users to it.

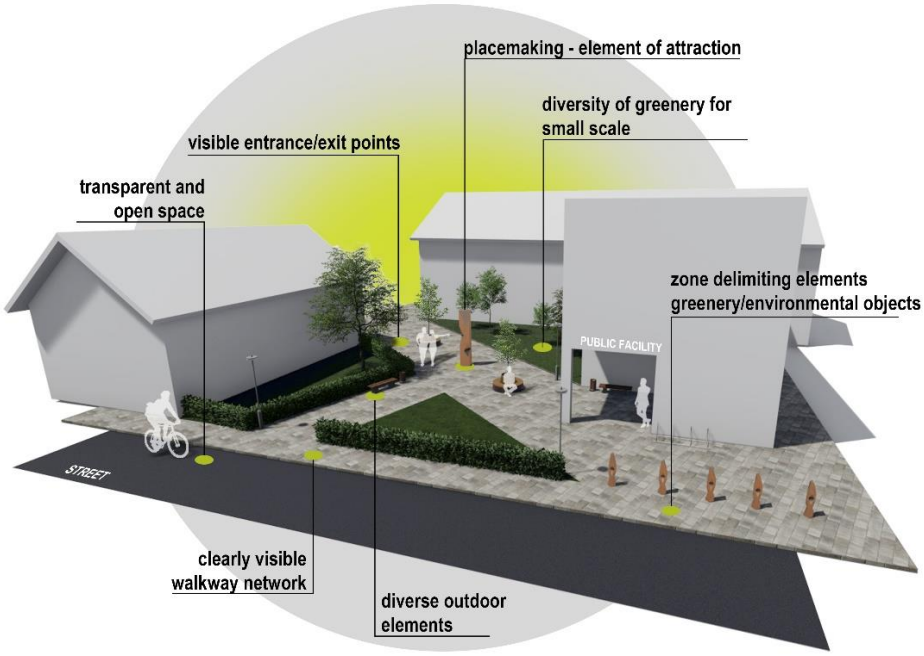


Fig. 2. Destination-type outdoor space model [construction by authors]

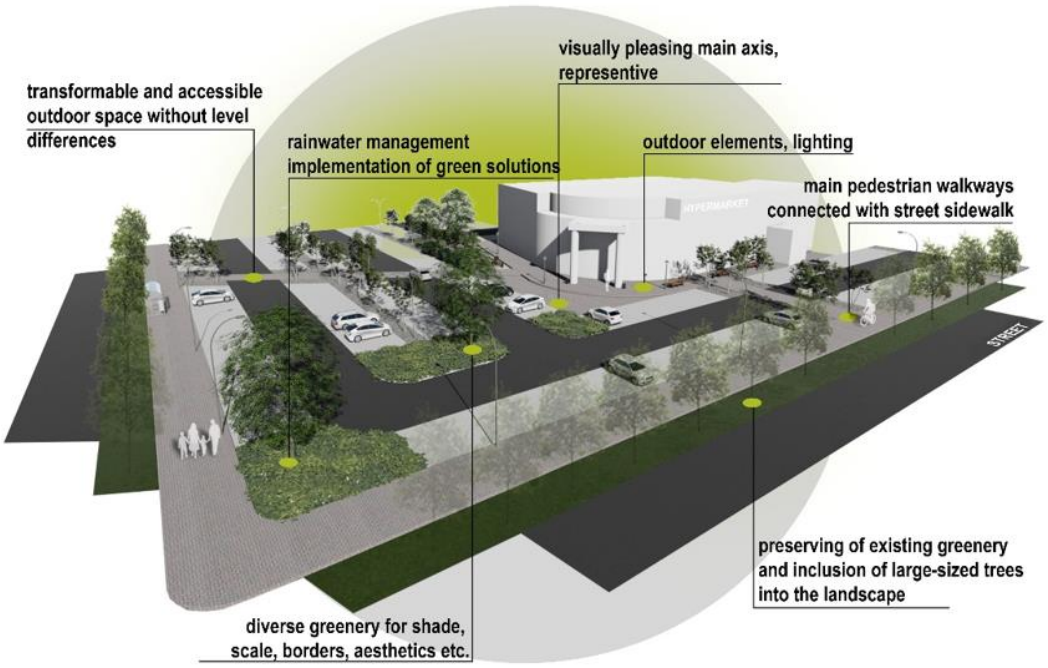


Fig. 3. Neighbourhood space model [construction by authors]

In terms of the structure of the spatial planning, a clear study of the directions of movement is initially needed, with legible paths, no dead ends, understandable entry and exit points that are at the same time clearly visible. The green structure provides the spatial framework and, depending on the scale of the outdoor space, its relevance to the human scale of the outdoor space. Regardless of the type of outdoor space, it should provide a green structure and connectivity with the public pavement and street in at least one part, forming a physical boundary with the aim of emphasising the more private atmosphere of the outdoor space, which is nevertheless also public.

Neighbourhood space

Neighbourhood space corresponds to the large-scale outdoor space associated with the use of the surrounding buildings, most often courtyards and squares used by visitors, employees, etc. of those buildings. The model is partly conceptual, based on the outdoor space of the shopping centre - the car park (see Figure 3).

Fig. 4. Walkable outdoor space model [construction by authors]

The provision of green space is important in the public open space of such large area as a shopping centre, which, given its function as a parking area and the large size of the site, needs to be balanced while maintaining the transparency, aesthetics, connectivity and functionality of the open space. The design of the large-scale outdoor space should incorporate the perception of its landscape from external viewpoints, addressing their sightlines, key axes and visual impact on the surrounding environment. To avoid creating a break point in the landscape, the outdoor space should retain large trees and be complemented by multi-stemmed, medium-sized trees that provide a variety of ecosystem services – shading, microclimate enhancement, incorporation of scale and visual, functional connection to the surrounding structure. It is also recommended that planting be provided as sustainable stormwater management solutions.

In order to achieve a safe integration of pedestrians into the accessibility of the internal outdoor space, it is necessary to introduce pedestrian routes from the main external access points, which are formed by public institutions with a high number of visitors located in the adjacent area. Such pedestrian routes can be visually highlighted by different pavements and their transitional sections need to be spatially separated by plantings. A balance should be struck between the proportions of greenery and open space, so that the possibility of transforming the open space for other uses is not lost.

Its entrance portal must be inviting, open and clearly legible. It is desirable to create temporary recreation areas in its vicinity, with provision for landscaping. For users of the neighbourhood space, where its nature requires it, create landscaped outdoor recreation areas.

Circulation space

The type of walkable outdoor space corresponds mainly to the street connection sections, which should provide an aesthetic and safe movement from point A to B. The model was based on real examples of walkable outdoor spaces (see Figure 4).

In the proposed model, the public open space includes both a major pedestrian route and car parking spaces, the boundaries of which are unclear. The proposal includes the physical and visual separation of these spaces from each other through planting. Due to the small scale of the outdoor space, use medium height, multi-stemmed tree planting that clearly marks the direction of pedestrian movement, the main axis and does not separate it from the street space. The connection to the two streets is vital for such an outdoor space and has the most direct influence on its use, therefore there can be no level or other barriers. The perceptibility of the outdoor space, due to its configuration and dimensions, should promote a safe, inviting feeling, with a visible exit. Therefore, the quality of the surface and the lighting are the key landscaping elements in a pedestrianised outdoor space. Secondary are recreational elements such as seating, cycle racks, bins, which depend on the use of visitors from the surrounding buildings but may be provided to a minimum.

Hiatus space

The type of outdoor space most commonly used for stopping (circulation) places is the sidewalk extension or "pocket" type of outdoor space or

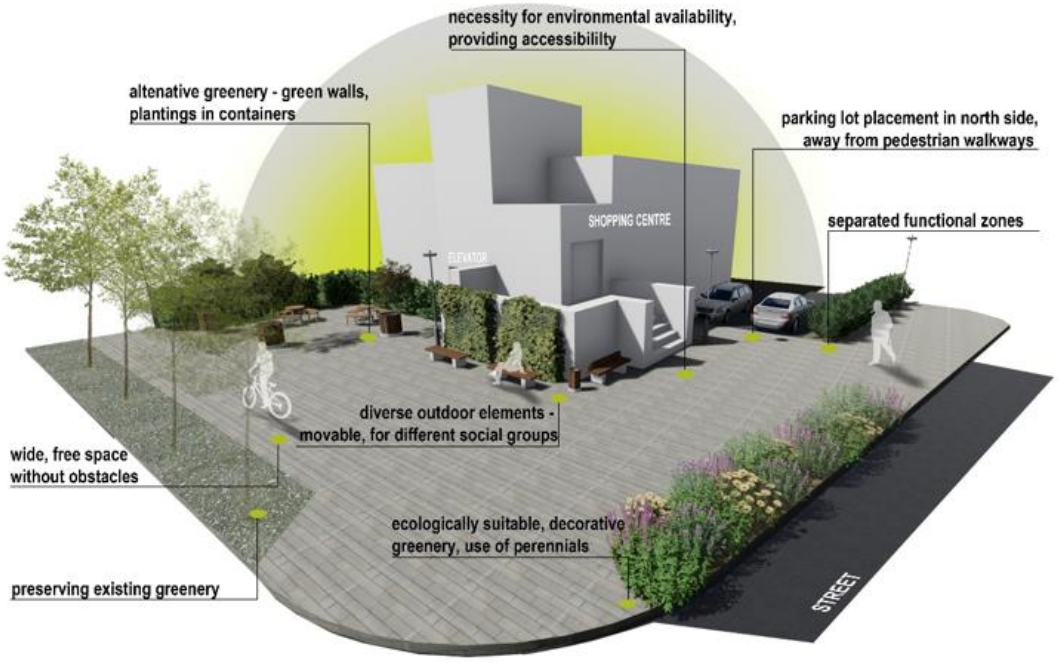


Fig. 5. Model of a hiatus space [construction by authors]

forecourt. Their main function is to provide a temporary residence facility, typically small in scale and connected to pedestrian transitway segments (see Figure 5).

Given the lack of green structure and landscape quality in such outdoor areas, which are related to the monolithic style of the buildings, the proposal includes complementing the green structure with alternative planting solutions such as tree planting in movable pots and vertical green walls in the recreation space, as well as planting enclosing the zone and the street space. Existing green structures complement the functional use of the outdoor space - seasonally changing, colourful ornamental planting is important as a stopover and 'calling card' outdoor space, emphasising the identity of the city and leaving an impression during temporary use of the outdoor space.

In the layout of the space, a public outdoor space for recreation can be located nearby one side of the building, facing some public institution for example the bus station. Pedestrian transit should be provided in a large space, without obstructions, with the possibility to stop and linger, as well as a direct connection to the public pavement, without level or other distinctions. This requires the provision of various types of amenities – bike racks, lighting, seating, bins.

Conclusions

During the spatial planning of urban environment with the emergence of new centres is not only about increasing housing stock and business opportunities through the sale of developable land, but about doing so in a measured way that considers all the elements necessary for a healthy and viable city, including public open space outside existing and developed centres. In addition, continuing these connections to the existing urban and external green fabric ensures a seamless network and accessibility of places, building on the ideology of city design, from the planning of living spaces to the development of buildings.

Any municipality concerned about the well-being and health of its residents and visitors should start by creating a landscape plan or programme that sets out how the green fabric will be developed beyond the city centre. On the basis of such a landscape plan and the planned use of the area, the spatial and green structure of the areas to be developed becomes clearer. The green network and interconnections defined in the landscape plan can, judging by the existing situation, be created by green corridors and green interspaces, which can also be provided by the public open spaces of private properties. As these are privately owned outdoor spaces, but included as part of a larger system, it is important to develop their spatial planning conditions to maximise their functionality, accessibility and coherence, also encouraging the development of green circles.

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Kopsavilkums. Kopš industrializācijas laikmeta iestāšanās novērojama tendence, kam raksturīga lielāko pilsētu radiālā izplešanās, strauja to apbūve un cilvēku koncentrēšanās tajās. Jau vēsturiski cilvēku saskarsmei un komunikācijai bija nepieciešama telpa ārpus mājas, ko pilsētā sniedza publiskā ārtelpa, veidojot sabiedriskās dzīves centrus. Mainoties laikmetiem un pastāvošām varām, vienlaikus arī mainoties apbūves apjomiem, drošības apsvērumiem un īpašumtiesībām uz telpu pilsētā, mainīgi bijuši arī cilvēku ārtelpas izmantošanas apstākļi un iespējas. Pētījuma mērķis ir izpētīt privātīpašumu publiskās ārtelpas būtību un to iespējamās attīstības pienesumu pilsētvides zaļajai infrastruktūrai, izstrādājot dizaina un plānošanas rekomendācijas privātīpašumu publiskās ārtelpas attīstībai pilsētvidē. Veiktais pētījums parāda tēmas, kā privātīpašumu publiskā ārtelpa tiek skatīta, aktualitāti lielākajās pasaules metropolēs, taču idejiski to ir iespējams pielāgot mazāka mēroga pilsētu plānošanai, piemēram, attiecināt uz privātiem investoriem un attīstītājiem, prasībās pret jaunbūvēm.

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Community Engagement in Urban Experiments: Joint Effort for Sustainable Urban Transformation

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Abstract. The increasing complexity of urban regeneration issues has recently made multi-stakeholder collaboration an important part to solve policy problems. While residents form an important part in a variety of collaborative governance processes, approaches used are often criticized as too formal, and lacking more inclusive participation. Therefore, new informal mechanisms of collaboration are sought, to ensure a more effective engagement and representation of population groups. Although community-led participation is the approach that leads to a more effective collaborative process, issues of power and inequality are a challenge in many places in planning practice [13]. Ways of civic empowerment, communication, and negotiation provide participants with transformative learning opportunities so that not only their arguments change but also the participants of the participation process themselves [6].

In order to test urban development ideas, the notion of "urban experiment" has been developed in recent years as a recognized and effective approach. The urban environment is viewed as a creative laboratory for testing the implementation of diverse initiatives and innovations [8]. The inner-city neighbourhoods in many cities are struggling to ensure vitality and liveability, thus these areas often represent a widespread location of urban experiments. In addition to these questions, the problem of community representation manifests itself in many inner cities. The potential to transform city centre streets and vacant areas into user-friendly urban spaces and the impact of those transformations on the city's liveability were recently tested by Riga municipality. Urban experiments varied in scale and form, resulting in street pedestrianization, urban gardens, and other temporary initiatives, which allowed more space for walking and cycling, street sales, social events and other activities. Thus, the aim of this article is to explore processes of testbed planning with regard to the role of community participation in the designing, implementing, and analysing phases of the experiment. After presenting the findings, the article concludes with a discussion on factors that influence public participation in collaborative governance including communication, the balance of interests, and the degree of resident involvement in decision-making.

Keywords: community engagement, urban experiments, collaborative governance

Introduction

Community involvement has become an essential part of urban planning and place making activities. Community presence is assumed to be a positive, success-promoting factor that ensures positive outcomes of urban activities [3; 12; 23; 33]. However, the diverse meanings of the Community, the often-formal role in the processes of urban activities, as well as the ambiguous influence on decision-making, often prevent the full potential of the collaborative approach from being used [19]. The term "community" has been used in various ways over time to manifest, legitimize or popularize various initiatives in both bottom-up and top-down approaches. Its universal application shows that it can cover a wide range of meanings, among which "community as actor" is used in this article. The term is used to describe a particular actor who can make a difference in various types of actions and interactions with others. Often, directly or indirectly, community is meant as a category of 'society' in which networks and social relations connect people in different forms [43].

Community involvement is defined as the process by which communities are involved in discussion, decision-making or implementation. This process is based on consultative and/or collaborative methods. Designing and implementing interventions with community engagement approaches increases community capacity and social capital [29].

In order to test urban development ideas, the concept of "urban experiment" has been developed in recent years as a recognized and effective approach. The urban environment is seen as a creative laboratory for testing the implementation of various initiatives and innovations [8; 37]. Urban experiments have emerged as a means by which multiple actors attempt both to understand today's needs and opportunities and to model future visions [7; 9]. Both the state sector, professionals in the field, private companies and public organizations are increasingly initiating activities to test future visions in diverse areas - this may affect the development of

the local economy, environmental protection, provision of infrastructure, academic research and others [20; 26]. Experimentation forms a common thread running through today's otherwise disparate urban trends, from corporate attempts to create smart, low-carbon cities to citizen-led movements to make neighbourhoods more socially cohesive. Although urban experiments take many forms, they can be conceptually distinguished from conventional urban development or policy with a clear emphasis on learning associated with testing ideas or intentions in real environments [25]. Urban experiments offer a framework for arranging tools, materials, and people to promote change in a controlled way, and then to evaluate and learn from that change [20; 27].

While long-term planning processes have defined approaches and procedures for building a collaborative approach, in short-term activities such as urban experiments or temporary solutions, the role of the community is not clearly defined and can therefore be very diverse. The potential to transform city centre streets and vacant areas into user-friendly urban spaces and the impact of those transformations on the city's liveability were recently tested by Riga municipality. Urban experiments in Riga varied in scale and form, resulting in street pedestrianization, urban gardens, and other temporary initiatives, which allowed more space for walking and cycling, street sales, social events and other activities. The aim of the research is to explore processes of testbed planning with regard to the role of community participation in different phases of the experiment in Riga.

Methodology

This research is based on a three-step approach to data collection, processing, and analysis. This allowed analysis of the urban experiment process from a diverse perspective including wider public, professionals and community groups (NGOs).

Identification of Experiment Phases

"Urban planning has been recast as a dynamic and fluid process that needs to be constantly adapted to the interactions between "people, place and capital flows" [14]. There is a tendency for public engagement processes to proceed with public consultation after main critical decisions have been made. For this reason, there is a need to understand at which points and how the public is expected to contribute [1]. Urban experiments may work as just one important step in a multi-phase collaboration process. Based and adapted from AlWaer et al., 2021, the following phases and the approach of stakeholder engagement in an urban experiment are analysed (Fig. 1):

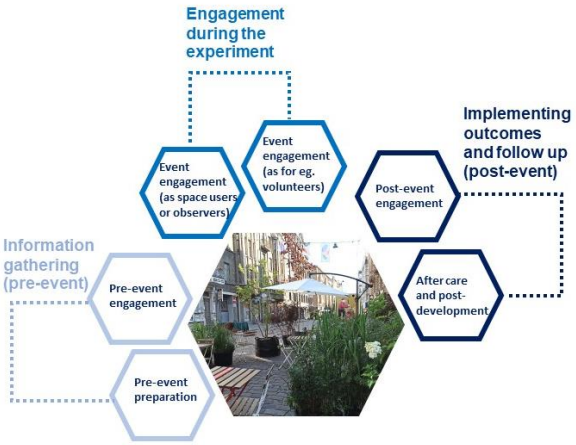

Fig. 1. Urban experiment phases [A.Korolova based on AlWaer, et al. [1]]

- **information gathering (pre-event)** - to identify issues to be addressed, decide on the type of processes and activities, devising inclusion strategies, publicising the event, agreeing with local stakeholders on intended aims, objectives and outcomes, etc.
- **face-to-face collaboration / engagement during the experiment**
- **implementing outcomes and follow up (post-event)** – important as allows to create shared ownership of the follow-on activities and their outcomes.

Up-to-date Urban Challenges and Case Selection of Urban Experiment Process and Results

Raising concerns related to climate change caused challenges and a growing awareness about the positive features of car-free urban zones has driven a growth of interest in summer urban experiments around the world. Moreover, car-free settings are proven to have a positive impact on human health, by providing opportunities for physical activity, social inclusion and creating more liveable urban environment [2; 15; 24]. Walking safety and comfort for pedestrians makes the essence of a liveable city, therefore smooth pedestrian routes avoiding interruptions and unnecessary kerbs increase both citizen's satisfaction and traffic safety [36]. Cycling is known as a sustainable mode of transportation which is affordable and has no environmental impacts [32; 46]. Furthermore, cycling can have a positive impact on health as it promotes physical activity and encourages spending time outdoors [41; 42]. It is widely recognised that nature in cities provides various health benefits, having a positive effect on physical and psychological wellbeing [34; 44]. Thus, also integration of community gardens has gained increasing attention as a space that has a positive impact on health, fosters a stronger sense of community and supports social inclusion [35; 38].

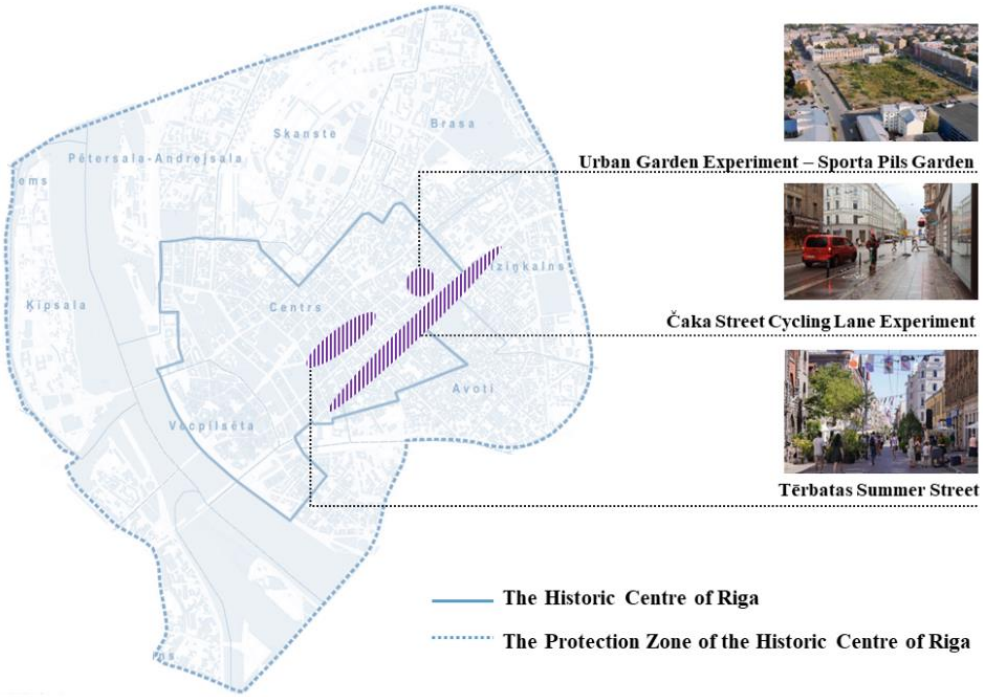

Fig. 2. Location of urban experiments in the Historic Center of Riga and its Protection Zone [figure by A.Korolova]

Fig. 3. Tērbatas street experiment I 04.01.2020 [photo by S. Treija]

Fig. 4. Tērbatas street experiment II 14.08.2020 [photo by S. Treija]

Selected cases (Fig. 2) are located in the inner city of Riga and differ in size, duration and type of the main organiser.

- *Tērbatas Summer Street Urban Experiment* - organised by Riga City Development Department.
- *Čaka Street Urban Experiment* - organised by Riga City Transport Department in cooperation with "City for People" organisation.
- *Urban Garden Experiment Sporta Pils Garden* - organised by an artist and a group of activists and volunteers.

Survey Among Urban Activist Groups

In the last decade there has been a growing interest from community in forming new and joining existing NGOs: neighbourhood associations, associations for liveable cyclist and pedestrian friendly environment, etc. Those NGOs represent an active part of a community, expressing their interest in urban regeneration processes. For this reason, this group was selected as a survey focus group. In total 17 NGOs participated in the survey.

Case study areas

Tērbatas Summer Street

Following the movement of a car-free zones, also the City of Riga tried this approach by closing to cars part of Tērbatas street for one month in 2020 and creating a liveable environment for walking, cycling and enjoying street life and cultural activities (Figs. 3 and 4). The Tērbatas street is located in the Riga Historical Center zone, and the street section from Elizabetes street till Stabu street was closed for traffic from July 17 till August 16, 2020, with the exceptions of residents and delivery access to retailers and gastronomy. This experiment was following the one-day car-free urban experiment in January 2020. Experiment aimed testing the

Fig. 5. Čaka street transformation after the experiment, 2023 [photo A. Korolova]

Fig. 6. Čaka street transformation after the experiment, 2023 [photo A. Korolova]

suitability of Tērbatas street as a pedestrian street, and evaluating the impact a car-free setting would have on local community and local businesses.

Čaka Street Cycling Lane Experiment

In Riga cycling is growing in popularity thanks to numerous urban initiatives to promote this mode of transport and free time activity. Still, cycling infrastructure especially in the inner part of the city is raising debates about necessity to invest more in development of new cycling paths, and transformation of streets towards more cycling friendly.

Thus, the experiment, which was held in 2021, aimed at testing integration of cycling infrastructure on Čaka street and evaluating the opportunities and challenges it may cause for traffic, local people and local businesses (Figs. 5 and 6). Part of the Čaka street is located in the Riga Historical Center zone and the other part in its protection zone. Originally, experiment was planned to be conducted from the 1st of December 2020 till the 1st of April 2021, still to gain more data and evaluation of seasonal changes, experiment was prolonged till the 1st of September 2021. One of the main challenges was to combine two priorities: public transport and cycling infrastructure and avoid development of traffic jams.

Urban Garden Experiment – Sporta Pils Garden

While urban gardening in Riga has more than 100-year traditions, with the first allotment gardens being introduced already in the beginning of the 20th century, community gardens here are a recent

Fig. 7. Sporta Pils Garden site before urban gardening experiment [photo A.Korolova]

Fig. 8. Sporta Pils Garden during the experiment [photo from facebook.com/Sportapilsdarzi]

phenomenon. Pilot projects, as well as community gardens on university, kindergarten or NGO territories started to appear during the last ten years and inhabitants started to understand the positive impact gardening can have on the quality of urban environment and on human health.

The community garden experiment is located on the territory where previously was located Riga Sports Palace (demolished in 2007). Developer planned to revitalize the territory by developing here business and residential premises. Still, due to the economic crises that started in 2008 development plans have been postponed. The territory stayed unused till autumn 2020 when a group of activists with a support of the local community and Riga city started the urban gardening experiment here. R. Lagzdina, who is the author of this idea, has managed to negotiate with the landowner to use the territory for urban gardening from 2020 till 2023. The territory was cleaned with the support of volunteers and prepared for the community garden (Figs. 7 and 8).

Results and Findings

The experience and outcomes of the urban experiments in Riga have been evaluated in at least three categories – among the residents, entrepreneurs, and the community partners – urban activists. The experiment results of *Tērbatas Summer Street* showed a significant increase in public open space use, thanks to the introduction of new green recreation spots. The use of outdoor cafes and other areas developed by private entrepreneurs

grew from 1,6 to up to 99 times, and 80 % of entrepreneurs observed profit increases or no changes in profit [28]. Therefore, also interviews of local entrepreneurs showed that 67,1 % of them support the idea of a totally or partly car-free street. On-site surveys of street users showed that people support closing this street to cars for certain periods, still a permanent transformation into a car-free street was perceived with uncertainty [22]. Residents' survey results in *Čaka Street Cycling Lane* experiment showed that 35 % of respondents support integration of cycling infrastructure on Čaka street, while 65 % are more likely against. 61 % of surveyed inhabitants and 58 % of surveyed entrepreneurs were supporting creation of cycling paths on other streets in Riga city centre, considering Čaka street being not the best option. Following this data and analysis of cycling path use intensity, Riga City Council Transportation Department decided to create a permanent cycling path only on one side of the street, moreover, new public amenities and greenery was created. *Sporta pils dārzi* became one of the most recognized urban experiments because of a longer – 3 years long implementation period. Already in 2021, the territory offered 150 gardens, 12 m^2 each, being arranged to local inhabitants. The experiment area allowed space and urban gardening opportunities for about 200 people. The area had also a spot for public events and picnics. The project got an international recognition and was selected as a Finalist of the European Prize for Urban Public Space, 2022.

TABLE 1

Overview of the themes and sub-themes included in the survey of the neighbourhood activists focus group [developed by authors]

Theme	**Sub-theme**
Overall attitude towards urban experiments and the role of community engagement	Impact of community engagement on development of the city
	Community engagement in urban experiments
	Importance of certain urban experiment phases
Attitude, experience and desired changes related to community engagement process in urban experiments in Riga	Urban experiment engagement experience
	Desired community engagement in urban experiments
	Specific recommendations

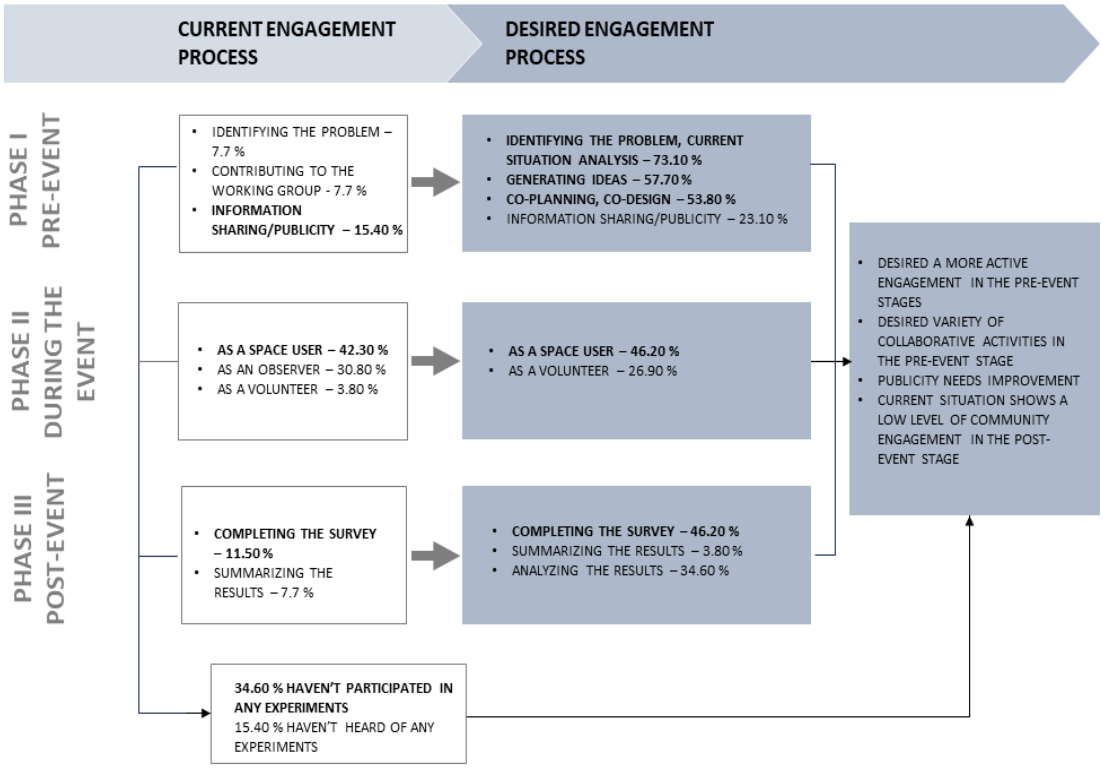

Fig. 9. Summary of the current and desired community engagement in urban experiments' process [A. Korolova based on the survey results conducted by authors of this article in 2023]

The activity of the community participation differs from case to case and from phase to phase, showing stronger engagement of the community partners in the early phases of designing or implementing the project rather than in the final phase of gathering the outcomes and analysing the results and impact of the project. To evaluate the urban experiments' outcomes and to identify the role of the communities in the preparation and implementation of them, a focus group survey was held among the neighbourhood activists in the summer of 2023 (Table 1). About 70 % of the respondents considered the preliminary phase of gathering information to be the most important for a successful urban experiment process, while about 20 % preferred engagement during the experiment, and the remaining 10 % saw the importance of the final – post-event phase. Most respondents admitted that they have participated in urban experiments as users of public open spaces or observers, pointing out that community engagement is an important instrument of urban development nowadays, and no decision-making can be considered qualitative without it. Some critical remarks were expressed about not always clearly understanding the expected outcomes, weak monitoring, and insufficient analysis of mid-term results. Some reflections indicated that the city is not a place for experiments but a place that should offer a good and inclusive living environment; and, while community involvement is an important element, neighbourhood development needs to be planned by professionals as a complex approach. The overall evaluation shows that more than 80 % of the respondents consider community participation to have a positive impact on the city's development, and up to 90 % consider urban experiments encouraging community participation.

Comparison between the current engagement in Riga experiments and the desired one showed, that respondents prefer a more active engagement in the pre-event phases, and with a more diverse choice of pre-event activities would likely contribute to several ones. Currently, there is a low activity in the post-event phase, still the survey showed that there is a potential to have more response from community, as almost half of the respondents would likely complete the post-event surveys and more than one-third would likely contribute to analysis of collected data (Fig. 9). Publicity can still be considered as a point requiring improvement, with the need to disseminate information about all experiment phases and engagement opportunities.

Discussion

The growth of successful examples of citizen-initiated urban activities indicates a paradigm shift in relation to the circle of urban creators and their role [5; 18]. Policy makers are now interested in moving to horizontal partnerships between the state, citizens and civil society organizations [29]. Consequently, such approaches can also be suitable for institutionalized planning processes, especially since there are increasing cases of synergy between informal and formal processes, in which citizen activism can be one of the driving forces [4; 39].

Experimental activities are often formed on the basis of a broad socio-political movements. They are often related to the specific needs of small groups of residents in a local context, such as the creation of a playground or the improvement of sports facilities. Over time, these practices can expand to a wider urban and regional scale, turning into full-fledged socio-political movements. Examples of such activity are increasingly the efforts of engaged culturally motivated groups that aim to collaborate with urban authorities on specific spatial events or projects [10].

Since experimental activities can be diverse both in terms of the goals to be achieved and in terms of the actors involved, their impact on the institutional context is also different [45]. Urban experiments can lead to wider institutional changes. Often this is precisely the impetus for urban experimental activities, during which justifications for new forms of governance are found, or social interests are given greater powers [7; 16; 31].

The strategic approach to stakeholder engagement stems from the experimental nature of the activity [21]. The participants of the experiment can be both multinational corporations (e.g., in experiments dedicated to the theme of Smart cities) and local communities (e.g., Transitions Towns activities). It is precisely as a result of urban experiments that the balance of mutual forces of the involved parties can be changed, giving both additional knowledge and opportunities to influence the results [17; 20].

Although the practice of urban experiments initiated or directed by urban activism is gaining more and more importance in many places, they are often excluded from urban policy processes due to their informal and rebellious nature. Consequently, the internal organization of communities and their ability to cooperate with public and formal institutions becomes a prerequisite for a successful outcome [30; 40].

Conclusions

Urban experiments provide diverse intersections between practice and theory. They increasingly shape the activities of cities trying to transform themselves and occupy the efforts of scholars from across a range of traditions to understand this process.

Community engagement in street experiments involves different phases: brief and focused pre-event preparation, pre-event engagement and briefing, engagement during the experiment, post-event engagement, aftercare, and development. To ensure the successful preparation, conducting and analysing the experiment results, involving the citizens in each phase is essential.

While urban experiments aim to test transformations towards a more liveable, greener urban environment, a higher satisfaction with the process and its results comes along with a higher level of community engagement in all experiment phases.

Urban experiments comprise a variety of experimental logics and thus can be organised in diverse ways, leading to contradictory ideas of what constitutes an experiment. Regardless of the type of urban experiment, it should follow a precise aim and define expected outcomes so that it's apparent to the community because an experiment in a particular place should happen.

Limitations of urban experiments should also be considered: representative structure of involved parties' group, available timeframe for these experiments as well as a problem of a long-term sustainability and assessment of impact.

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Kopsavilkums. Sakarā ar pilsētu reģenerācijas jautājumu pieaugošo sarežģītību, daudzās pilsētās tiek meklēti jauni neformāli sadarbības mehānismi, lai nodrošinātu efektīvāku iedzīvotāju grupu iesaisti un pārstāvniecību pilsētvides kvalitātes uzlabošanā. Lai pārbaudītu pilsētvides attīstības idejas, pēdējos gados kā efektīvs plānošanas instruments tiek attīstīts jēdziens "pilsētvides eksperiments". Pilsētvide tiek aplūkota kā radoša laboratorija dažādu iniciatīvu un inovāciju ieviešanas testēšanai. Rīgā pēdējo gadu laikā ir testētas iespējas pārveidot pilsētas centra publiskās ārtelpas par lietotājam draudzīgām pilsēttelpām. Šī raksta mērķis ir izpētīt pilsētvides eksperimentu plānošanas procesus, ņemot vērā kopienas līdzdalības lomu eksperimenta plānošanas, ieviešanas un rezultātu analīzes fāzēs. Pēc izklāsta raksts noslēdzas ar diskusiju par faktoriem, kas ietekmē sabiedrības līdzdalību sadarbības pārvaldībā, tostarp komunikācijā, interešu līdzsvarā un iedzīvotāju līdzdalības pakāpi lēmumu pieņemšanā.

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Kinetic model in the agglomeration design: on the example of Lviv

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Abstract. The kinetic components of local settlement systems with implemented processes related to the movement of people, materials, energy, information, etc. are studied. A kinetic model of the organization and controlled development of local settlement systems is proposed, which is built on the knowledge of movement theories and the properties of space associated with them and provides an opportunity to organize connections between its subsystems and elements of various spheres. The nature of kinetics (movement) in urbanized systems is concentrated in the systems' processes, events, and behavior. Their study and modeling are accompanied by the analysis of phenomena that occur from the point of view of time (presented in the form of a function where time is independent), as well as random events, which by their nature are poorly predicted. The provisions of the kinetic model are applied to the analysis, evaluation, and justification of the concept of spatial organization and development of the local settlement system "Great Lviv". The prospects of Lviv as an agglomeration in the system of connections and relations with the environment are revealed. The requirements for development and conceptual proposals for the optimization of movement within the agglomeration are substantiated. It is defined that requirements and proposals should be oriented toward the search for solutions that reveal the uniqueness of the city space and its surroundings, ensure the harmonious integrity of the agglomeration, and the practical "mounting" of communication functions into the structure of the space.

Keywords: methodology of urbanism, kinetic model of urbanized system development, spatial planning

Introduction

The system of spatial planning and urban planning in Ukraine is characterized by the inconsistency of national, regional, and local scales of planning, design, and decision-making: the hierarchy of the system has been destroyed; there is no agglomeration planning, competing "perspectives" between communities of urban, suburban, supra-urban and regional scales are sharpening. There is a demand to go beyond the existing confrontations between systems of different levels, to improve the methodological foundations of the development of concepts, strategies, and urban planning documents in institutional, cultural, social, ecological, and economic contexts, and to develop practical recommendations for their implementation. Urban development processes can be understood with the help of theoretical provisions that combine the dynamics, kinetics, and connections of places. The same provisions can be used to identify types of cities and to distinguish urban phenomena from the rest of social reality. Urbanized systems are primarily functional connections, social communications, and relationships. In the conditions of globalization and the dynamization of processes in cities, kinetics (connections to movement) becomes a fundamental category in the methodology of urbanism and requires in-depth research. This problem is especially acute within urban agglomerations and local settlement systems of large cities.

The purpose of the article is to reveal the phenomenon of displacement as social-mass-energy-information integrity in the space of urbanized systems; substantiate the kinetic model and ways of local settlement system development on the basis of kinetics. The kinetic model of the organization and controlled development of local settlement systems is built on the knowledge of theories of movement and the related properties of space and makes it possible to organize connections between subsystems and elements of different spheres to increase the efficiency of resources, energy and information transfer in the network, which as a result will affect the validity of project decisions.

Theoretical prerequisites of kinetics analysis for tasks of urbanism and spatial planning

The kinetic model of local settlement system development was based on the evolutionary theory of urban systems [5; 8; 15; 20; 24, p. 94–117]; models of city development as a complex system [6–7; 10; 14; 25], using analogies with the laws of kinetics, dynamics, and thermodynamics as a science of movement, motion, and energy [2; 12; 21; 26]. The analysis of kinetics (movement, dynamism, impulse, etc. in urban planning, regional planning, and agglomeration design) requires certain abstractions and generalizations of in-depth understanding with an orientation to professional tasks.

The urbanized system is an open hypersystem that exchanges energy, matter and information with the environment [16]. The main idea of urban planning is to create order out of disorder by improving processes and interactions between elements in the system and with the environment at different levels [1; 3–4; 22]. The main properties of such systems are openness, nonlinearity, dissipativeness. Open systems are supported by the continuous inflow of substances, energy, and information from the outside. There are non-linear situations and dependencies when joint actions of individual factors lead to effects that have nothing to do with the results of their action separately. The dissipativeness of systems (scattering) is associated with energy losses, part of which is transformed into other types of energy over time, the transition of part of the energy from an ordered to an energy-disordered process. In order to substantiate the set of indicators and characteristics of the space in local settlement systems, where movements take place, the position of multidimensionality of the urban planning space was used, and the indicators of urbanized systems were structured in a five-vector space: "human – H, functions – F, conditions – C, geometry – G, time – T" [9].

The movement in urbanized systems is a function of these five groups of variables. The first group of characteristics concerns a person, his trips and includes needs, priorities, and opportunities; the second group is the conditions of movement (restrictions, obstacles, means, requirements for movement); the third is geometries of movement systems (settlement, centers of gravity, remoteness, development of networks); the fourth is the time characteristics of movement (speed of movement, duration of cycles, synchronization of connections, the intensity of movement); the fifth group includes movement functions such as transit (external), internal, infrastructural coordination of functions, functional stability. The structure of the elements and double interactions of the space, where the processes of people's movement and their needs are realized, are systematized in the table.

The paired combinations of HC spatial interactions relate to the conditions of movement, their comfort and safety. The indicators of population density, anthropometric features of territory development, distances of people's movement in space are evaluated in the HG plane. The combination of HT characterizes the dynamics of the quantitative characteristics of the human dimension (population growth, migration), the average age and age structure of the city's residents; the analysis of trends is carried out and changes in the characteristics of human potential are predicted for the future.

TABLE 1

Characteristics and paired interactions of space dimensions of local settlement systems

Vectors and interactions	**Content of measurements and characteristics of their interactions**
H (human dimension)	structure, goals, needs, priorities, opportunities
F (functions)	of movements to production, service and recreation, transit and internal, consistency of functions, functional stability
C (conditions)	natural, resource, means, conditions, requirements, restrictions, obstacles
G (geometric characteristics)	network development, distances, configuration, settlement, gravity centers
T (time dimension)	cycle duration, speed of movement, synchronization of connections, intensity of movement
HF	functional needs of different groups of people, employment of the population, efficiency of functions, functional adequacy
HC	people's movement conditions, safety, condition and facility use, quality of service
HG	density, distribution of the population on the territory, distances of movements to the gravity centers
HT	social dynamics, movement dynamics, time priorities, changes in needs
FC	conditions and resources for the implementation of functions, technological level, technological influences
FT	productivity, functional dynamics, infrastructure development level, functional stability, timeliness of service provision
FG	functional development of the territory, functional structure of the territory, length of the networks, development of connections with the center, diversity of networks
CG	distribution of movement conditions, geometric characteristics of the territory, special traffic regime zones
CT	movement condition dynamics over time, movement intensity, movement condition stability
GT	change of geometric characteristics of the network over time, networks stability

The level of functional use of the available potential and resources, requirements and restrictions, as well as the level of man-made impacts on the environment is assessed in the FC plane. The availability and quality of communication routes and communication networks, the transit of the territory and the level of functional infrastructure development are the most important conditions for the effective functioning of urbanized systems. The FG interaction is characterized by the functional structure of the territory, the location and size of

functional zones, the scale of various communication systems.

Triple combinations of vectors outline the three-dimensional space of component interaction, them it is possible to characterize people's working conditions, labor and material resources of a certain functional area; population employment dynamics; conditions of people's movement in the process of functional implementation; structural allocation of attraction objects; dynamics of employment and people's trips; the state of resources and conditions for realizing needs; dynamics of functional conditions and resources; changes in functions in space; dynamics of settlement; changes in living conditions.

Quadruple interactions of the five-dimensional urban planning space mean the fixation of one of them. When fixing, for example, the measurement of time, the spatial situation is evaluated at a certain fixed moment. The fixation of other dimensions gives the characteristics of social, demographic, functional processes in the urban complex and an opportunity to assess their consequences. The full set of characteristics of space and urban planning tasks is formed in a five-dimensional combination and is evaluated by an integral indicator of social-ecological-economic efficiency of movements, which includes indicators of usefulness, economy, environmental friendliness and safety of processes.

The kinetic model of local settlement systems

The kinetic model for the study and organization of movements in the urbanized system space reveals the essence of social-mass-energy-informational processes [2; 18; 23]. The nature of kinetics (movement) in urbanized systems is concentrated in the processes, events and behavior of the systems. Their study and modeling are accompanied by the analysis of the phenomena that occur from the point of view of time (presented in the form of a function where time is independent), as well as the study of random events, which are poorly predicted by their nature. We will single out the requirements for the kinetic model of the urbanized systems development: 1) the consideration of kinetics as a holistic process associated with social-mass-energy-informational movements in urbanized systems; 2) the approach should be based on fundamental and objective laws of motion; 3) the connection with the study of the specificity of processes and events in urbanized systems; 4) the orientation of the model to the task of spatial planning and interpretation of it as a tool for optimizing the space of social activity; 5) identification and symbolization of model elements have to reveals the relationships between the properties of spatial dimensions and the characteristics of kinetics (movements).

The model is structurally logical in form and includes indicators of movements (kinetics) in urbanized systems: distance, speed, acceleration, trajectory, mass (volume), force, momentum, inertia, entropy, flow density, elasticity (flexibility), stability, polarization, self-organization, uniformity of distribution, transient processes, diffusion, attenuation, disturbance. The kinetic properties of space are divided into groups that characterize: 1) movement flows; 2) migration processes. The model is built to regulate the development of local settlement systems and coordinate the interaction of movement characteristics with the properties of space. The properties of the space of urbanized systems as hypercomplex systems are structured and summarized in terms of dynamism, flexibility, uniqueness, high information content, energetic, poor predictability, openness to the environment, manageability, evolutionary impulse behavior, homocentricity, entropy, purposefulness, ability to self-organize.

The kinetic model is presented in the form of a multidimensional matrix, the dimension of which is determined by the number of its elements, and the number of cells corresponds to the number of paired combinations. The model aims to reconcile spatial and movement characteristics both within the system and with the supersystem. With a relatively small size (we used 40 elements), the matrix was assembled manually. For matrices with large dimensions and a larger amount of information in the cells, it is advisable to represent them in the form of computer expert systems as databases and knowledge bases. In the field of interactions, triangular submatrices are distinguished, which consider the connections between individual characteristics of the same group, as well as rectangular submatrices of connections between different characteristics. Thus, each element of the matrix has a common cell with all other elements, which will contain information (Fig. 1).

When filling out the matrix, the significance of its characteristics is evaluated, taking into account the establishment of priorities. The most important characteristics (20 spatial and kinetic) were selected. The situations are identified when the connection between the elements of the matrix is absent, exists, important. The analysis of the matrix confirms the presence of a large number of controlled connections. Out of 780 cells related to urban planning activities, there are 172 interaction fields of connections. Other connections should be coordinated with other areas of activity. The possibilities of urban influence on the development prospects of the settlement system through 82 connections are the widest. They are manifested through the functional structure, natural

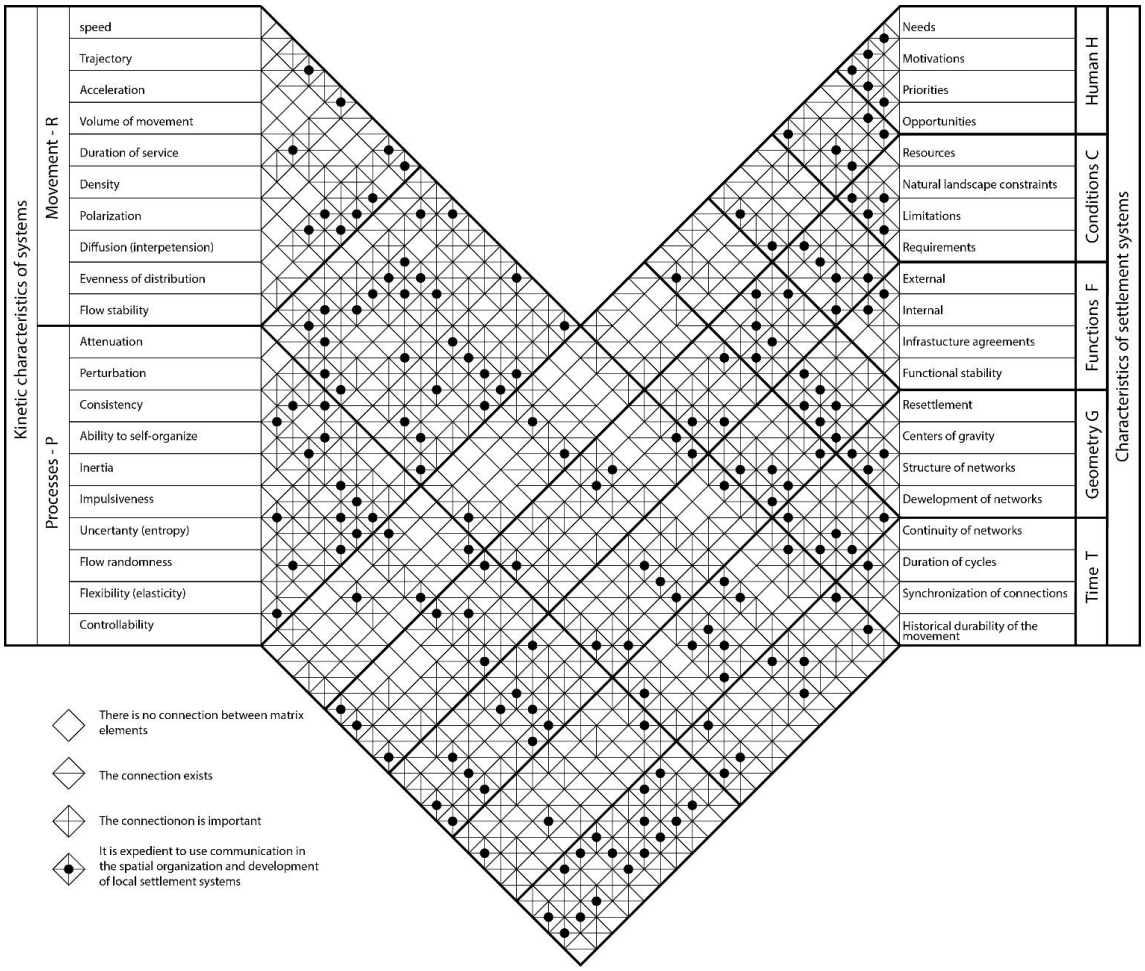

Fig. 1. Matrix of relationships of spatial and kinetic characteristics in local settlement systems. Factors influencing spatial organization and development [created by authors]

and landscape properties, technologies, living conditions, and management of space, but above all through communications. The role of aesthetic characteristics and traditions in the processes should also be emphasized. Contradictions also arise between the characteristics of individual dimensions. All managed connections, as well as those that are appropriate to use in the justification of decisions, should be reflected in the purposes of urban planning activities.

From the analysis of the matrix of connections, a number of important tasks arise for the implementation of the kinetic approach in agglomeration design. The package of such "typical" tasks is formed taking into account the interactions of spatial and kinetic characteristics. Thus, regarding the function of ensuring the connectivity of the system, it is necessary to take into account 28 characteristics.

The laws of classical mechanics (kinetics and dynamism) are experimentally confirmed, and their rethinking and use for the analysis and modeling of movements (people, substances, energy, information) in settlement systems are appropriate and correct. Kinetics can be expressed as dependence on a group of variables that are established from a matrix of relationships and have a strong and manageable relationship as a function of these factors.

The level of movement organization is assessed by an integral indicator of movement efficiency, which includes indicators of usefulness, economy, environmental friendliness, and safety. Increasing the efficiency of movements in settlement systems requires consideration of the entire array of characteristics of five-dimensional space and interactions of all dimensions that form spatial movements. An integral criterion for assessing kinetics in urbanized systems is the socio-ecological-economic efficiency of movements, which can be used to determine logistically advantageous or disadvantageous movements. In a general form, the integral evaluation of efficiency can be written as a dependence:

$$Э = f(K, N, C, H, G, T)$$

where Э is the social-ecological-economic efficiency of movements; K – useful results of movements; N – total negative consequences of displacement; C – expenditure of resources (including time) to obtain a result; H – characteristics of the human dimension, in particular the number of people participating in

the process and using it, the quality of relocation services; G is a geometric dimension, for example, the area occupied by the system; T – time (duration) of the effect of the result, time spent.

We propose to consider the spatial efficiency of movements in space as a relative indicator, where the numerator reflects the potential usefulness, the aggregate costs of resources, and the negative consequences of movements in the system, and the denominator reflects the characteristics of the human, geometric and temporal dimensions of space. It can be modified to

$$P_{\varepsilon} = \frac{K_к - (N_b + N_p + N_e)}{H \cdot G \cdot T}, \quad (2)$$

where P_ε is the spatial efficiency index of movements; K_k – total potential useful results of movements in the system in energy units; N_b – useful losses from various movements; N_p – loss of resources; N_e – negative consequences for ecology.

After simple transformations, we get the formula for the movement efficiency index:

$$P_{\varepsilon} = P_{max} \cdot [1 - f(B)], \quad (3)$$

where P_ε and P_{max} are, respectively, the actual and the maximum possible movement efficiency index; $f(B)$ is a function of space and movement disorder.

The movement efficiency index has urban planning significance. Its analysis makes it possible to identify existing trends in spatial processes and contradictions in the organization of space and communication systems and to justify directions for their optimization and integrated development. The performance index is an integral criterion that includes social, environmental, economic and aesthetic characteristics of solutions. A multi-criteria choice is required. Preference is given to the option for which the value of one of the criteria is preferable to the equivalence of the others.

Lviv local resettlement system: analysis of connections and movements and assessment of the kinetics

The local settlement system of the city is divided into three options (Fig. 2): the territory within a radius of 30 km from the city (a); the territory within the proposed second ring road; the territory within the limits of Lviv city territorial community (b). Statistical materials and data from geo-information systems and sociological analysis (interviews and surveys conducted in public transport by student experts on various directions of suburban movements) were used. The system of indicators and characteristics of the analysis and assessment of the local resettlement system of Lviv was divided into groups:

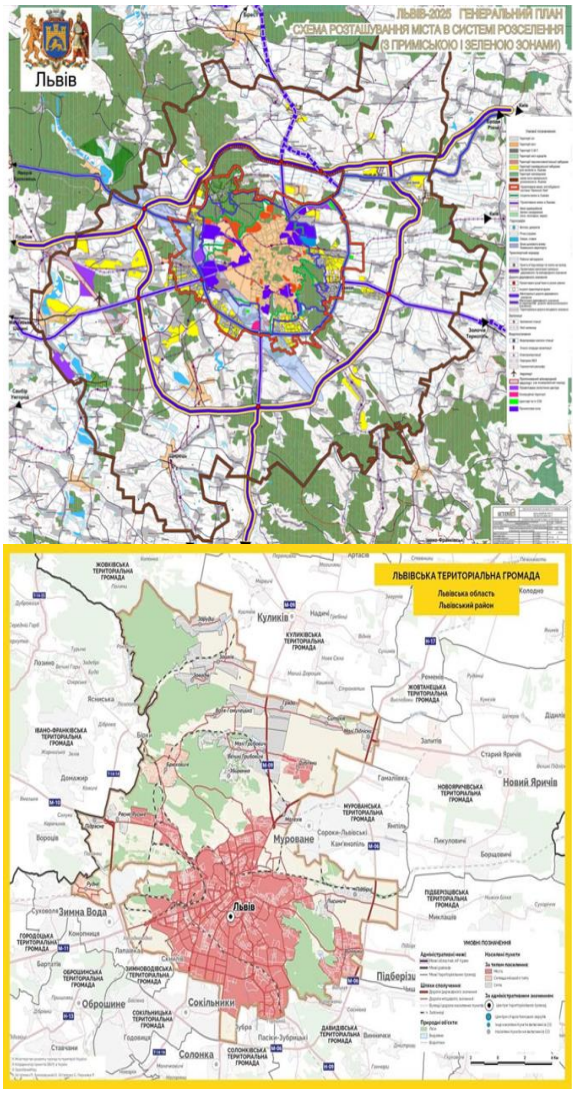

Fig. 2. Schemes of Lviv urban territorial community (a) and Lviv suburban zone (b) [created by authors]

1. The characteristics of the city center include the number and structure of residents; economic potential (employment prospects and the number of jobs); development of social and engineering infrastructure (water supply, food supply, energy supply); state and dynamics of the real estate market [17]. The main attention was paid to the city's transport network and engineering and transport problems.

Lviv is the largest multifunctional city in the western regions of Ukraine with an 800-year history, a large industrial center, and a transport hub in the past. The area of the city community is 315 square km, the population is 783,065 people, and the density is 2481.19 people/sq km. In the field of the city's transport system, there was a redistribution of freight and passenger transport in favor of road transport, and the demand for electric transport increased. The level of motorization has increased

from 100 to 300 units over the past 30 years per 1000 people.

Ten important directions converge in Lviv, and the centralization of transport communications is observed within the immediate environment. Within the city center, people move: 25 % by car; 24 % – by bus and on foot; 22 % – by electric transport; 4 % – by bicycles (22 %), 1% – by taxi, scooters, scooters, etc. The high density and historical value of buildings in the central part do not allow the reconstruction of streets with the expansion of carriageways.

The complex topography of the area significantly affects the choice of routes and the speed and safety of traffic. The location of the historical part of the city in the Lviv basin creates problems with the development of underground urbanism, including underground high-speed tram. Contradictions arise between the functional characteristics of the city space and the complex transport system. The functional structure of the city has developed historically and has a mosaic nature of interweaving zones of different functional content.

The Plan of Sustainable Urban Mobility of Lviv [19] has been developed to solve the problems of moving people, increasing network capacity, normalizing traffic, and moving around the city. However, it does not outline a systematic approach to solve key issues – public transport in the suburban area is underdeveloped, inefficient, and uncomfortable, and the city is "choking" from traffic jams. Lviv has entered the stage of functional "drying up". It is a phenomenon that has engulfed the once efficient city.

2. The characteristics of suburban areas include settlement system (location of settlements and their density), urban settlement, characteristics of the population (share of the urban population in these areas, ratio of the population of the suburban area to the city-center, employment and structure of employment, socio-demographic situation); economic development of the suburban area (structure of economic systems); the quality of the environment (the difference in the ecological state between the city center and the surroundings).

The suburban area of Lviv is almost 3 thousand square km (13 % of the regional territory), and the population is about 1.2 million people (approximately 45 % of the population of Lviv region, taking into account the population of the regional center). The spatial structure of the suburban zone of the city (Fig. 2b) is characterized by a variety of natural and landscape conditions, a high population density, a concentration of production, engineering and transport infrastructure, and the dynamism of economic and social processes taking place here.

One of the features of this territory is its location on the Main European Watershed, which divides the territory almost in half. Separate natural areas with a complex configuration are distinguished within the zone. They are the geomorphological area of Lviv Roztochchi, Davydivska hriada, and Hologora; the Lviv Plateau stands out from the south, and the Hryadove Pobuzhzhia, which is divided by the Poltva River and its tributaries, from the north.

The system of settlement in the suburban territory is characterized by unevenness: in the western direction within the borders of Zhovkva and Yavoriv districts, the farm system has been preserved; in connection with the construction of a military training ground in this area after the Second World War, the natural process of settlement formation was interrupted, it has not stabilized to this day.

The settlement network of the suburban zone of Lviv is characterized by different population sizes; quantitative predominance in the settlement structure of small and medium-sized settlements (from 5 to 10 thousand people), which mostly perform agricultural and recreational functions. It is also characterized by the absence of urban-type settlements in the settlement network of the rural administrative environment and intensive development of pendulum migration of the population.

3. Developed connections between the central city and suburban territories include transport accessibility of the central city (network and transport system development), distance from the center and accessibility to peripheral communities, economic relations between the central city and the surrounding territories (integration of the labor market, agricultural enterprises and land to provide the population with products), the share of workers in the center and suburban areas, functional connection, continuity of construction, the prevalence of urban lifestyle, the cohesion of territorial communities.

In conditions of depopulation and a decrease in the number and quality of functions (tourism is preserved, the IT sector is developed, the "fabric" is growing – residential construction as a static component) the kinetic structure degrades. The analysis of the relationship between the characteristics of space and indicators of kinetics in urbanized systems indicates the growing need to use multi-criteria methods in justification and decision-making.

The kinetics model makes it possible to evaluate the whole set of factors that ensure movement in space. A detailed analysis was carried out regarding the processes of: a) movement of people; b) functioning of life support engineering networks; c) the logistics system of providing products and goods.

a) analysis of population movement

Spatial and statistical parameters of pendulum migration can be traced on the example of Pustomyt, where 2/3 of the population of working age commutes to Lviv for work and study every day; the increased dynamics of the annual rate of growth of the population, which is due to the development of migration processes, primarily from rural areas [11]. Most settlements in the suburban zone are characterized by the development of post-suburbanization processes (construction of modern residential blocks, employment of the population in the tertiary sector, in particular in trade and the field of household services, the development of new means of communication, which provides the opportunity to work remotely, etc.). In quantitative terms, the volume of load on Lviv, which creates transit traffic flows, averages 348,000 residents.

The average volume of city traffic generated by the city's residents per day is more than 2 million trips by various types of transport, and tourists added more than 35,000 trips in peacetime. The most popular places of entry into the city are railway stations (46% of the total) and car roads (36%). Half of the total volume of human traffic is created by residents living in a 15-km zone around Lviv (more than 76,000 residents every day), as well as from settlements that are 4-10 km from the city (25% of the total volume, or more than 38,000 people). The most intense traffic was recorded at the exit point from the villages of Malekhiv and Murovane (4 thousand people) and through Horodotska (3.8), Stryiska (3.5), Lychakivska (3.3) streets (Fig. 3).

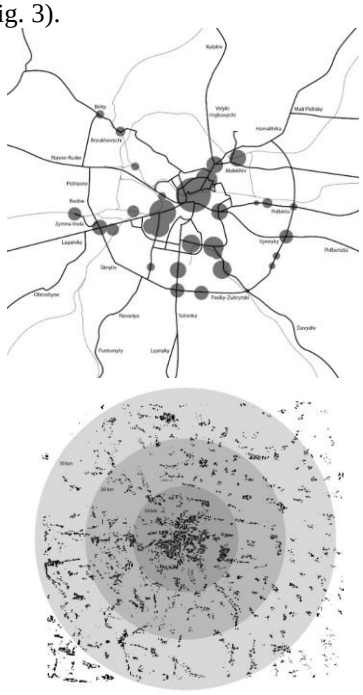

Fig. 3. Centers of active movement of people and scheme of public transport routes [created by authors]

According to the authors, slowing down the development of the transport network and public transport systems in the suburban area is due to the slowing down of suburbanization processes, which are connected with the increase in the cost of land in the city center. This factor reduces its influence with the creation of the Lviv City Territorial Community (2016) and the annexation of adjacent territories to the city. It was assumed that the development of off-street public transport would free up more space for other types of movement and the development of transport infrastructure.

b) the analysis of engineering systems of city sustainability

The water supply system in Lviv was gravity-fed for a long time and included water intakes, reservoirs and a water supply network. Today, Lviv's water supply is carried out exclusively from underground sources (18 group water intakes and 1 gallery), located at a distance of 20 to 80 km from the city. The explored reserves, provided they are effectively developed, are sufficient for the normal water supply of the city for the next 50 years. The city uses 45–50% of explored underground water reserves (280–300 thousand m3 of water per day; approximately 200 l/day (with the estimated capacity of water intake facilities of 452 thousand m3/day) per inhabitant). Due to the lack of demand, the Verkhnyobuzk water intake at a depth of 200 m is not used (available water reserves of 90,000 m3 per day). Thanks to the implemented zoning of the city water supply network and the creation of 11 hydraulically independent water supply zones instead of four, along with other actions (Project "Water Supply and Sewerage of the City of Lviv", 2008), the problem of water supply was solved (in 2002, 20% of the city residents used water around the clock; in 2009 – 89%; now – 100%). Water is supplied to the city by 581 km long main water pipelines. A complex and technologically important element of the system is the urban distribution network, the length of which is 800 km with only large-diameter pipes (100–900 mm).

The wastewater disposal system consists of 605 km of sewer networks (in 1938, the length of the city sewer system was 163 km). The city's domestic, industrial and storm drains runoff through the completely closed collector of the Poltva River (until the middle of the 19th century, together with numerous streams, flowed freely through the streets) enters the treatment facilities with a design capacity of 490,000 m3/day (consisting of two technological lines), where their mechanical and full biological cleaning is carried out. Since the natural and landscape conditions of Lviv cause frequent and large floods, the main river of the city could not cope, the problem was extremely acute:

c) the analysis of the logistics system of providing products (food security) and industrial goods to city residents

The city processes, receives, and sends hundreds of thousands of cargoes every day. Lviv is supplied with products and industrial goods, as a rule, from warehouses and within individual divisions. Companies in this field are improving the logistics system for competitiveness in the market. The companies "Logistic Park Lviv" and "Karpaty-Logistik", Devik, which are among the largest warehouse complexes in Western Ukraine, have new modern office and warehouse complexes and access roads to highways. The city is at the initial stage of creating logistics hubs. A universal warehouse and sorting complex "Postal and Logistics Center" (the area of 26,000 square meters), a new "Epicenter" in Sokilnyky (240,000 square meters), a logistics center in Pasiky-Zubrytskyi (a project of the Ukrainian company Regno, which is engaged in the import of various food products into Ukraine with the total area of the territory is more than 8 hectares), and logistics centers in the area of St. Horodotska, Taras Shevchenko, and Yaroslav the Wise are in the perspective of construction. The movement of resources and goods is linked to the location of storage, transportation, and sales centers and has a decisive influence on the movement in the system.

We evaluated the kinetics and the processes of movements against the background of the general processes of Ukraine in wartime conditions. Strengths and chances are highlighted:

- world support for Ukraine in the war with Russia;
- the integration of critical infrastructure into the EU common market;
- expansion of opportunities to attract funds from international structures for the reconstruction of critical infrastructure;
- modernization of national documents of the spatial development of territories according to EU standards;
- activation of technological development, improvement of access to modern technologies, creation of a new structure of the economy;
- strengthening Ukraine's position on the world market as a food supplier.
- Weaknesses and threats for Ukraine, the region, and the local system of resettlement of Lviv:
- the destruction of industry and critical infrastructure;
- a drop in real GDP, a decrease in the living standard of residents;
- mass migration abroad, demographic crisis, growth of unemployment among people of working age;
- problems of the agricultural sector, ineffective land policy;
- difficulty with logistics (blockage of ports, destruction of transport infrastructure);
- unfinished reforms (decentralization, judicial, tax, etc.).
- According to the kinetic model of "movement - space" relations, the following points are recorded in relation to the local settlement system of Lviv:
- relocation of production facilities. Lviv and the region became the main ones in the relocation of technological companies (before the war, the city was the third after Kyiv and Kharkiv in the IT sector - 30,000 specialists worked here; now the number has increased to 100,000 people);
- attempts to create a new structure of the economy and development of industrial parks and industrial clusters;
- development of transport and logistics infrastructure (completion of the north-western part of the ring road of Lviv, formation of transport and logistics hubs on the border with the EU, narrow railway to Lviv);
- formation of a temporary resettlement system of forced migrants. According to estimates, more than 500,000 forced migrants have moved to Lviv Oblast, 200,000 to 250,000 of whom intend to stay here. More than 200,000 people from Lviv Oblast are "wage earners" who have gone abroad for a long time;
- increased attention to the viability of systems and security (production, storage, logistics, processing, realization of energy resources and food, cooperation, control over resources);
- unsystematic territorial policy and reservation of plots for the development of infrastructural systems of the region.

Based on a well-founded kinetic model and analysis of movement processes in the system, the initial requirements for the spatial organization of the agglomeration are determined under the conditions of increasing the movement efficiency index.

Justification of solutions for the spatial organization and development of the "Great Lviv" agglomeration based on kinetic requirements

Spatial organization as a means of ensuring the harmonious integrity and development of the system involves defining the components of space and arranging the connections between dimensions: people (social) – functions (economic and operational) – conditions (natural and legal environment) – time (cultural and historical) – geometry (layout and composition). Its main purpose is the formation of spatial order, effective
exploitation, and development of territories, protection of the natural and historical environment, stimulation of socio-economic processes, coordination, and complex solution of coordination, investment, control, and security tasks. A special role belongs to the issues of managing territories and resources, as well as increasing the "connectivity" of space.

Based on this understanding of the tasks of spatial organization and development of the local settlement system, the requirements for the "Great Lviv" agglomeration are formed. We interpret the city and the suburban zone as a kinetic system, accordingly, it is advisable to focus development on increasing the efficiency of processes, connections, and relations (connections and movements):

1) *coordination of local and general processes*: general and local goals, integral and partial criteria for assessing its achievement, determination of priorities (resource and time), the hierarchy of functions and "powers". Special attention needs to be paid to optimization of boundaries, assessment of resources and networks, coordination of interactions;

2) *equalization of spatial accessibility conditions* is associated with the reform and development of the street network of the central city, public transport systems, terms and sources of financing, regulation of traffic, etc. Important evaluation criteria are operational losses, energy efficiency, capital intensity, safety, environmental friendliness and comfort;

3) *minimization of unproductive movements* by reforming and harmonizing spatial characteristics (social, functional, natural-landscape, geometric, historical) with a priority on new technologies and information systems;

4) *development of inclusive and elimination of extractive systems* that inhibit development. Property rights, in particular to land, should be rationalized as conditions for stimulating infrastructure development, avoiding mistakes in construction and land speculation;

5) *regulation of movements at different levels* means wide use of scientific achievements, primarily in the field of urban planning, sociology, economics, and informatics, development of new management technologies and their implementation in practice, involvement of scientists in analytical work, increasing the level of provision of the apparatus with decision-making support systems based on modern methodology and informatization tools, compliance with the principles of publicity and transparency in activities.

The development of local regional settlement systems and agglomeration planning is aimed at revealing the uniqueness of space, each subsystem of which has its own geographic, economic, social, geometric and historical specifics. The kinetic model is most consistent with the policy of integrated development and is associated with the revitalization of degraded space and an increase in the efficient use of non-renewable resources (primarily land). It is aimed at strengthening the identity of cities and districts, which should be accompanied by increasing the dynamism and competitiveness of the entire space of the settlement system, the effective formation of a systemic combination of the central city with the surroundings, which become more attractive, capable of meeting growing needs at the expense of common resources, the creation of conditions for coordination of processes and needs of balanced territorial development of the entire region in conditions of dynamic processes and phenomena.

The substantiation of the priority directions in development will take place on the way of clarifying dichotomies, in particular, the strengthening of existing ones, such as the development of new structural connections in the territory, "integration - isolation" of nature protection, and economic objects, the choice of economic forms of using the spatial potential of the region, etc. Thus, in dichotomies:

1. of urbanization – deurbanization should be focused on the development and return to life of small towns and towns, the spread of urban lifestyles;
2. a mono-functional - poly-functional structure should focus on expanding the functions of both the central city and the suburban zone, increasing the functional flexibility of the system;
3. of concentration – deconcentration of economic activity, deconcentralization is more beneficial, which is more consistent with the spatial structure and historical traditions of management in the allocated territories;
4. monocentric – the polycentric structure of the supporting centers indicates the need for support and development of settlements of the environment and the creation of new growth centers;
5. closeness – the openness of the location system, traditions and processes in the region confirm the need to effectively expand the openness of the system to the external environment, strengthen existing and build new structural ties.

The answers to dichotomies allow us to substantiate the principles of spatial organization and development of local settlement systems according to the requirements of kinetics: unity, dynamization of space, and consistency of dimensions. The unity of the spatial organization is connected with the transit function of the agglomeration. Throughout its history, Lviv was not characterized by high indicators of these processes, which were influenced by the specifics of natural resources, political and economic conditions. These principles receive active development in new political and socio-economic conditions, form the demand for the dynamization of space, and the coordinated development of transport, engineering, and information communications. Macro characteristics, which are substantiated when outlining the prospects for effective interaction of the city and its suburban zone, include functionality, communication efficiency, compactness, the dynamism of space, and the development of the structure.

The model of spatial organization and development of the "Great Lviv" agglomeration which was formed on the basis of kinetics provides: 1) strengthening the

integrity of the entire spatial system (settlement, and the functional and planning structure of the territory, including the integration of recreational, agrarian functions and etc.); 2) increasing the dispersion of the settlement structure by supporting the development of small settlement elements through a change in functions; 3) strengthening the multifactorial differentiation of the functional structure of territorial elements according to efficiency criteria, as well as taking into account the specifics of natural and landscape conditions, the nature of settlement and management, historical and cultural features; 4) redistribution of transportation in favor of effective public transport systems and creation of conditions for alternative communications, development of transport infrastructure in the system, formation of transfer stations from private to public transport, increasing the number of slow-moving and pedestrian streets, allocation of public transport lanes, etc.; 5) increasing the multifunctionality of the space (when the working place is near the place of residence); 6) allocation of communication spaces of local settlement systems as a separate administrative-territorial layer of the region. There are various options for "collecting" communication systems into the spatial structure of territorial systems, such as by means of spatial planning and urban design, the creation of metropolitan areas that cover the central city and surrounding communities (with the mandatory provision of powers to solve tasks and perform metropolitan functions).

Conclusions

1. The properties of urbanized systems are characterized, and the special role of dynamism and kinetics in the development of the settlement system and agglomeration planning is emphasized. The central factor in all types of movements in urbanized systems is the events and processes that take place.

2. The nature of movements and kinetics as an all-encompassing phenomenon is characterized. The analysis of fundamental and applied theories of movement indicates the usefulness of the laws of classical mechanics and the principles of thermodynamics, the general theory of systems, and engineering systems for substantiating the kinetic model of the development of urbanized systems, ordering indicators, and criteria for evaluating their kinetics.

3. The kinetic model of the development of local settlement systems is presented in the form of a multidimensional matrix (which includes 20 indicators that characterize space and 20 characteristics of movements) and contains the information about the five-dimensional model of urban planning space "man – functions – conditions – geometry – time". The matrix makes it possible to analyze both individual elements of space and their interactions (780 combinations) in order to evaluate the state of space according to the criteria of kinetics and to substantiate the ways of urbanized system development on the basis of kinetics.

4. The methodological value of the kinetic model is confirmed, which reveals wide possibilities for the analysis and assessment of various spatial situations, as well as the coordination and synthesis of spatial organization and development of local settlement systems. The requirements for modeling the spatial development of agglomerations are substantiated (they range from the selection and structuring of information to the search for ways and means of using modeling results).

5. The provisions of the kinetic model were applied for the analysis, evaluation, and justification of the concept of spatial organization and development of the local settlement system "Great Lviv". The prospects of Lviv as an agglomeration in the system of connections and relations with the environment are revealed. The requirements for development and proposals to optimize movements within the agglomeration are substantiated. It is necessary to focus on the search for solutions that reveal the uniqueness of the city and its surrounding space.

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Kopsavilkums. Pētījumā tiek pētītas vietējo norēķinu sistēmu kinētiskās sastāvdaļas ar realizētiem procesiem, kas saistīti ar cilvēku, materiālu, enerģijas, informācijas u.c. kustību. Tiek piedāvāts lokālo norēķinu sistēmu organizācijas un kontrolētas attīstības kinētiskais modelis, kas balstās uz zināšanām par kustību teorijām un ar tām saistītām telpas īpašībām un sniedz iespēju organizēt savienojumus starp tās apakšsistēmām un dažādu sfēru elementiem.

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Development Patterns of Universal Design in Residential Courtyards in the Jugla Neighbourhood

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Abstract: Quality and accessible outdoor living space in the immediate vicinity of one's home is an important factor in ensuring people's well-being, safety and community belonging. Access to building entrances is one of the key conditions for people to be able to reach the outdoors and enjoy equal mobility opportunities. Thus, one of the important challenges in achieving the principles and objectives of universal design on a small scale is related to building entrance areas. The building regulations at the time when most of Riga's large-scale residential areas were built did not include requirements for environmental accessibility solutions. Most of the entrance areas of residential buildings and adjacent areas were constructed according to the construction practices of the time, using concrete steps to connect the carriageway level with the staircase doors. The study therefore includes conceptual solutions for environmental accessibility in building entrance areas - existing locations with specific environmental characteristics that would be applicable to as many building entrances as possible, regardless of the location of the buildings.

Keywords: universal design, courtyards, neighbourhood, urban environment

Introduction

The development of cities and their housing stock over the last 60 years has been rapid, not only in Latvia but globally, with the creation of large-scale housing estates, thus encouraging the migration of people from rural to urban areas. The development of urban residential areas has gone hand in hand with the development of extensive transport infrastructure, the main objective of which has been to ensure the most convenient organisation of road traffic. The housing stock and the volume and importance of roads and road transport have grown, but the role and importance of people in the urban model have diminished over the decades and the conditions under which people move around the city and in residential areas have gradually deteriorated. Although the last decade has seen a gradual change in thinking and an increasing focus on people's needs, progress has been slow.

The concept of universal design has gained recognition in Latvia with the ratification of the UN Convention on the Rights of Persons with Disabilities, but the implementation of the Convention's requirements in both planning and implementation aspects is slow and lags significantly behind the practice in the Nordic countries. Efforts to date to provide a safe and accessible external environment for all citizens have mainly been in the planning and research phase. When confronted with the real living environment and the urban outdoor space, the study finds that the urban planning decisions, building regulations, political settings and other ambitions of previous decades have left a significant imprint on the outdoor space and that a change of approach cannot happen quickly and on a large scale, and that changes to the existing urban environment require thoughtful, careful and detailed planning and implementation. Studies have been carried out nationally on the condition of public buildings and their compliance with accessibility requirements, and NGOs have carried out studies on the accessibility of buildings and facilities, but overall no comprehensive environmental assessment has been carried out, nor is it currently included in future development plans. The research process is limited to apartment blocks built during the Soviet era when universal design principles were not included.

Residential neighbourhoods and their problems are topical in various fields, it is necessary to analyse residential areas and find solutions in the context of universal design and environmental accessibility from the point of view of landscape architecture. Therefore, the aim of the study is to determine the most optimal development and use potential for the entrances of the inner courtyards of residential buildings in the Jugla neighbourhood through modular solutions.

Materials and Methods

The changes needed in the very foundations of urban planning are clearly visible at the beginning of the 21st century. Approaches and mindsets are gradually changing and people and their needs are once again becoming a priority, as is the demand for quality living environments [3]. The redevelopment of urban spaces is necessary for them to fully fulfil their function as safe,

lively, sustainable and healthy environments. Respect for people is a key reason for changing the way we think and design at the grassroots and creating environments that serve everyone.

Accessibility is an issue that affects different city scales, from the whole city down to the courtyard level. The structure of the city, neighbourhoods and districts and the functional condition of urban spaces form a cluster that characterises the quality of life and the diversity of opportunities for people to live in and make the most of their surroundings.

Research is needed at different scales to draw conclusions about environmental quality and to find solutions for improvement. Neighbourhood areas are an integral part of neighbourhoods and the city, but their scale requires detailed and individual research and solutions. This requires clearly defined scales of issues to be investigated and a framework for solutions. Therefore, the study includes several levels of aspects and solution proposals for the Jugla neighbourhood of the city of Riga, which are carried out from the neighbourhood to the courtyard scale. One of the innovations of the work is the development of modular solutions for the entrance areas of Soviet-era apartment blocks. Using the theoretical research method, the study collects historical data on the development of courtyards and, using the comparative method, develops schemes and maps for assessing the existing situation in the Jugla neighbourhood, as well as inter-comparison of the surveyed areas and mapping of environmental accessibility at the block scale. The descriptive or monographic method was used to evaluate all the findings of the study and to gather information on universal design through theoretical surveys. In the process of the research, an outdoor space quality assessment matrix was developed, which provided comprehensive information about the current situation of Jugla's residential neighbourhoods today.

Results and Discussion

At European level, the Nordic countries are seen as leading societies in the context of inclusion and universal design, where issues of inclusion and environmental accessibility have been topical for decades. As in other parts of the world, the Nordic universal design performance is focused on social inclusion and sustainability [7] and relates todesign both as a product and as a design process from an inclusive perspective. The collaborative work of five Nordic professional groups, incorporating both practical and theoretical knowledge, has resulted in the Nordic Charter initiative, which aims to provide a rationale for a successful contribution to universal design and its understanding in society. The Charter is part of a Nordic strategy to introduce and increase awareness and knowledge of universal design in society. Although Nordic initiatives on universal design have been similar, national practices and experiences are not equivalent [7]. Despite the fact that the concept of universal design is welcomed-nationally and efforts are made to establish common frameworks, the Nordic region has not been able to find common approaches and solutions in urban planning and design. The main shortcomings in the implementation of common approaches are the coordination between national and local institutions, the integrated approach and the definition of institutional responsibilities. However, the greatest challenges are in the urban planning and design sector, which is governed by regulations, layouts, and standards, within which achieving a solution that is attractive to everyone is a complex task.

In 2016, the Association of Persons with Disabilities and Their Friends "Apeirons", with financial support from the European Economic Area Financial Mechanism and the Latvian state, prepared "Methodological material for ensuring environmental accessibility in public buildings and external environments according to universal design principles", and in 2018, the Association of Persons with Disabilities and Their Friends "Apeirons" prepared "Methodological material for ensuring environmental accessibility in public buildings and external environments according to universal design principles", with financial support from the European Economic Area Financial Mechanism and the Latvian state. In 2018, the Latvian organisation SUSTENTO, on behalf of the Ministry of Welfare, produced "Guidelines for environmental accessibility in public buildings and spaces and public outdoor space" [2]. Since the ratification of the UN Convention, various plans and reports have been developed, but the overall situation of environmental accessibility in the country lags behind the requirements of the Convention. Referring to the "Plan for Creating an Accessible Environment in Latvia 2019-2021 (Plan..., 2019), it is pointed out that no comprehensive and permanent analytical studies on environmental accessibility in Latvia have been carried out. However, various reports from the Latvian Ombudsman's Office (Latvian..., 2021) and other instances are compiled with indications of insufficient accessibility of the environment and information. The Ombudsman's report includes complaints received by the Ombudsman's Office from citizens about insufficient adaptation of the environment and housing for people with

disabilities. The accessibility status of apartment buildings is highlighted as an important shortcoming in terms of accessibility. The Ombudsman points out that this is based on the norms of the Law on Apartment Property, which are contrary to the Constitution. The provisions of the Apartment Law state that if a ramp or a lift is to be installed in an apartment building, but the general meeting of the apartment owners votes against it, people living in such buildings are dependent on the goodwill of their neighbours, which is contrary to the UN Convention and the Constitution 91 and 97 [8; 5; 10].

Non-governmental organisations make an important contribution to the study of the situation. For several years, the Association of People with Disabilities and their Friends "Apeirons" has been carrying out independent research on environmental accessibility issues. "In 2016, Apeirons reported (Plan..., 2019) that in a survey of 40,000 sites, around 80 % of new and renovated buildings were not adapted for people with disabilities and only 2% of all buildings were fully accessible. A major finding on the reasons for non-compliance of facilities cited mainly a lack of knowledge or understanding of environmental accessibility criteria. Consequently, the Jugla neighbourhood of Riga was selected for the study. The neighbourhood was chosen as one of the first neighbourhoods in Riga where the construction of large-scale residential blocks began in the mid-20th century, which now marks an important spatial structure of the neighbourhood and reflects a typical part of the city of Riga that was mainly developed during the Soviet Union.

At the scale of the quarters, residential quarters are identified architectural types of buildings are grouped, and quantitative information on the number and types of buildings in each quarter is collected.

Jugla is located 10 km from the centre of Riga in the eastern part of the Vidzeme suburb of Riga. Jugla is the second largest neighbourhood and has a complex spatial structure. Jugla covers an area of 1409.9 ha and has approximately 26,000 inhabitants. Although it is easy to identify the Jugla area in nature, however, its spatial unity in the northern part is undermined by the transit routes of the Vidzeme highway and the Sigulda railway line, which cross the territory and functionally separate the northern part of the neighbourhood. The largest part of the built-up area is occupied by

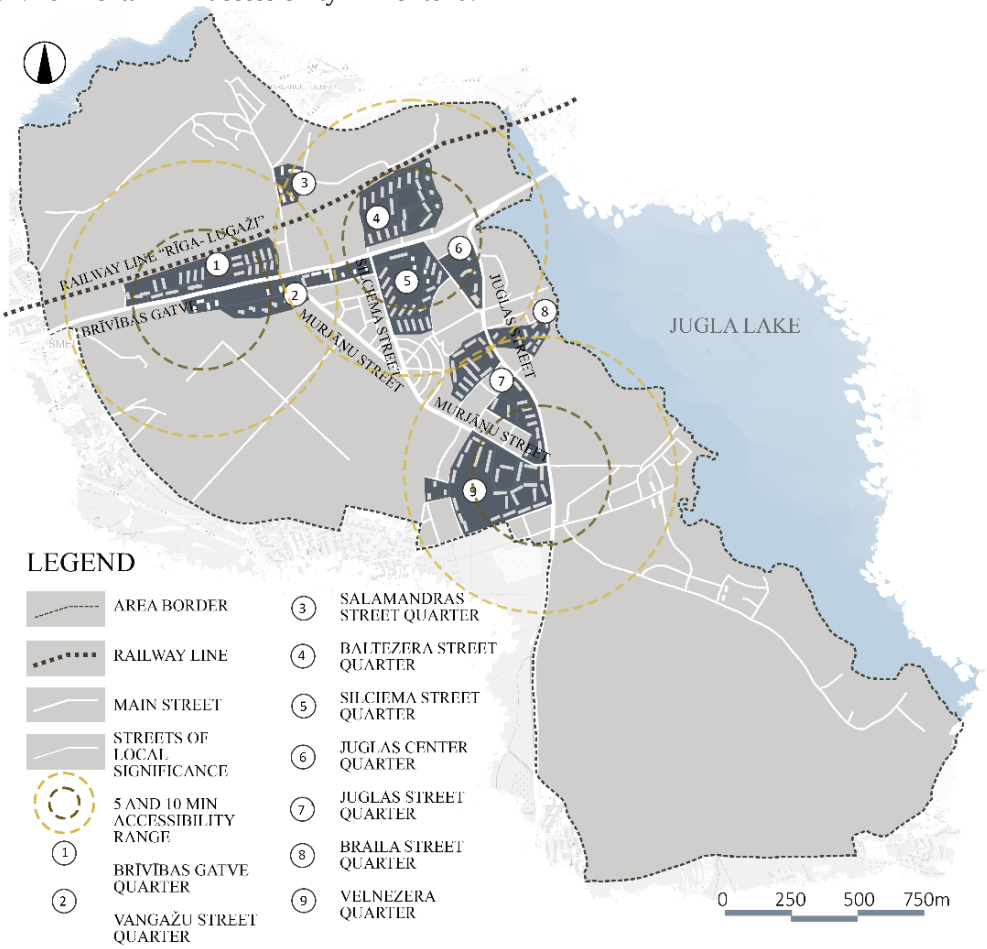

Fig. 1. Jugla residential districts [Bergmane, 2021]

residential areas – 9 %, where the dominant buildings are five-storey houses from the 1960-70s with a network of access roads, courtyards and inner courtyard green areas. There are also a number of isolated areas of 9 and 12-storey dwellings in the vicinity of the Jugla Canal and Schmerlis Forest.

The residential areas surrounding Juglas Street are divided into five blocks. The area between Juglas Street in the east, Umurgas Street in the north, Lilastes and Svīteres Streets in the west, Murjāņu Street in the south -Juglas Street Quarter. The area between Brīvības gatve in the north and Juglas Street in the east and west, is penetrated by Upesciema Street – Juglas centre quarter. The area between Juglas Street in the west and Braila Street in the east – Braila Street Quarter. The areas are between Juglas Street in the east, Murjāņu Street in the north, Veldre Street in the west and Maliena Street in the south - Velnezers Quarter.

In the Jugla neighbourhood, large-scale residential blocks began to be built in the 1960s at the same time as the construction of Āgenskalns and Ķengarags. The quarters are characterised by the spatial organisation of residential buildings typical of Soviet-era construction in the 20th century, with buildings interspersed with green spaces and a distinct network of access roads, which include driveway widths insufficient for modern traffic loads and a lack of parking spaces.

The buildings in the blocks are monotonously spaced, and parallel to each other. The spatial organisation of the inner courtyards and the arrangement of the outdoor elements in the blocks follow the principles of spatial organisation put forward by the Soviet Union, which are arranged [4; 10] at certain angles to the streets – 30, 45, 90, 120 and 180 degrees. Several types of development are characteristic of the quarters: perimeter, terraced, combined and group development [1], where each type of spatial development has its own characteristic architectural structures for buildings, road infrastructure, green areas and the arrangement of outdoor elements. The field study summarised the housing stock of the neighbourhood by building typology. A total of 9 different types of Soviet-era architectural buildings and two types of 21st-century apartment building projects were identified in the neighbourhood. The survey was carried out for the whole Jugla neighbourhood and for each residential quarter separately. In the whole Jugla neighbourhood, 163 apartment buildings with 4097 apartments were found. Based on the number of apartments, an estimate of the population was also made, assuming an average occupancy of 2.5 persons per apartment, giving a total of 10,003 inhabitants. According to

Fig. 2. Series 1-316 - Brivibas gatves quarter example [Bergmann, 2021]

Fig. 3. 1-464 series building - Silciema street block example [Bergmann, 2021]

Fig. 4. Czech type project, type 1 - Vangažu Street example [Bergmann, 2021]

Fig. 5. 9 storey project Silciema Street [Bergmane, 2021]

Fig. 6. Stalin-type building Brīvības gatves quarter [Bergmane, 2021

Fig. 6. Small families project Brīvības gatves quarter [Bergmane, 2021]

the above-mentioned summary, the two most characteristic and predominant types of typical building design in the neighbourhood are the buildings divided into series 1-316 and 1-464 according to the Soviet-era architectural standard. This type of building in Jugla accounts for 81 % of the total Soviet-era apartment buildings, but only 64% of the total number of apartments, which is explained by the number of storeys.

In the buildings of Vangažu Street, Baltezera Street and Velnezera Quarter there are also buildings of the Czech type, which are characterised by 12 storeys, they are built of brick and the construction of the buildings was mainly carried out in the 20th century. The building was built in the 1970s. In the Vangažu and Silciema Street quarter, 9-storey brick buildings with one staircase are also found.

In the vicinity of the Brīvības Street corridor you can find several Stalin-type residential buildings built in the 20th century after World War II and low-family project 5-storey buildings built in the 20th century. 1980s.

Although the scale of the study does not foresee an in-depth study of environmental accessibility in projects built in the 21st century, the context of the blocks also requires mentioning the newly built development. In Jugla, there are only a few new apartment projects, which should be characterised more as the construction of individual apartment buildings.

In order to create a transparent assessment of the residential outdoor space and its compliance with environmental accessibility requirements, one residential neighbourhood was selected for the study -Velnezers neighbourhood – where environmental accessibility was assessed at both the neighbourhood and the courtyard level. For this phase of the study, the main categories of outdoor elements were selected and evaluation criteria were developed. Using this set of criteria, the compliance of courtyard areas and elements with the accessibility criteria was assessed and conclusions were drawn on the current situation. The following stages of the study can be identified: block scale – development of a typology of architectural types of residential buildings and entrance areas. The study found that one of the most important indicators of environmental accessibility in residential neighbourhoods is the entrance areas of residential buildings. For the purpose of the study, building entrance areas have been grouped according to two parameters in order to establish accessibility evaluation criteria:

- Horizontal and vertical dimensions of the building entrance platform.
- Horizontal dimensions of building entrance forecourts.

Based on these two indicators, the study develops building entrance platforms and forecourt types, which can lead to solutions for accessibility of entrance areas.

Assessment of building entrance areas

The survey of Soviet-era apartment buildings in the Jugla neighbourhood gathered information about the different types of building entrance areas in the form of photo-recordings. As mentioned above, 9 different types of buildings were found throughout the neighbourhood, each characterised not only by the architectural structure of the building, but also by the style of organisation of the adjacent outdoor space.

The assessment of the environmental accessibility contact of the building entrance areas shows that some of the building entrance areas are level with the pavement level of the driveway, however, most of the building entrance platforms are located on several steps, without levelling devices and are not accessible for people with reduced mobility. Thus, all the building entrances surveyed were aggregated and entrance platform types were created, grouped according to the vertical dimensions of the entrance platforms up to the level of the entrance door. As existing access solutions for entrance areas are mainly grouped according to the number of platform steps, this was also the basis for the creation of platform categories, graded according to the average height of one step – 15 cm. This resulted in 5 groups of entrance platforms.

Another important aspect of building entrances is the size of the forecourt space, as this influences pedestrian movement patterns and the quality of accessibility. The organisation of the forecourts at the entrances of buildings is characterised by certain features for each category of building, mainly in the horizontal plane. They are characterised by two parameters: the width of the entrance platform and the length of the entrance forecourt to the carriageway. This has led to the creation of 4 categories of entrance forecourts, as shown in the table below.

TABLE1

Categories of building entrance platforms
[created by authors]

Type	Description	Number of steps	Ramp length required for environmental accessibility, m
1	Building entrance platform flush with pavement	None	Not necessary
2	Building entrance platform level difference up to 15cm with pavement	1	Up to 3m
3	Building entrance platform level difference 15–30cm with pavement	2	3–6 metres
4	Building entrance platform level difference 31–45cm with pavement	3	6–9 metres
5	Building entrance platform level difference over 45cm	More than 3	Over 9 m

Types of entrance platforms found in the Jugla area:

Fig. 7. Entrance platform – Type 1 [Bergmane, 2021]

Fig. 8. Entrance platform – Type 2 [Bergmane, 2021]

Fig. 9. Entrance platform – Type 3 [Bergmane, 2021]

Fig. 10. Entrance platform - Type 4 [Bergmane, 2021]

Fig. 11. Entrance platform - Type 5 [Bergmane, 2021]

TABLE2

Categories of building entrance forecourts
[created by authors]

Type	Description
A	Width of building entrance platform: >2 m; entrance forecourt extends to the building facade
B	Width of building entrance platform: >2 m; length of entrance forecourt to carriageway: <3 m
C	Length of building entrance platform: >2 m; length of entrance forecourt to carriageway: >3 m
D	Length of building entrance platform: >5 m; entrance forecourt extends to the building facade

Fig. 12. Entrance forecourt – type A [Bergmane, 2021]

Fig. 13. Entrance forecourt – type B [Bergmane, 2021]

Fig. 14. Entrance forecourt – type C [Bergmane, 2021]

Fig. 15. Entrance forecourt – type D [Bergmane, 2021]

The entrance area layout of the Khrushchev type 1-316 series buildings is characterised by 2 different types of forecourt organisation: 1) the forecourt area extends directly along the building facade; 2) the building entrances are located several metres away from the carriageway and are separated by green areas.

Typology of building entrance areas

The typical vertical and horizontal parameters of the entrance areas of each serial building can be deduced from the data of the buildings in the neighbourhood. The entrance areas of each building are thus grouped according to the criteria established above and presented in the table below.

TABLE 2

Correlation of categories of entrance areas with building types [created by authors]

Building type	Description of building type	Entrance platform category	Entrance forecourt category
1	"Khrushchev" type building – Series 1-464	1, 2, 3, 4	B, C
2	"Khrushchev" type building – Series 1-316	1, 2, 3, 4	A, B, C
3	Czech project – 12-storey building; type 1	2, 3	D
4	Czech project – 12-storey building; type 2	4	D
5	Spec project – 12-storey building	5	D
6	9-storey buildings	4	A
7	Single-family building; type 1	4	A
8	Single-family building; type 2	1	C
9	"Stalin" type buildings	4	A

Characterising the groups of entrance zones in different layouts, it can be concluded that all the entrance zones found in the residential areas of Jugla can be divided into.

By combining the categories of building entrances and forecourts created above, a combined typology of entrance areas has been created, as shown in the table below.

From the summary, it can be concluded that there are 15 different types of residential entrance areas in the neighbourhoods. As the entrance platform type 1 includes a single-level access area to the front door of the buildings, this category is considered to meet the environmental accessibility requirements for the purpose of the study and no further conceptual solutions to the problem are sought. As the study has identified a certain number of parameters related to entrance areas, it is necessary to assess the development of standardised accessibility platform-type models that provide convenient, adaptable, visually high quality and accessible access to building entrances.

TABLE 3

Typology of building entrance areas and its application in the Jugla neighbourhood [created by authors]

Building entrance platform/ Building entrance area	Building an entrance platform on one level with the pavement	Step height up to 15 cm	Step height 15–30 cm	Step height 30–45 cm	Step height over 45 cm
Width of the building entrance platform: ->2 m; the entrance forecourt extends to the front of the building	–	2A	3A	4A	–
Width of the building entrance platform: >2 m; length of entrance forecourt to carriageway: <3 m	1B	2B	3B	4B	–
Length of building entrance platform: >2m; length of entrance forecourt to carriageway: >3m	1C	2C	3C	4C	–
Length of building entrance platform: >5 m; the entrance forecourt extends to the front of the building	–	2D	3D	4D	5D

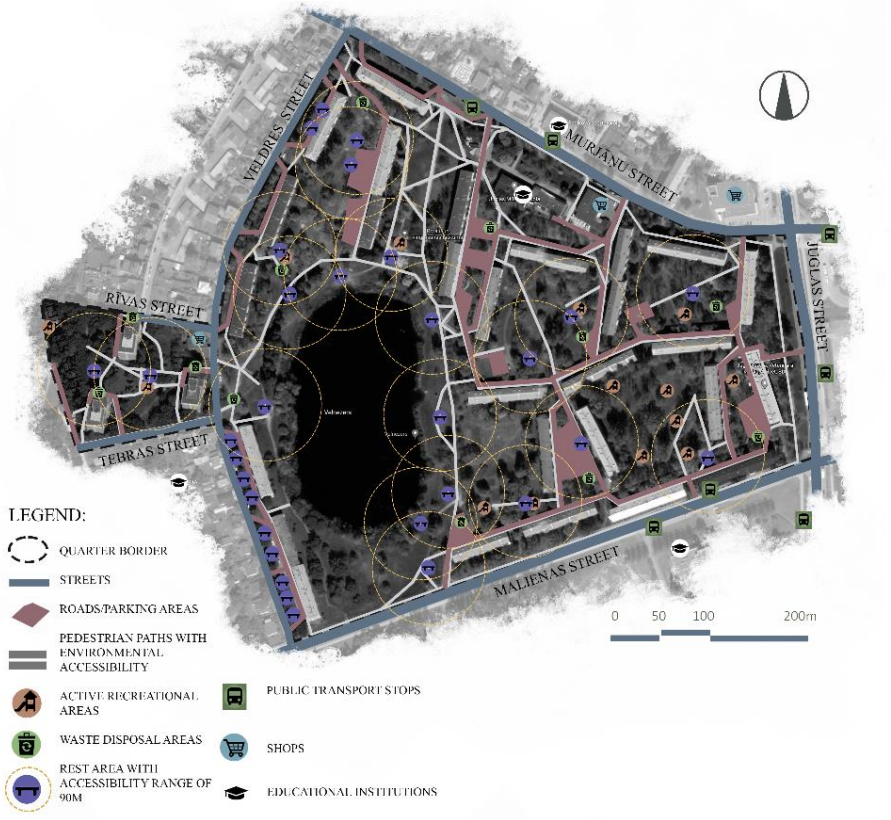

Fig. 16. Accessibility map of the Velnezers quarter [diagram by the authors, using www.google.com/maps]

Summarising the results of the study of the existing situation of the blocks in the context of accessibility, it can be concluded that improvements are needed for each group of elements to ensure the environmental accessibility of the residential areas, but improvements are needed for the whole block. One of the main reasons for the lack of accessibility is the outdated and degraded state of the road surfaces, and the lack of lighting, which limit the use and accessibility of the zones.

Concept

The principles of spatial organisation of the typical Soviet-era large-scale housing blocks and courtyards allow for the creation of typical environmental accessibility solutions, thus ensuring the introduction of a unified design concept in the entrance areas of the buildings. This can be achieved through a uniform choice of forms, materials, colours elements and modular solutions. The concept is based on the idea of a modular entrance node solution, similar to the one used in the 'parklet' zones, creating a small seating and green area as a public amenity on or adjacent to the pavement. Parklet ideas are currently mostly implemented in urban areas in car parking zones, where standardised-sized seating platforms are placed. Similarly to parklets, the concept is to turn building entrance areas into attractive and multifunctional seating areas with different configurations. The modular solutions are intended to incorporate a set of elements tailored to the specific characteristics of the respective entrance areas. The mix of elements can be changed according to the preferences of the residents.

Typical modular solutions

According to the typology of entrance areas developed in the study, 12 typical entrance area solutions have been developed, corresponding to each of the entrance area categories:

TABLE 4

Summary of building entrance zone types [created by authors]

Building entrance platform/ Building entrance area	Step height up to 15cm	Step height 15–30cm	Step height 30–45cm
Width of building entrance platform: <2 m; entrance forecourt extending to building facade	A2	A3	A4
Width of building entrance platform: >2 m; distance of entrance forecourt to carriageway: <3 m	B2	B3	B4
Length of building entrance platform: >2m; distance of entrance forecourt to carriageway: >3m	C2	C3	C4
Building entrance platform length: >5 m; the entrance forecourt extends to the front of the building-	D2	D3	D4

The existing concept does not foresee the creation of a 5th entrance platform type solution, as the vertical level difference of the entrance platform is above 45 cm, to provide access to buildings with a level difference, it is recommended to create environmental accessibility by means of a mechanical device. The use of mechanical lifting devices is not included in the concept and should be addressed in another study. Each of the 12 standard solutions is designed as a module and includes the above-mentioned landscaping elements -ramp, flower boxes, boundary walls, benches, litter bins and, in some modules, bicycle racks. For each of the 12 types, 2 modular variants have been developed.

3D examples of typical models

Typical modular solutions are visualised according to the concept idea. As mentioned above, the ramp design takes into account the regulatory requirement of 5% longitudinal drops, so that access to buildings can be made by one individual without the participation of others. The ramps are designed in lengths of 3, 6 and 9 m, depending on the number of steps.

A-type

The developed solutions of A-type 2, 3, 4 models are suitable for the buildings of the "Khrushchev" project series 1-316, where the building entrance areas are narrower than 2m and the hard pavements of the carriageway are adjacent to the building facades and the entrance platforms are projecting from the building facades. A4 models are also suitable for the Stalin project, 9-storey buildings and Small Family Type 1 buildings.

B-type

The developed B-type model solution is suitable for both the 1-316 and 1-464 series buildings of the "Khrushchev" project, for which the entrance to the buildings is more than 2 m wide and the distance from the entrance to the carriageway is up to 3 m.

C-type

The C-type model solution is suitable for the largest number of building project types. It is applicable to both the Khrushchev 1-316 and 1-464 series, as well as to the entrances of the Small Family buildings, where the entrance plazas are wider than 2m and the distance of the entrance to the carriageway is greater than 3m.

D-type

The D-type model solution is mainly suitable for the 12-storey buildings surveyed in the Jugla neighbourhood, where the entrance areas are wider than 5 m and the entrance forecourts are adjacent to the building façade.

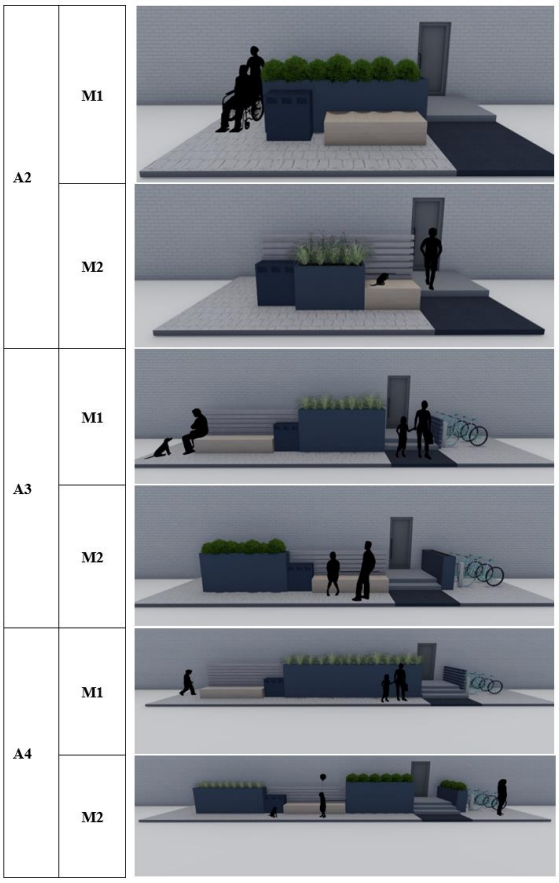

Fig. 17. Solutions for A-type entrance areas [created by authors]

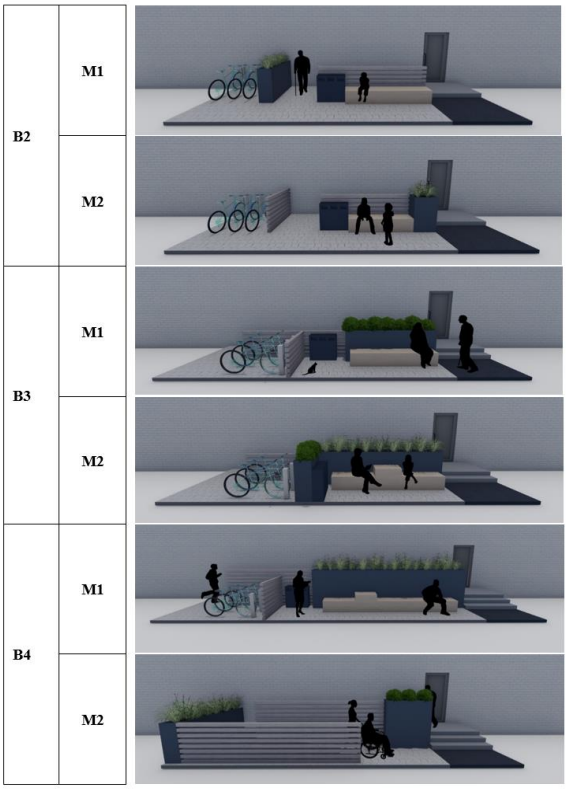

Fig. 18. B-type entrance area solutions [created by authors]

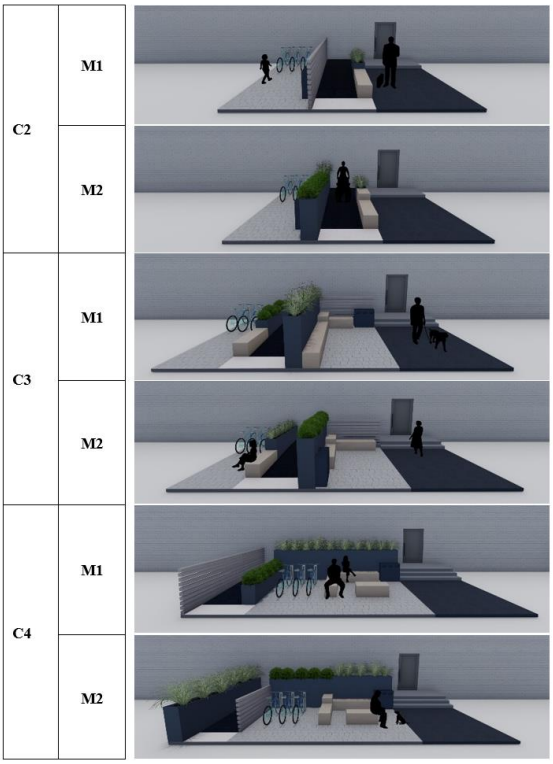

Fig. 19. C-type entrance area solutions [created by authors]

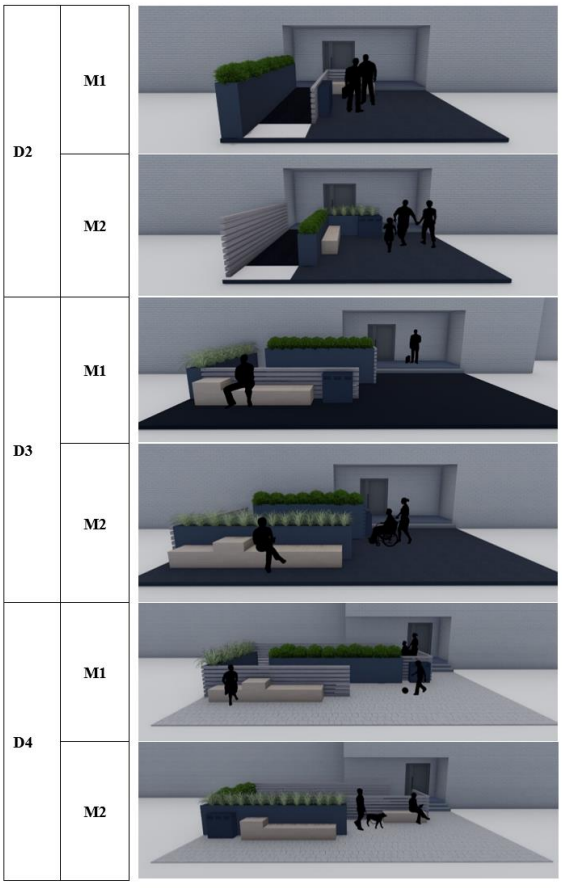

Fig. 20. D-type entrance area solutions [created by authors]

Modular entrance areas offer a high degree of customisation and modification, as the connectivity of the elements allows the flexible design of different types of modules according to user preferences and can be implemented on a staircase or house scale.

Conclusions

1. For decades, people and their needs have been subordinated to the development focus of urban transport infrastructures, where the urban environment no longer serves its main purpose - to be a healthy and sustainable place where people meet, live, talk and where the environment is subordinated to people as a priority. Today, a built and accessible environment for people is becoming a priority.
2. Applying the principles of universal design at the level of design concepts can incorporate and respond to the specific needs of groups of individuals, and create harmonious solutions that are equally beneficial and suitable for all citizens.
3. Public education and involvement are needed to raise public awareness of universal design. Actions that raise awareness among users encourage rapid adoption of ideas and principles. Education among the design professions and academics is a priority. Successful solutions require compatibility with many good practices.
4. In Latvia, the progress made so far on the UN Convention on the Rights of Persons with Disabilities is very different from that in the Nordic countries, but planning and conceptualisation are underway, as are studies on environmental accessibility in public buildings and public open spaces, but there is a lack of research on the state of the housing stock to identify. However, data on accessibility issues are collected, both by representatives of non-governmental organisations surveying various facilities in Latvia and by the Ombudsman, who collects complaints from citizens about the lack of accessibility.
5. Problems can also be seen in the context of the regulatory framework, which is mainly related to the complex area of property rights and has a direct impact on the opportunities and pace of development of territories. In the context of accessibility, the regulatory issues are most acute in the large-scale housing stock, which is 20th century 1950s.
6. The results reflect the problems of residential neighbourhoods, which are not only related to accessibility issues but also to the quality of the environment in general. The pattern of problems identified can be applied to any residential area where improvements to the landscaping and surrounding areas have not

been made for a long time. The environmental situation in the neighbourhoods is significantly worsened by the increase in the number of vehicles in the context of limited space.

7. Improvements to existing residential neighbourhoods are a complex and multifaceted task, involving the assessment of road infrastructure, green infrastructure and amenities, and the search for harmonious solutions. Initiatives to transform existing infrastructure are subject to technological, legal and physical challenges, where the implementation of successful solutions depends on a balanced interaction of options.

8. In the context of accessibility improvements, the work includes a proposal of small-scale solutions developed and typologies of building entrance areas created in the study. At a conceptual level, modular environmental accessibility solutions for entrance nodes are proposed. The concept of modular solutions is based on the idea of attractive and multifunctional seating areas with different configuration possibilities and consisting of a set of elements adapted to the specific characteristics of the respective entrance areas and whose composition can be changed according to the needs.

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Kopsavilkums. Kvalitatīva un pieejama dzīvojamā ārtelpa savas dzīvesvietas tuvākajā apkārtnē ir svarīgs faktors cilvēku labsajūtas, drošības un kopienas piederības nodrošināšanai. Piekļuve ēku ieejām ir viens no galvenajiem nosacījumiem iedzīvotāju spējai sasniegt ārtelpu un baudīt līdzvērtīgas pārvietošanās iespējas. Tādejādi viens no svarīgiem uzdevumiem universālā dizaina principu un mērķu sasniegšanā mazā mērogā ir saistīts ar ēku ieeju zonām. Būvniecības normatīvais regulējums laikā, kad tika būvētas lielākā daļa no Rīgas lielmēroga dzīvojamiem rajoniem, neietvēra prasības par vides pieejamības risinājumiem. Lielākā daļa dzīvojamo ēku ieeju zonu un pieguļošo teritoriju ir izbūvētas atbilstoši tā laika būvniecības praksei, izmantojot betonētus pakāpienus, lai savienotu brauktuves līmeni ar kāpņutelpu durvīm. Līdz ar to pētījums ietver konceptuālus risinājumus vides pieejamības nodrošināšanai ēku ieejas zonās – esošās vietās ar specifiskiem vides rādītājiem, kas būtu piemērojami pēc iespējas vairākām ēku ieejām, neatkarīgi no ēku atrašanās vietas.

Pētījuma procesā nosakot izmantošanas potenciālu Juglas apkaimes dzīvojamai ārtelpai, ir sniegti inovatīvi un ilgtspējīgi moduļveida risinājumi Padomju laiku lielmēroga dzīvojamo kvartālu ieejām, kurus būtu nepieciešams attīstīt un izstrādāt detalizētākus risinājumus, ieviešot pakāpeniski dzīvojamās ārtelpas konfigurācijās.

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A Conceptual Framework Development for Designing Nearby Nature for Older Adults

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Abstract. As the world population ages, the role of environmental design in promoting the health and well-being of older adults becomes increasingly important. This study aims to explore the concept of nearby nature and its potential benefits for the aging population, focusing on the specific needs and preferences of older adults. The study adopts a multi-disciplinary approach, involving researchers and practitioners from various fields including environmental psychology, urban planning, plant sciences, and landscape architecture. Through systematic steps of data compilation, categorization, and integration, the study identifies key themes related to designing for older adults as individuals and as a stage of life. These themes encompass aesthetics, thermal comfort, personal experiences, social cohesion, embracing changes and losses, sensory perceptions, and risks.The resulting design recommendations address both the physical requirements, such as accessibility and mobility, and the mental requirements, such as feelings, perceptions, and emotions, of older adults. The guidelines provide insights for creating inclusive and accessible nearby nature spaces that cater to the unique needs of older adults. This study emphasizes the importance of collaboration between researchers and practitioners in developing design solutions for the aging population. By bridging the gap between scholarly knowledge and practical expertise, the study contributes to the maturation of landscape architecture as a discipline. The findings and recommendations can serve as valuable tools for designers, planners, and decision makers in creating environments that promote the well-being and quality of life of older adults in urban areas.

Keywords: Nearby nature, older adults, well-being, design recommendations, conceptual framework

Introduction

The world population is aging (World Health Organization, 2015). Designers, planners, and decision makers can help slow and mitigate some limitations along with improve their health and well-being through environmental design. One of the environmental factors of human health and well-being is nearby nature, especially in the urban area (Suppakittpaisarn, Jiang, & Sullivan, 2017). To the overall population, nearby nature had several positive benefits towards human health [1-3]. Fewer studies are focused on the urban aging population. We need to explore whether older adults interact with nature differently, resulting in different relationships between nearby nature and their well-being. As we approach the aging society, I propose a series of call to actions so that designers, planners, and decision makers can design places that allow the older adult to thrive in their homes, towns, and any places they wish to be. Without addressing these requirements, these environmental designers may make the spaces that are unhelpful, unhealthy, or even harmful towards the aging population.

The World Health Organization had announced the year 2020-2030 as the Decade of Aging. By the end of 2030, the aging population would increase from 1 billion to 1.4 billion and are increasing faster in the developing countries [4]. People face new challenges as they age, such as reduced or limited mobility and risks of injury and higher risks of memory loss and dementia. In the population scale, designers, planners, and decision makers may need to come up with the environmental design solutions for people with these changes [5].

There are many ways to define people within the aging population. When talking about aging, the World Health Organization (WHO), mostly refers to those above 60 years of age. However, they admitted that aging is not linear, and there are several factors that might affect how people age during the years [4; 6]. Someone who is 90 year-old might have the same capacity as another person who are only 65. Furthermore, there are many terms used to discuss the group. For example, ‘older persons’ are used by WHO [4]. At the same time, seniors [7; 8], elderly [9-12], and older adults [13-17] are also used across scientific communities. Among these definitions and descriptions, we chose the terms older adults because of its common use, however, we would say that there is no defined age for older adults. Rather, we examined this environmental design for those who have shown increasing symptoms that accompany aging, such as frailty, multimorbidity, losses in muscle masses, and decline in physical and mental capacities [6].

Growing body of evidence suggests how environmental designers might assist in creating of

healthy environments. Spending time in appropriate nearby environment can help improve human health and well-being [3; 18; 19]. Nearby nature is defined as places close to people's daily lives that have natural elements, such as street and neighborhood trees, parks, open spaces, and gardens. Theories and hypotheses are utilized to connect adjacent nature to human health and well-being. According to the Biophilia Hypothesis [20] and the Habitat Selection Theory [21], humans have intrinsic associations with the forms of nature from which they evolved: open grasslands and clusters of trees, and when exposed to such situations, humans receive physio-psychological responses [22; 23].

The stress reduction theory (SRT), also known as the psychoevolutionary Theory, supported the idea by claiming that people recovered from stress more efficiently in areas with mature trees, parks, and open spaces [24]. Evidence suggests that living near open spaces and trees may improve long-term health outcomes such as blood pressure, sleep patterns, and general hospital visits [18; 25-28]. This also impacts the economic outcomes. A research study in the United States found that for every 10 trees planted in a community, the residents' health spending is comparable to those with a $10,000 USD higher income per year, and their health appeared to align with someone 7 years younger [29].

According to the attention restoration theory (ART), humans can exhaust their attention capacity, or ability to focus and process information, leaving them with a condition called mental fatigue [30]. People with mental fatigue become angry, illogical, impulsive, and less capable of making long-term decisions [31]. As a result, attention capacity may be a crucial component of human well-being. The notion proposed that being in nature, which grabs their fascination quietly while removing them from everyday problems, allowing their mind to wander, and inviting them to stay as long as they like, would replenish the person's attention capacity more successfully than other types of environments (Kaplan et al., 1998). Experimental and observational studies also suggested that such environment in nearby nature can influence positive behaviors and academic performance in students [32-34], but it can be beneficial to the older population as well [35].

Another environmental aspect for human health and well-being is interpersonal relationships: social cohesion. Social cohesion is a concept that describes how members of a community know one another and are willing to connect with one another [36,37]. Because loneliness and social isolation can be harmful to human health, particularly in older adults, social cohesion becomes an important aspect in human well-being, and the aging population must build strong social relationships with others [38,39]. Nearby nature can serve as a third location, a stage where people may relax and spend time together in a favorable environment.

According to the theories and supporting evidence, environmental designers can build urban spaces that improve human health and well-being through nearby nature. To encourage people to use such space, people must like it and feel emotionally attached to it. Preference for a location is a quick assessment of whether a person can thrive in an environment [40]. As a result, it becomes a component of human well-being in the built environment. The four features of a scene are identified as interacting aspects in constructing preferred landscapes: coherence, complexity, legibility, and mystery [41]. A more recent study classified urban components of preference into three landscape perceptions: naturalness, neatness, and safety [42]. These components may help environmental designers identify how people prefer the places, including the aging population.

While these theoretical bases had been investigated clearly among adult populations, researchers still need more evidence in the aging group. Many observational studies, both cross-sectional and longitudinal had been conducted to understand the relationships between the living environment and older adults' health. One study showed that privacy in the residential environment can help lower the risks of depressive symptoms in older adult [43]. Other study showed that the tree density and availability towards green and blue spaces around residence may positively impact the physical and mental health of the older adults such as stress, anxiety, depression, heart condition, adiposity, and bone density [44-49]. These health benefits can be strengthened with social interactions and physical activity levels.

In terms of the human scale of the environment for the aging population, many studies have focused on aging at home and mostly about how public green spaces may related to them [10; 44; 45; 50]. While there is evidence that greener environments are better for the aging population compared to little or no nature, the design of the environment is not highly emphasized. For the aging home facility cases, the older adults expressed that they value to nearby nature deeply but could not go due to their physical limitations [51]. In the aging-at-home groups, perception of safety and physical comfort became more important for the elders [50], especially because they are more vulnerable and less perceptive in some of the hazardous conditions, such as thermal discomfort [52]. At the same time, vigorous activity and mystery become less important, suggesting a shift in characteristics that may be important to the future designs [50].

Several knowledge gaps persist regarding the relationship between nearby nature and older adults' health. These gaps of knowledge prevented us from creating meaningful changes in physical environments across the world to accommodate healthy aging.

First, richer and more complex understanding of the relationship must be explored. What factors influence and mediate the relationship, and to what extent? In the literature, we found that social cohesion, perceived safety, and physical activity might be pathways through which nature influences health in aging populations [46,49,50]. Second, how do cultural differences and experiences within the culture shape the way the aging population interact with the environment and the magnitude of benefits they garner from the interaction—and to what extent? The cultures may inform their perceptions, preference, and decisions regarding nearby nature [53]. Third, there exist a gap between researchers and practitioners in the discipline [54; 55]. Previous research shows that in landscape architecture, the information from researchers may not be transferred easily to designers, and the questions from practitioners might not be addressed by researchers [56,; 57]. Thus, this disconnection may prevent us from creating a mature design disciplines that are more inclusive and effective towards creating a better world [58; 59].

With these remaining challenges, the collaborations between environmental designers and researchers are needed. Environmental designers and decision makers have the opportunities to interact, change, and gather initial data and observations from the real world and inform researchers, while researchers can use those observations to conducted quantitative, qualitative, and mixed-method studies to inform designers and decision makers. These collaborative relationships must exist in the global scales to compare the results across geographical regions and cultures, and the conceptual framework might be needed to start this global collaboration. Thus, in this study, we asked the following question.

- What might be some landscape design recommendations address both the physical and mental requirements, such as of older adults?

Methods

In this study, we used a multi-disciplinary approach in conceptual framework development. This reflective analysis, serves as a method aimed at advancing scientific knowledge through the integration of various existing disciplines [60]. This research method is categorized as a secondary description research technique [54]. The example of previous works include the creation of a conceptual framework that merges geography and statistical geography to make landscape architecture decisions [61], as well as the cultivation of a mixed-method approach for educational assessment [62], among other applications.

Six researchers and practitioners from the field of environmental psychology, urban planning, plant sciences, and landscape architecture were invited to contribute in the discussion. They were selected to represent the decision makers over nearby nature for older adults. A series of on-site, on-telephone, and online discussions were conducted from April- May of 2022. During these discussions, the researchers together followed a series of systematic but non-linear steps adapted from Jabareen (2009) [60] to include the intrinsic knowledge from their professional experiences as well as their academic rigors: 1) compiling data from internationally published journal articles relevant to their respective fields since 2000, 2) categorizing and grouping the collected data, 3) combining the findings with their professional and field experiences 4) organizing the identified concepts, 5) categorizing and reordering the concepts as necessary, 6) integrating the selected concepts into a cohesive framework. 7) synthesizing and refining the framework, and 8) interpreting and adapting the resulting framework to ensure practical applicability in real-world contexts. One key researcher (PS) organized all the data and summarized the results based on the communications and reflexive journals collected during the process. Throughout the process, data collection and analysis were recorded and obtained through electronic communication exchanges and meeting records.

Results

The results are reported to highlight the steps of the discussion and conceptual framework development, which were categorized into three stages because of the method's non-linear nature. The stages include information and concepts (Step 1-4), emerging framework (Step 5-6), and synthesis for practical implications *(Step 7-8).*

Information and concepts (Step 1-4)

In the first part, each collaborators presented their literature within their field. We did not conduct a systematic review of literature. Instead, we conducted an exploratory narrative review [63,64] which made us understand the basis of the knowledge in our fields and arguments made within the scope of our study—which was nearby nature and older adults. Many studies focused on the mental well-being of older adults through frequent visits to green spaces and availability of green spaces [14,65-68]. Some observational studies also looked at physical outcomes such as bone density, cardiovascular diseases, and obesity risk [25,69,70]. Other studies investigated dementia and depression [17,35,71,72]. Some studies showed that elements of

walking in nearby nature such as the seasonal stories and availability of social contacts may be factors toward health [14; 15; 35; 65; 73]. For landscape architects, some guidelines and matrices were proposed for designs for older adults [2; 74; 75]. However, while there were bodies of evidence across different fields that nearby nature benefits the health of older adults, they could only be applied at the urban planning scales. Most studies, aside from the existing design guides, were too generic to benefit environmental designers in their professions. The gaps are reduced across the years, but there is much to discover.

After the literature and guidelines were collectively presented, the discussions involved the designers and researchers expressing their experiences in the design professions and fields. Overall, the six collaborators understand the basic concepts of landscape design and architecture for older adults. However, they have also added some flavors of experiences into the discussion. For example, a researcher identified the role of nature as a part of design because of how older adults usually have to stay in place for a long time due to mobility issues.

> *"... [Trees] are important in this case because if [older adults] cannot go anywhere for a long time, trees are more interesting than anything humans made. There are layers upon layers of leaves and stems. Lights and wind will make it change. Then birds, insects, and animals make them more interesting..."*

A landscape architect expressed their experience that they could see themselves in the designs and reflected that all of us will eventually get old, and the lines between adults and older adults are arbitrary, they argued as follows.

> *"I don't see why we should design for older adults in any different ways than we design for us. We will get old. It's not like our preferences and selves die at the age of 60."*

This sentiment is reflected by another planting designer, who compared the guidelines of landscapes for older adults to guidelines for children and disagreed with some part of the guides accordingly.

> *"...[Older adults] are experienced adults. Aside from tripping on roots or fruits, they know what plant parts are poisonous and won't put them in their mouth. They won't go and play with unknown animals or insects. They know more than us in many things, so we just see [these older adults] as a client. Then we design for them."*

However, cautions along with reduced physical and mental functions were discussed as well. One landscape architect noted the following.

> *"[Older adults] don't see well in bright or dim light. They also can't feel hot or cold as sensitively so they are likely to have pneumonia or heatstroke. We need to be extra careful with the choices we give them in our designs."*

In similar note, the environmental psychologist suggested the common experiences the older adults face, which might not be as common in other age groups.

> *"Imagine one day losing your job. One day you are a professor and then you are just a grandmother sitting at home with nothing to do. Imagine being able to run but suddenly you can't. Imagine one day waking up to a body of your husband, cold and stiff, and deciding how to tell your kids. I can't even imagine how to deal with that yet, but at one point we are designing for these people."*

From the literature and discussion, the researchers and designers identified seven key concepts that ones might consider while designing for the older adults. The key concepts are identified in Table 1.

TABLE 1

Key concepts identified from the literature and discussion [created by authors]

Concepts	Example keywords
Aesthetic	beautiful, preference, enjoy, pretty, complex, quality
Physical comfort	comfortable, bright, staying, pain, movement, tired, hot, cold, thermal comfort
Individuality	meaningful, experience, past, story, reflection, self, own person, activity, fun, expression
Social vs loneliness	friends, husband, wife, grandchildren, community, activities, visit, public, loneliness, dependent
Changes	death, wheelchair, retirement, loss, ability, purpose, accessibility, mobility
Senses	smell, touch, dull, soft, dim, sensitivity
Fear	poison, tripping, falling, care, death, sick, recovery, cancer, depression, anxiety

Emerging framework (Step 5-6)

Over the discussions, the finalized two key themes emerged: 1) designing for older adults as individuals—which focuses on how older adults are humans and are subject to typical design requirements for any person and 2) older adults as a stage of life—which focuses on how older adults face some common lived experiences, and struggles, as a population group. Of these two key themes, seven smaller themes were identified and refined from the concepts including aesthetics, thermal comfort, personal experiences, social cohesion, embracing changes and losses, sensory perception, and risks. Of these themes, social cohesion was identified for both designing nearby nature for older adults as individuals and as stages of life (Figure 1).

Synthesis for practical implications (Step 7-8)

Togethers, the researchers and practitioners identified two groups of design recommendations for each theme: physical requirements and mental requirements. The design recommendations, organized by themes are shown in Table 2.

TABLE 2

Recommendations addressing key themes of designing nearby nature for older adults

Key themes	Older adults & nearby nature themes	Physical requirements (Mobility and accessibility)	Mental requirements (Feelings, perception, and emotion)
Older adults as individuals (Older adults are humans and are subject to typical design requirements for any person)	1) Aesthetics	- visually accessible with different geography and terrain. - be part of the neighborhood and the geological-cultural identities	- listen and incorporate the preference and of older adults within the cultures. - plant materials usually draw attention. - engage in distance appreciation of wildlife. - create impression and place attachment
	2) Thermal comfort	- create enough interplay of sunlight, shade, and wind for comfort. - provide nearby shelters (plants or architecture) from sudden changes in microclimate.	- place plants and architectural feature to allow interactions with sunlight and wind.
	3) Personal experiences	- use cultural elements, signifiers, and plants with cultural or historical significance	- discuss with the community you design for to understand more collective experiences - design elements that create connection, changes, and stories, i.e., plants that change with the seasons
Combination of two key themes	4) Social cohesion	- create green spaces and nearby nature as third places - locate nearby nature at accessible intersections between residents and daily functions	- create safe open spaces for older adults to sit - provide both wide open spaces for social bridging and smaller, more private intimate spaces for social binding.
Older adults as a stage of life (Older adults face some common lived experiences as a population group)	5) Embracing changes and losses	- emphasize places that are comfortable during daytime, where free time is accessible for older adults. - add winding paths and other elements for rumination and fascination. - universal design and wheelchair accessibility	- create spaces for new activities and sharing of experiences - create opportunities that provide giving back in different scales, such as birdbath, fruit trees, or squirrel feeders
	6) Sensory perceptions	- sufficient lighting. - hard and smooth pave surfaces for easy walking	- engage in multiple sensory engagements, such as visuals, sounds, and smells.
	7) Risks	- eliminate fall risks such as gaps and lack of railings. - avoid sharp corners and drastic changes in height - available and comfortable seating along distances - accessible in case of medical emergencies - avoid plant materials that are toxic to touching or have sharp thorns.	- open visible spaces to make the older adults feel safe. - sufficient lighting for both day and night. - provide cues of care and maintenance more than usual nearby nature - provide risk-reduction protocols, such as an emergency button.

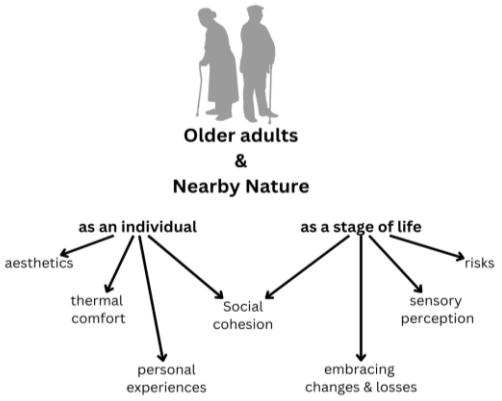

Fig. 1. Conceptual framework regarding designing nearby nature for older adults [created by authors]

Additional consideration:
Other design concerns for older adults

In landscape architectural and environmental design projects, there exist various forms of projects, objectives, and user types. In some design projects, older adults may not be the primary target group, resulting in challenges and obstacles in terms of accessibility. This is commonly observed in designs from previous eras that may not have sufficiently considered the diverse needs of users. It is not only the older adults who face such situations but also individuals with disabilities, wheelchair users, and families with strollers. Currently, landscape architecture and design are increasingly embracing the concept of universal design, which aims to create equal access and usability for people of all types [76]. However, the level of responsiveness to different user needs varies depending on the evaluation of satisfaction on a project-by-project basis. Factors such as adequacy of facilities, level of maintenance, and appropriate timing for construction play a role.

To address specific problems and challenges, it is necessary to focus on public spaces, particularly the lack of connectivity in usage. For example, issues related to ease of transportation and access to various functional areas are relevant. Even if a project is designed to accommodate usability, it does not necessarily promote efficient usage. Therefore, designers and relevant organizations should not solely prioritize project requirements but also strive to understand the broader environmental context.

Discussion

This study developed the two key emerging themes as guideline to design nearby nature for older adults from researchers and practitioners: older adults as individuals and older adults as a stage of life. From these themes emerged seven categories of recommendations: aesthetics, thermal comfort, personal experiences, social cohesion, embracing changes and losses, sensory perceptions, and risks. These can be developed into a design guidelines and evaluation guidlines towards designing nearby nature for older adults.

Many themes from the guideline aligned with other guidelines and theories to create healthy and therapeutic landscapes such as stress reduction theory [24], the third place theory [77], attention restoration theory [30], and prospect-refuge theory [78]. It also addressed some key elements in senior-friendly park design guideline [7] with some differences, such as personal experiences, and expand upon the guideline to include suggestions from the residential scales.

This study is novel because it engaged the conversation between researchers and practitioners in the build environment design professions. Such interactions need to be done to exchange both scholarly and intrinsic knowledge neccessary to develop a mature landscape architecture discipline. However, the research in this field, including this study, is still in its early stage and needs further development to contribute to the changes in the built environments towards healthy aging. Future researchers can use this guide to develop a hypothesis for future design, while future practitioners can use this guide as a toolbox to develop specific projects to address the needs of older adults in their nearby nature designs.

This exploratory study included a small group of researchers and practitioners with similar background: they are all researchers and practitioners affiliated in Thailand. Thus, while the results suggest similar answers to larger theories, geographical and cultural contexts may need to be included in future research. Comparison and testing of the conceptual framework may be needed to increase its validity and generalizability in the future.

Conclusion

This study aimed to develop design guidelines for creating nearby nature spaces for older adults, focusing on two key themes: older adults as individuals and older adults as a stage of life. Through discussions and collaboration between researchers and practitioners, seven categories of recommendations were identified. These recommendations can serve as a valuable tool for designers and practitioners in developing projects that cater to the needs of older adults. By engaging both researchers and practitioners, this study bridges the gap between scholarly knowledge and practical expertise, contributing to the maturation of landscape architecture as a discipline. Overall, this study provides valuable insights and recommendations for designing nearby nature spaces for older adults, promoting inclusivity, accessibility, and well-being in the built environment.

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Kopsavilkums. Pasaules iedzīvotājiem novecojot, vides dizaina loma vecāka gadagājuma cilvēku veselības un labklājības veicināšanā kļūst arvien svarīgāka. Pētījuma mērķis ir izpētīt tuvējās dabas jēdzienu un tās iespējamos ieguvumus novecojošai sabiedrībai, koncentrējoties uz vecāka gadagājuma cilvēku īpašajām vajadzībām un vēlmēm. Pētījumā izmantota daudzdisciplināra pieeja, iesaistot pētniekus un praktiķus no dažādām jomām, tostarp vides psiholoģijas, pilsētplānošanas, augu zinātnes un ainavu arhitektūras speciālistus. Veicot sistemātiskus datu apkopošanas, kategorizēšanas un integrācijas posmus, pētījums identificē galvenās tēmas, kas saistītas ar plānošanu gados vecākiem pieaugušajiem kā indivīdiem. Pētījumā iegūtie rezultāti var kalpot kā vērtīgi instrumenti dizaineriem, plānotājiem un lēmumu pieņēmējiem, veidojot vidi, kas veicina gados vecāku cilvēku labklājību un dzīves kvalitāti pilsētās.

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The historical development of Latvian aviation and airfield territories

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Abstract. In the 20th century, built airfields and airports, have significantly impacted the European landscape and environmental quality today. Territories that have lost their former function can now be considered as a stimulus for the creation of new landscapes and for urban development. The publication covers the history of Latvian aviation through time, where a total of 97 airfields have been established, which served as military, agricultural, sports, and civil aviation airfields. Scientific literature, popular scientific literature were used to gather information. For mapping was used ArcGIS. Nowadays, according to the data of the Civil Aviation Agency, 9 airfields are certified – 7 civil aviation airfields, and 2 air transportation airfields. As well as a military base of the Air Force has been established at Lielvārde airfield. Airfield's development opportunities until now have not been researched in Latvia, this is the first study to capture resources available and development strategies.

Keywords: airport landscape, planning, post-industrial airfield

Introduction

Around the world, in the 20th century, several hundred airfields and airports were built, which have significantly impacted the European landscape and environmental quality today [10; 9; 14]. Architects and landscape architects, urban planners, engineers, etc. have been involved in the transformation of abandoned airfields, reducing and eliminating the negative impact on the environment, by creating new landscapes. Post-industrial heritage reflects human activities through time. The Soviet period and regaining of independence of the Baltic states affected the further development of these territories; as a result, today there are abandoned airfield territories of different sizes and with different raised problems, which degrade the surrounding landscape and do not contribute to the growth of the cities.

The degraded areas are a relatively new problem and need their own terminology, which would be used in political documents, legislation, and education. In other countries, the problem was recognised in the 1970s, but in Latvia, the problem of these territories became widely popular ten years ago [2].

The reuse of abandoned and degraded post-industrial territories and their integration into the urban environment is a topical subject, taking into account the fact that the need for additional territories for urban development is increasing and these lands are an unused resource. The post-industrial brownfield landscape, hereinafter post-industrial airfield territories, consists of a large-scale landscape with adjacent buildings that have lost their original function. These territories can be described as non-ecological, aesthetically unattractive, and functionally unused open landscapes. Such post-industrial landscapes have the potential to become productive, which would prevent different negative consequences affecting the surrounding, densely populated areas. Territories that have lost their former function can now be used as a resource, which is considered as a stimulus for the creation of new landscapes and for urban development [10].

Method and Materials

The development of Latvian aviation was examined, where the history of Latvian aviation was divided into time periods related to the political and economic conditions in the country, developing the growth of aviation. The development of Latvian aviation can be divided into five periods. Latvian War of Independence, in 1918-1920, which is the reference point for the beginning of Latvian aviation. The interwar period in 1921-1938, known as the heyday of Latvian aviation, and World War II in 1939-1945 when Latvian aviation was eliminated, see Figure 1.

Both scientific literature and popular scientific literature were used to gather information, as well as mapping was applied using *ArcGIS*.

The period of Soviet occupation from 1944-1989 was related to the creation of agricultural airfields and the strengthening of military airfield networks. However, Latvian aviation in the period of 1990-2022, after Latvia's Independence was regained, resulted in the mass abandonment of airfields, see Figure 2.

Latvian War of Independence in 1918-1920

The Latvian War Aviation Regiment, originally the War Aviation Group, Division, was established in 1919 by former Latvian war pilots of the Russian Army, who returned to Latvia after World War I and the proclamation of Latvia's independence. By this time, air bases and airfields were established such as: Spilve, Tukums, Vecauce, Vaiņode and Pētersfelde (around Dobele) and a temporary battle airfield in Cēsis. During the battles of Cēsis,

Fig. 1. Timeline from 1918 to 1945 [Author's visualisation based on the sources, 2022]

Fig. 2. Timeline from 1945 to 2022 [Author's visualisation based on the sources, 2022]

Fig. 3. Krustpils airfield with soldiers of the Aviation Park [Latvian War Museum [6]]

the National Armed Forces of Estonia and Latvia did not yet use aviation. Because at that time Latvians did not have their own military aviation. When the Strazdumuiža truce was concluded, as a result of which the German troops had to leave Riga, the German troops left Spilve airfield and moved to the original Kurzeme airfields.

Major General Count Rüdiger von der Goltz was sent on behalf of the German government to lead the German 6th reserve corps together with the Latvian southern brigade of Colonel J. Balodis, fighting together against the newly founded Baltic states, against Russian communism, while protecting Europe and Germany. However, the major general had other hidden intentions to put the Baltic states under his control and restore the monarchy in Germany. When the true intentions of Germany were discovered, soon after that the Latvian army was created. With the unification of the Southern and Northern brigades, General Simansons was appointed as first commander-in-chief of the army. During this time, he established a headquarters, and shortly after that he organised various structures of the army: the engineering corps with the aviation department, and the supply and armament department. On 19 June 1919, an army aviation group was established with Commander Alfrēds Valeiks. The task was set to prepare pilots for combat missions as quickly as possible, creating as an aviation unit on the Latgale front, the main battle base of the national aviation, Krustpils airfield (established during the time of the Tsar, during World War I), see Figure 3 [4; 6].

On 22 July 1919, the formation of the headquarters department of the aviation group took place with Commander J. Priedītis. Two aircraft were assigned to the department: Sopwith Strutter No. 2341, constructed in 1915 in England, and

Fig. 4. Aviation Division Spilve airfield in 1920 [Latvian War Museum, [6]]

Nievport 24 bis No. 4300, constructed in 1916 in France. Shortly after that, on 5 August the 1st flight took place at the Latvian national airfield in Spilve, which was followed by other training flights. Since the acquired aircraft were in relatively poor condition, a repair base was needed to restore the aircraft. And this was created on the premises of the cement factory in Spilve. Parts for repair, as well as items useful in aviation, were collected from former air bases and airfields abandoned by the Germans: from Ozolnieki, Pētersfelde near Dobele, Vecauce, where the Germans had a school for the observers, and Vaiņode. Later, the repair workshop was moved from Spilve to Riga – the aviation department of the army's main mechanical workshop. September of the same year was significant; the Latvian National War Aviation made the first combat flights under the leadership of J. Priedītis from Jumpravmuiža and Spilve airfield of the Latgale front [4].

German troops hesitated to leave Latvia, even though the Treaty of Strazdumuiža was concluded. The conclusion of a secret agreement between Bermont and von der Goltz, in which German troops voluntarily joined with the Russian western troops under the leadership of Bermont, contributed to the fact that on 8 October, German-Russian troops attacked Riga. Unfortunately, during the entire Bermontiade, the Latvian Aviation Park was unable to create a sufficient aviation department at the Sigulda airfield, which was the first airfield of the Aviation Park front (used during World War I as an airfield for Kurzeme and Lithuanian Tsar army bombers). However, despite this, the Latvian army, which rapidly increased in numbers, faced the Bermontiade regiment. In 1920, the Aviation Park became strong thanks to the acquired German and English aircraft. In the fight against the Bolsheviks, who were based at the Rēzekne airfield, four aircraft of the park took part in the combat flight. With the conclusion of a peace treaty between Latvia and Soviet Russia, in August 1920, the war of Latvia's liberation against the German-Russian troops ended. Aircraft were mainly used for reconnaissance from a high altitude to be protected against infantry weapons. The abandoned German airfield of Pētersfelde, which is located 7 km from the Dobele-Kalnmuiža road, was taken over by the Aviation Park, placing the third aviation department [4].

The year 1919 is related to the time of the War of Independence when the first military aviation units of the Armed Forces of the Republic of Latvia were established, which were based at the Biķernieki airfield. Along with the establishment of a unified structure of the Latvian Army, the Aviation Group was also created, which was later (in 1920) named the Aviation Park [6; 24].

Latvian aviation in the interwar period of 1921-1938

As the number of aircraft gradually increased, the activities of the Aviation Park also expanded, and it was planned to increase the number of flying pilots. As a result, the Aviation School was established under the leadership of P. Stūrāns. The first aviation festival in Spilve took place in 1920. A month after this festival, the fund for injured pilots of the Latvian Aviation Park was established. Since then, the aviation festival has been held every year, see Figure 4 [4]. Initially, the Aviation Park had a small number of aircraft, until 1921 when additional equipment arrived and it was renamed the Aviation Division [6; 24].

At the Aviation School, in addition to daily military training flights, the Aviation Division was involved in "peacetime" airmail flights. In the 1930s, packages were mainly delivered to Valka with intermediate landings in Cēsis and Valmiera [4]. In 1924, the Aviation Division consisted of 5 squadrons: fighter, scout, artillery, corrective, and reserve. A network of airfields was also created: in Spilve, Krustpils, Daugavpils, Liepāja, and Gulbene [6; 24].

In the period 1922-1925, new foreign aircraft were purchased: single-seat fighter Ansoldo A-1 Balilla, light bomber reconnaissance vehicle SVA-9 and SVA-10, training aircraft, etc.

1926-1927 The Aviation Division was renamed the Military Aviation Regiment with commander J. Baško. In the period 1928-1929, continuous training of new pilots took place after the replacement of Commander A. Skurbe [4].

The last decades of military aviation (1930-1940) could be considered the "heyday". Because at that time, the most modern purchased aircraft from abroad were available [4]. In the period up to 1930, the aircraft fleet included 150 aircraft, which were supplemented over time with various foreign mission aircraft, training aircraft, and 26 Gloster-Gladiator II biplane fighters.

The base of the Aviation Regiment was located in Spilve, while the aviation workshops were located in Kalnciems. Initially, military aviation was located in Riga, but at the end of the 1920s, it was concentrated closer to the country border [6; 24]. The Aviation Regiment grew rapidly by 1934; reconnaissance and fighter aviation were developed. Reconnaissance squadrons were deployed in Krustpils and Gulbene, and a fighter squadron was in Riga [4]. Also, aircraft construction developed rapidly under the "Law on Civil Aviation" of the Council of Ministers. The most important aircraft were built in the workshops of Liepāja naval port – KOD type aircraft, as well as aircraft designed by K. Irbītis built at the State Electrotechnical Factory [16].

With the change of political system made by K. Ulmanis on 15 May 1934, the further development of war aviation changed. Aviation reorganisation was carried out by the newly elected army commander, General K. Berķis who participated in aviation flights of 6 aircraft groups with landings at Krustpils, Ludza, Daugavpils, and other airfields. The Aviation Regiment also held training flights in Daugavpils during summer camps and additionally used the base at Spilve, Krustpils, and Gulbene airfields. The name Aviation School was changed to Aviation Courses in 1935 [4]. Until 1936, the largest airfields in Latvia were Spilve, Skulte, Liepaja, Krustpils, Daugavpils, Gulbene, Ventspils, and Jelgava [6; 24]. In the last years of the Military Aviation Regiment's existence (1937-1940), the main event was the unified aviation festival of 1938, in which various Latvian aviation organisations took part with different aircraft together [4].

It should be mentioned that in 1921 the first regular passenger airline was opened, Riga-Kaunas-Königsberg-Danzig-Stettine-Berlin. In 1937, however, the German-Soviet airline "Deruluft" provided air traffic to Riga from Moscow and Berlin. The Polish "Lot" provided air traffic to Vilnius and Warsaw, but the German "Lufthansa" provided air traffic to the Nordic countries and Berlin. The best airfields in the Baltics were created in Riga, providing international flights. Also, during the Soviet occupation, Spilve and Rumbula airfields were used for commercial flights from Riga. However, Liepāja and Ventspils airfields were also used for passenger traffic [16].

World War II from 1939-1945

Along with the signing of the pact of mutual assistance in Moscow in 1939, which was signed without the government's knowledge by the Minister of Foreign Affairs of Latvia V. Munters, the establishment of the military bases of the Red Army followed: in Liepaja, Ventspils, Ēdole, Durbe, Priekule, Ezere, but USSR army regiments entered Kurzeme and Liepaja. Also, the construction of Russian airfields was carried out in Grobiņa, Ezere, and Vaiņode. Along with that, flight restrictions for the Aviation Regiment were introduced in the region of Liepāja, Durbe, and Ventspils. Bombers of the Soviet Union occasionally landed at the war airfield of Cēsis-Priekuļi. The events created the need for intensive training to increase the readiness of war aviation. Training flights took place over almost all of Latvia: in Daugavpils, Krustpils, Gulbene airfields, as well as Bauska, Tukums, Ventspils, and Jelgava landing fields. On the other hand, the main base of the Latvian War Aviation Regiment was the airfield in Spilve-Riga with hangars, petrol warehouses, etc. auxiliary buildings. Similar airfields for squadrons were in Krustpils and Gulbene, and Daugavpils airfield was always used for summer camps. The reserve airfields of the Latvian Aviation Regiment were located in Jelgava and Ventspils. The Aeroclub managed landing fields throughout Latvia, which were also used in sports aviation for glider and regional competition flights in Kuldīga, Tukums, and Vaiņode. Plans of the aviation industry did not evolve taking into account the military-political developments. And a general ban on flying in the Aviation Regiment was announced, as a result of which the USSR occupied the main airfield of the regiment – Spilve airfield [4].

In 1940, after the Soviet occupation, the Aviation Regiment and the Latvian Army were eliminated [6; 24]. This can be explained by the beginning of the Soviet era and the awareness that the aviation officers would try to protect Latvia; therefore, to maintain power, it was decided to either shoot the officers or send them to Siberia. As for the Latvian aircraft, they were hidden in the "Provodnik" factory, a couple of aircraft were taken to Russia, and the rest were left to degrade [3].

With the arrival of the Soviet Union, the occupation of Latvia had begun, accepting a declaration stating that the land was the property of the country. Along with the land reform, see Figure 5, the establishment of military airfields was carried out on agricultural lands, eliminating the farms, dismantling the buildings, and planning the territory. Agricultural lands were also divided, and the farms

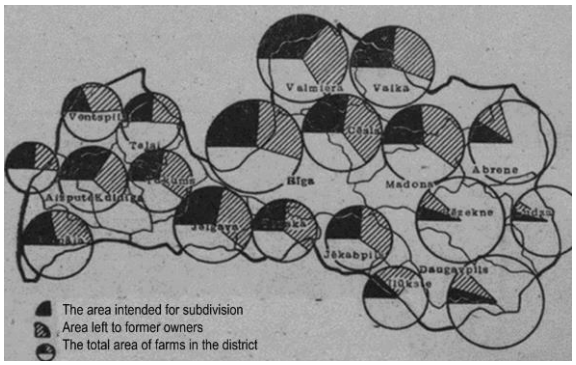

Fig. 5. Bolshevik land reform in 1940 in Latvia [Rūtenfelds, 1943 [29]]

from the period of Latvia increased, renaming them state farms [29].

The beginning of World War II can be traced back to the already mentioned year 1939 when Latvia was occupied by the Soviet Union and the future of Latvian aviation was decided. In 1940, the Red Army created Long-range Bombing Aviation, which carried out raids during the USSR-German war. However, German war aviation was superior, resulting in the loss of a large part of the air force [13]. But later, in 1941, German troops entered Latvia [23]. In 1942, the USSR created the Air Force Long-range Aviation of the Red Army, whose task was to destroy any enemy war objects [13]. Therefore, later, in 1944, the Red Army of the USSR occupied Riga again, which contributed to the retreat of the German army and the occupation of Latvia [23]. Along with the development of aviation, it was used in passenger transport, cargo transport, medicine, agriculture, and forestry, as well as in sports. Aviation was considered to be important in terms of defence, so it developed rapidly during World War I. Together, the land, sea, and air forces indicated the country's defence capability. Consequently, the USSR Air Force and the Red Army grew in development based on the socialist industry [27]. Sources mention that in 1944, the USSR used both civil and military aviation, which means that during the war it used existing airfields and built new airfields for war operations [30].

Aviation during the Soviet occupation in 1944-1989

It is important to mention that Latvia only learnt about the use of aviation in agriculture in 1941, when the All-Union Exhibition of Mechanisation was held in Ukraine, mentioning the victory of socialist agriculture. During the exhibition, it was possible to get familiar with the experience of increasing the yield. Various types of agricultural machines and tractors, whose task was to increase the growth of agriculture, were at the exhibition. Also mentioned was the aviation method in the fight against pests, therefore improving sugar beet crops, and improving cotton and forest areas, as well as swampy areas [15].

But initially, during the post-war period, tractors (for cultivating, sowing, and harvesting) were built in the USSR for agricultural purposes. While in other places outside the territory of Latvia, aviation was used in agriculture. For example, in the Krasnodar region, 49 collective farms were using chemical methods against weeds. This increased the harvest. Pests were also eliminated in large areas in the Krasnodar and Stavropol regions. And the most interesting thing is that by flying with an aircraft and spraying fields with a chemical substance, the cotton fields were prepared for harvesting [5]. The USSR used helicopters in agriculture from 1959 until 1969. They were used in places that tractors and aircraft could not access: mountain slopes, valleys, and places with different obstacles [1].

Until 1969, a take-off and landing area for agricultural aviation aircraft was built in the Barkava Soviet farm, in the Madona region. This airfield is significant because it was the first one built at the expense of agriculture in the republic. This year, a contract was signed with 100 farms that used agricultural aviation services. The Barkava Soviet farm was a model for other farms, which promoted the idea of building common agricultural aviation airfields. Warehouses for mineral fertilisers and chemicals were also built at the airfields. As an additional benefit, sanitary aviation for the population would be expanded. At that time, the Institute of Land Management Design studied and compiled the economic possibilities of airfield construction. Each airfield could support 5-14 farms. The developed calculations pointed to many benefits, such as airfields on farms would be cheaper than if mineral fertilisers were spread by tractor equipment, as well as the work would be completed on time, where the weather would not be able to affect it. In addition to that, extensive use of aviation would allow for saving not only time but also manpower [21; 7].

Following Barkava's positive example, a five-year plan for the development of the national economy of the USSR was prepared, which in 1971-1975 decided to increase the yield of crops. It was believed that the creation of agricultural airfields and the use of aircraft, see Figure 6, contribute to crop production, as the fields are fertilised early in the spring. Also, the fact that aircraft are irreplaceable because regular equipment is unable to enter the field in early spring [28].

Using AN-2 and JAK-12 aircraft, pilots of the Latvian Civil Aviation Authority treated the agricultural lands of Soviet farms with plant protection products used in Dobele, Bauska, Madona, Jelgava, Daugavpils, and Ogre region farms.

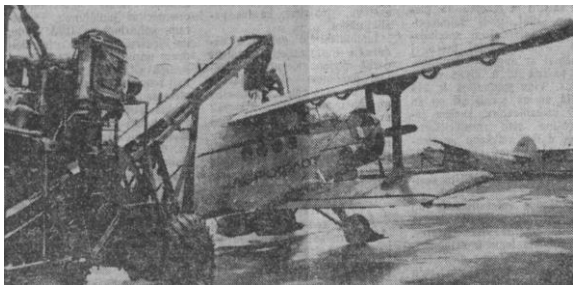

Fig. 6. Use of aircraft in agriculture [Ronis, 1967 [28]]

Fig. 7. Loading of mineral fertilisers on an aircraft at the agricultural airfield of the Soviet farm in Priekule [Pliens, 1985 [25]]

Fig. 8. Soviet war airfields and war ports in occupied Latvia [Laiks, 1984 [17]]

Inter-collective farm "airfields", hard surface runways, were built in the republic. They were built in Madona, Liepāja, and Riga regions, and they were also built in Bauska and Saldus regions [26].

In 1973, agricultural aviation services were already provided to 170 farms. In many places, farms set up fields with a hard surface – airfields. This made it possible to sow mineral fertilisers in the fields in early spring and use aircraft to sow clover and wheat. This ensured an increased yield of cereals, based on the experiments. Airfields are located in Liepāja, Riga, Rēzekne, and Madona regions [18]. Along with the development of agricultural aviation, a civil aviation airport was established. The airport "Riga" was opened in 1974. The sources mention that overflights from airfields were made within the borders of the USSR [16].

As field cultivation work had to be done in the springtime, when it was impossible to get to the field with motorised equipment due to moisture, collective farms and Soviet farms were increasingly forced to use agricultural aviation to improve the fertility of fields with mineral fertiliser. With the help of aircraft, the work was done quickly, see Figure 7. Once there four aircraft were working in the farms of the Liepāja region, which served the Soviet farms of Priekule, Aizpute, and Liepāja. As well additional aviation agricultural services were received by K. Marks and Durbe collective farms, "Pionieris", "Zieds", "Ļeņina ceļš", Vaiņode, Gramzda, and Medze Soviet farms [25].

The sources also mention that the USSR established a military base in the Baltic states. The sources mention that 22 military airfields were built in Latvia by 1984: In Tukums, Daugavpils, Dundaga, Ezere, Cēsis, Jēkabpils, Jelgava, Liepāja, Lielvārde, Bauska, Ogre, Pāvilosta, Preiļi, Rēzekne, Riga, Vaiņode, Valka and Ventspils, see Figure 8 [17].

Since agricultural aviation has brought great benefits to agriculture, its impact on the environment did not receive much attention. Until 1988, the question of the negative effects of agricultural aviation on nature was considered in public consultation. However, G. Eniņš was the one who tried to propose an exception to the bill. On the other hand, A. Zobens opposed the banning of agricultural aviation, arguing the huge benefits, as well as mentioning the fact about the extensive network of airports, which cost tens of millions of roubles. However, considering the fact that plant protection products are sprayed by aircraft (called chemicals in the articles), which cause great damage to the environment, water bodies in the fields, streams, habitats in the field copses, and living animals and insects are mentioned as an example [31]. Since the environment was polluted by the use of agricultural aviation, and as technical regulations were often not followed to promote further environmental protection, in 1987 the Agro-Industrial Committee together with the Ministry of Health Protection, the Society for the Protection of Nature and Monuments of Latvia, the Ministry of Land Reclamation and Water Management, the Civil Aviation Administration, and the Baltic Fisheries Board determined the following at the meeting. Since 1988, it is only allowed to use granular mineral fertilisers in the territory of the republic with the help of aviation, prohibiting any activity around the territories of nature reserves. It was determined that the limit of sowing granular mineral fertilisers is 500 m from rivers, lakes, and water reservoirs, as well as 300 m from settlements and homesteads [22].

To summarise, in the period from 1945-1991, agricultural aviation was widely used. During this period, there were approximately 100 chemical airfields. Used helicopters: in special aviation and sanitation work. Sports aviation was based at Bauska, Cēsis, Glūda, Cīrava, and Langaži airfields [7; 8].

Latvian aviation in 1990-2022

In 1991, after the restoration of independence, the first international flight was made, after which "Riga" airport acquired the status of an independent state capital company [16]. The sources mention that by 1994 military airfields had been established on the territory of Latvia, as well as about 100 small agricultural airfields of collective farms and state farms. They were no longer used, being left to gradually degrade. This is because the Ministry of Transport decided that the maintenance of small airfields was not necessary, as well as their maintenance required large financial resources and it was not known whether the airfields would still be used in the future. Taking this into consideration, if necessary, it will be more profitable to build new airfields [11].

In 1991, after the restoration of independence and the establishment of the Latvian Defence Forces, the State Airspace Protection and Control Service was established. And in 1992, an air defence department was established, which was called the Air Force Headquarters. An aviation base was also established at Spilve airfield in Riga, which is assigned to civil aviation aircraft.

Shortly after 1994, the Aviation base was moved to Lielvārde airfield. Jēkabpils and Tukums airfields were also assigned to the Air Force [6; 24]. The Air Force not only monitors national defence, but also participates in search and rescue, as well as participates in the transportation of injured parties and extinguishes fires in cooperation with the Disaster Medical Centre [16].

In 1992, the Ministry of Transport took control over the military airfields of: Vaiņode, Jelgava, and Daugavpils. Daugavpils airfield belonged to the Daugavpils region municipality and Jelgava airfield was leased to Riga Aeroclub. However, the Ministry of Defence was responsible for the military airfields of Lielvārde, Tukums, and Jēkabpils [12].

In 1995, an airport and airfields were established in Latvia, such as the international airport "Riga", the airports: "Spilve", "Liepāja", as well as airports that are not used: "Ventspils", "Rēzekne", "Daugavpils". Former military airfields: Lielvārde, Jēkabpils, Tukums, Vaiņode, Jelgava, Daugavpils (Naujiena), Paplaka. Military reserve airfields, such as Zaļenieki, Limbaži, Ezere, Kalupe, and Mārsnēni (Skangaļi). Also, 78 general aviation airports are located throughout the territory of Latvia [19].

In 1996, the Air Force took part in the first international training "Baltic Challenge" at the Ādaži base. A year later, due to a lack of funds, the Ministry of Defence, led by T. Jundzis, closed the Tukums and Jēkabpils airfields. In 1998, the Regional Airspace Initiative was signed in the Baltic states between Latvia, Lithuania, and Estonia. An international agreement on the creation of the BALTNET Airspace Surveillance System has been concluded. In 2003, radio equipment posts of the Airspace Surveillance Squadron were located in Ventspils and Rēzekne [6; 24].

In 2007, a border guard aviation support point was established at Ventspils airfield (Kokars, 2022). From 2009 to 2013, a NATO-compliant airfield with technical buildings was built at the "Lielvārde" aviation base in a project co-financed by NATO Security Investments. In 2018 it became the training centre of the Air Force [6; 24].

International air traffic is controlled by "Riga" airport, Liepāja airport has been certified for commercial flights since 2016. The following general aviation airports were established: Spilve, Ventspils, Cēsis, Ikšķile, Limbaži, Ādaži, as well as 7 general aviation heliports in Latvia. Hot air balloon flights are actively used in Latvia, where tourist flights are conducted in Sigulda, Cēsis, Kuldīga, and Liepāja. Different types of international hot-air balloon festivals and sports competitions take place in Latvia [16].

However, nowadays, according to the data of the Civil Aviation Agency, 7 civil airfields and 6 heliports are certified. Air transport airports – VAS International Airport "Rīga", SIA Avia company "Liepāja". General aviation airfields – SIA "Ventspils" (Ventspils), SIA "Meža īpašnieku konsultatīvais centrs" (Cēsis), Ikšķile airfield, SIA "Vidrižu Atvari" (Limbaži), SIA "Adaži Airpark" (Ādaži). General aviation helicopter airfields – SIA "Future Wings" (Heliport Nākotne, Glūda airfield), SIA "GM Helicopters" (M Sola, Jumprava airfield), State Border Guard Aviation Administration "Jaunsmilgas" (Ludza AVP, Ludza airfield), SIA "Čiekuri-Shishki" (Čiekuri, Madona), SIA "Klauģu Muiža RE" (Klauģu Muiža, Madona County), SIA "Nogales īpašumi" (Nogale, Talsi County) (Civil Aviation Agency, 2022). The private airfield "Jurmala airport", which is currently not certified for civil aviation flights, has been reconstructed in the Tukums region. Daugavpils airport is not certified, but it would be important for ensuring civil aviation. The development of Daugavpils airport is necessary to promote the regional development of Latvia, where Liepāja, Ventspils, and Daugavpils would provide air traffic hub points of the Baltic Sea region with other capitals, forming them as airports of national importance. However, the reconstruction of Daugavpils airport requires large financial resources. After regaining independence, airfields were decentralised, and handed over to local

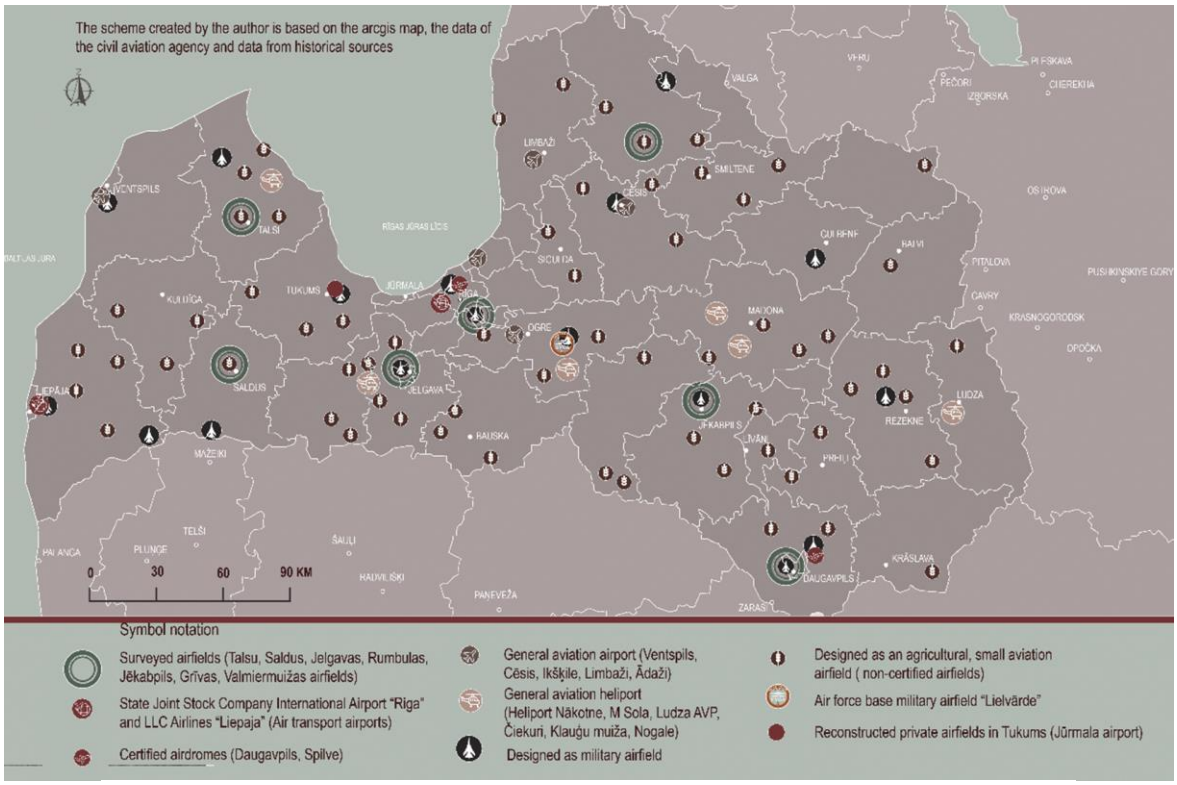

Fig. 9. Airfields formed over time [Visualisation created by the author, based on sources, 2022]

governments. This results in the fact that the development of airfields in Latvia is driven by local governments by determining the development of territories in regional planning documents [20]. Based on the materials available in the literature, as well as using *ArcGIS* mapping, a summarised map of Latvian airports was created, see Figure 9.

Conclusion

Looking at the history of Latvian aviation, several dozen airfield territories have been formed over time. Many of the airfields have adapted over time, but with the collapse of the USSR in 1990, both agricultural and military airfields were no longer used. In total, 97 airfields have been established throughout the territory of Latvia, of which 9 are certified (Ādaži, Cēsis, Ikšķile, Jūrmala, Liepāj, Limbaži, Riga, Spilve, Ventspils). This study is the first in Latvia to provide an insight into the development of airfields, assessing today's development opportunities and defining the resource that is available.

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Kopsavilkums. 20. gadsimtā uzbūvētie lidlauki un lidostas ir būtiski ietekmējuši Eiropas ainavu un vides kvalitāti mūsdienās. Teritorijas, kas zaudējušas savu agrāko funkciju, tagad var kalpot par resursu jaunu ainavu veidošanai un pilsētvides attīstībai. Publikācija aptver Latvijas aviācijas vēsturi cauri laikiem, kur kopumā izveidoti 97 lidlauki, kas kalpojuši kā militārās, lauksaimniecības, sporta un civilās aviācijas lidlauki. Informācijas apkopošanai tika izmantota zinātniskā literatūra, populārzinātniskā literatūra. Kartēšanai tika izmantots ArcGIS. Šobrīd pēc Civilās aviācijas aģentūras datiem ir sertificēti 9 lidlauki – 7 civilās aviācijas lidlauki un 2 gaisa transporta lidlauki. Kā arī Lielvārdes lidlaukā izveidota Gaisa spēku militārā bāze. Šis pētījums ir pirmais Latvijā, kas sniedz ieskatu lidlauku attīstībā, izvērtējot mūsdienu attīstības iespējas un definējot pieejamo resursu.

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The Architectural Activity in Lithuania During the First Soviet Occupation (1940–1941)

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Abstract. During the first Soviet occupation of Lithuania, which lasted from June 1940 to June 1941, gradual changes were planned to be implemented in the country's field of architecture. Although the occupation was short and lasted only a year, the design structure was changed according to the Soviet model, many architectural ideas were planned to be implemented, and a number of design projects of the new buildings were developed. Therefore, this article, based mainly on archival and historical material, analyses the architectural activity and the peculiarities of this process that took place in Lithuania during the first Soviet occupation.

Keywords: architecture, soviet architecture, first Soviet occupation of Lithuania

Introduction

When the first year–long Soviet occupation of Lithuania began in June 1940, the country lost its independence and became one of the republics of the Soviet Union. During the occupation, as the sovietisation of Lithuania was implemented, various processes took place in the occupied country, which led to political, economic, and cultural changes. At that time, significant changes also took place in the field of architecture and design structure. Arguing that the cities and towns of Lithuania needed "socialist reconstruction", many architectural ideas were planned to be implemented in practice [15]. The aim was to create a minimum of the new types of buildings in cities and towns. As a result, the design practice established during the years of independence was reorganised following the Soviet model. Thus, the centralisation of the design process was implemented with the establishment of the new state–run design offices. Most of the buildings planned to be built at that time were to be designed in the new design offices. Although a number of individual building projects were developed in a short period of time, it was planned to gradually move to the mass use of standard design projects.

In contemporary studies of Lithuanian architecture, the architectural processes that took place during this short period are very little analysed. More studied are the architectural processes of the second Soviet occupation of 1944–1990 [6]. Therefore, in the studies of the history of Lithuanian architecture, the occupation period of 1940–1941 is obscure and largely overlooked. Wider studies of this period are only related to the architectural processes that took place in individual Lithuanian cities, such as Vilnius and Kaunas [8], [22]. Therefore, this article aims to disclose the fundamental architectural changes that took place in the country at that time in more detail.

The architectural ambitions of the new regime

According to Richard Anderson, in the Soviet Union "everyday life was the arena where Bolshevik cultural aspirations and spatial programs intersected" [1]. Therefore, in occupied Lithuania, the new government planned many ambitious projects. After the beginning of the occupation, there were many unfinished constructions of various buildings in the country, which were started in the years of independence. Thus, the new government sought to complete at least a part of these buildings. In the first months of the occupation, efforts were made to continue the construction of hospitals, schools, public, administrative, industrial buildings, and nationalised private houses [33]. However, the new government in the country also sought to implement many new architectural ideas in the coming years. Some of them were to be buildings of the new typology, based on the Soviet model. Therefore, in occupied Lithuania, it was aimed to form a minimum of new buildings, the basis of which had to be buildings of the new typology [12]. Lists of what type of buildings and how many of them needed to be built in various cities and counties of Lithuania were compiled by the newly established Planning Committees [21].

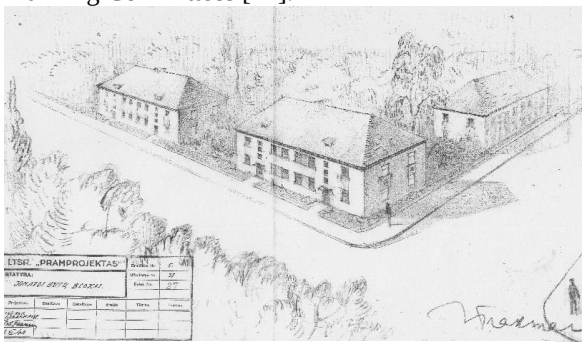

Fig. 1. Design for the residential complex in Jonava (eng. arch. Izaokas Trakmanas, 1940). [Vilnius Regional State Archives, f. 1171, ap. 4, b. 645, l. 1]

The most ambitious architectural ideas of this period can be considered the planned constructions of large residential complexes of apartment buildings for workers. The idea was not new as the constructions of such buildings were built during the period of Lithuanian independence, mainly in the then temporary capital of Kaunas, where it was aimed to provide workers working in industry with comfortable living quarters [31]. The new government sought to speed up the implementation and expansion of this idea in practice throughout Lithuania at that time, especially since "favourable" conditions were created for this. After the nationalisation of city lands, the implementation of larger–scale architectural ideas became easier. In addition, at that time, the construction of individual houses "was reduced to a minimum" in most Lithuanian cities [35]. Therefore, when planning to carry out the industrialisation of the country, the issue of accommodation of workers in larger cities became more relevant [26]. The construction of new residential complexes was concerned in the first months of the occupation (Fig. 1). These complexes, which were planned to be built in blocks, were to include not only apartment buildings, but also sports, shopping facilities, and kindergartens. All this was apparently done based on the example of the Soviet Union, where such residential complexes "became a standard urban unit implemented throughout Soviet territories from the late 1920s" [4]. The new residential complexes for the workers were planned to be built not only in the main Lithuanian cities, Kaunas and Vilnius, but also in smaller cities such as Šiauliai, Panevėžys, Marijampolė, Raseiniai, Jurbarkas, Tauragė, Telšiai [5].

Other architectural ambitions can be associated with the People's houses of culture. Shortly after the beginning of the occupation, in the summer of 1940, the idea of establishing and building such houses was discussed in the national press. It was planned that these buildings would be equipped with halls for political meetings, performances, concerts, rallies, and lectures. Thus, in these houses, which were urged to be established in every city and town by constructing new special buildings, a mass socialist–cultural education work was to be carried out [2].

It was also planned to build the buildings for mass gatherings (Pioneers houses, public centres) and for communal use (bathhouses, laundries, kindergartens). In addition to all this, it was proposed to build buildings for the executive committees, industrial facilities, and high schools. It was also planned to move forward with the construction of hospitals and primary schools, which were built in large numbers during the years of independence. In the national press a propaganda campaign of the planned architectural ambitions was carried out, positively emphasising the large scale of the planned constructions. For example, at the beginning of 1941, it was stated that "23 residential blocks with 448 apartments each with 2–3 rooms and a kitchen for workers will be built this year <...> New small bathhouses will be constructed in a number of towns. New buildings for the executive committees and the People's houses of culture will be built in many cities and towns. <...> A number of new fire depots and garages will be built" [11]. Thus, it was advocated that "In the socialist system, construction not only does not stop, but is significantly expanded, and it will only take a few years of rapid construction for our republic to have a number of truly excellent new buildings" [29]. However, in some cases a part of the planned constructions were not considered necessary. For example, in 1941, in the city of Trakai, according to the plan of the People's Commissariat of Public Utilities, due to a lack of funds, only a bathhouse was planned to be built. Despite that, in the opinion of the county executive committee and the local architectural specialists, the more necessary buildings were considered to be a new hotel, a fire depot, and an apartment building for workers [35]. Therefore, not all constructions planned at that time met the real needs of the country's cities and counties.

Reorganisation and centralisation of design processes

During the years of Lithuania's independence, the design processes in the country were largely decentralised. In cities and counties, there were construction departments under the local municipalities, which were headed by the local civil engineers and engineer–architects. They designed most of the private, public, and industrial buildings in the cities and counties. Other architectural specialists (architects, civil engineers, and civil technicians) were engaged in private practice and had their own private design offices. Sometimes individuals or institutions held design competitions for the new buildings or chose themselves who should design a certain building. The design processes and constructions throughout the country were supervised by the Construction and Road Inspection established under the Ministry of Internal Affairs. However, with the beginning of the Soviet occupation, the decentralised design structure was changed according to the Soviet model.

In order to implement the planned architectural ambitions in practice, the reorganisation and centralisation of the design organisation was started. Already in the summer of 1940, the Construction and Road Inspection, which oversaw construction and design during the years of independent Lithuania, became the Construction Department, later the Construction Board, and was attached to the

newly established People's Commissariat of Public Utilities. The purpose of the Construction Board remained largely unchanged as it continued to approve various building projects. After the local municipalities were reorganised into executive committees in the first months of the occupation, they still had Construction Departments for some time. But at the beginning of 1941, they were reorganised into the Construction Departments of the Public Utilities Departments and the institutions of city architects (in larger cities), which were entrusted with developing only the design project of small buildings and overseeing construction work in cities and counties [27].

Major changes in the design organisation were brought when the new state–run central design offices, based on the model of the Soviet Union, which had not existed in Lithuania before, were established in the main cities of Kaunas and Vilnius. These were the design office of the People's Commissariat of Local Industry of Lithuanian SSR "Pramprojektas" (established at the end of 1940) and the design office of the People's Commissariat of Public Utilities of Lithuanian SSR "Komprojektas" (established at the beginning of 1941). The aim of the new design offices was to design industrial, public, and residential buildings "in a planned and rational socialist manner" and to develop urban reconstruction projects [9]. The majority of Lithuanian architectural specialists were transferred or moved voluntarily to work in both of these institutions. For example, out of the 790 architectural specialists registered in Lithuania at that time, around 150 of them worked in Kaunas branch of "Pramprojektas" alone [18].

After the establishment of central design institutions, the executive committees and commissariats were instructed to order projects for larger buildings from these institutions [36]. Thus, the centralisation of the design organisation in Lithuania, which had been operating in the Soviet Union since the 1930s, was implemented [1]. In addition, the new Construction Departments were established under various commissariats, former ministries, which had to design certain types of buildings. One, for example, was established under the People's Commissariat of Education, which had to design small primary school buildings, while the second was established under the People's Commissariat of Health, which had to supervise the constructions of health facilities [20], [14]. After the establishment of the new design organisations, which operated in Kaunas and Vilnius, the vast majority of the new buildings, based on the Soviet design norms, had to be designed there. As a consequence, private design practice in the country ceased to exist, and architectural specialists had to work not individually, as in the years of independence, but in collectives. The client–designer relationship had also changed. As private property no longer existed, the state and the commissariats became the main clients for various building projects, which had to finance the construction and design processes, while the specialists who worked in the new design offices became the main designers of the buildings in the country [36]. Thus, since then, the local architectural specialists of smaller cities, who worked in the Public Utilities departments of the executive committees or in the offices of the city architects, had almost no influence on the architectural processes that had to take place in the regions of the country.

However, the design centralisation process was not smooth. For example, in the spring of 1941, the main shortcomings of the design office "Komprojektas" were the fact that "the institution was not fully organised (76 percent of the required positions have been filled); co–workers do not know each other at work; they do not know the design norms. <...> There is a lack of technical literature" [17].

The pursuit of standardisation

Although a number of individual designs of the buildings were developed in a short time in occupied Lithuania, the goal was to gradually implement the standardised designs for the majority of the buildings, which were planned to be built. The use of standard designs in the architecture of Lithuania was not a new matter. During the period of independence, quite a few standard designs were developed for certain types of buildings, for example, primary schools [25]. However, the only difference was that during the period of the Soviet occupation, the aim was to implement the mass–use of standard designs in practice, which in the future could have limited the creative freedom of the local architectural specialists.

At that time, standardisation was considered a rational way to speed up the planned "socialist constructions", not wasting resources in developing individual designs, as well as an effort to reduce the influence of local architectural specialists on design processes. Hence, already in the first months of the occupation, plans for the mass–use of standard designs in the architecture were discussed at the meetings of the newly established design and construction organisations. In the late 1940 it was even emphasised that in the coming years the development of individual designs should be reduced, and the use of standard designs should be expanded. As a consequence, it was planned that "the general construction of the country should be limited to several types of standard designs: schools, commercial buildings, hospitals, etc. <…> Thus, in the future, the fantasy of architects, which has so far

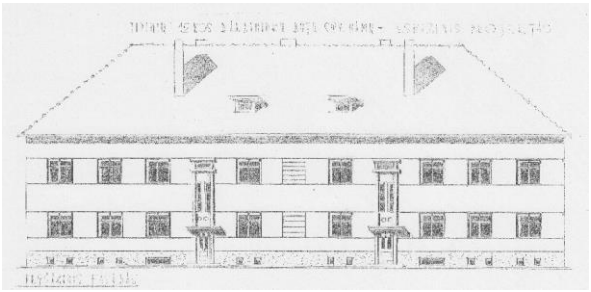

Fig. 2 Design for the standard 12–apartment building (eng. arch. Izaokas Trakmanas, 1940). [Vilnius Regional State Archives, f. 1171, ap. 4, b. 648, l. 1]

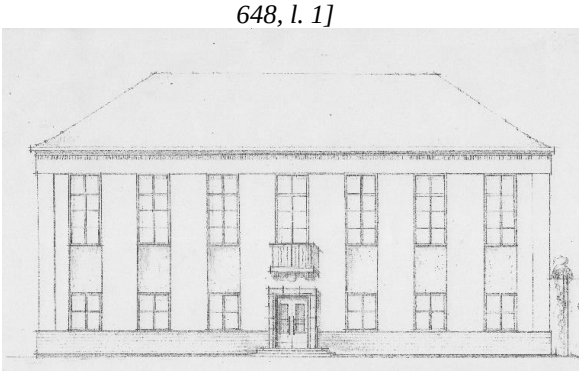

Fig. 3. Design for the standard administrative building (eng. arch. Izaokas Trakmanas, 1940). [Vilnius Regional State Archives, f. 1171, ap. 4, b. 655, l. 1]

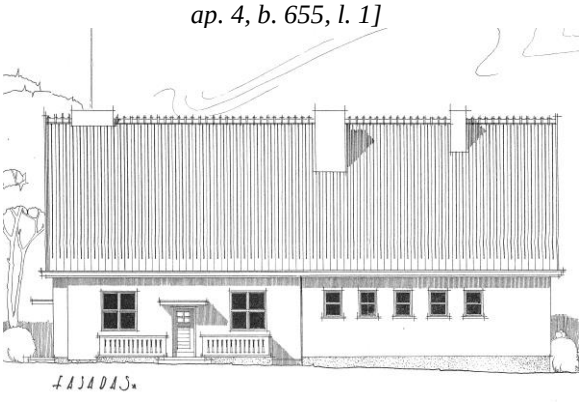

Fig. 4. Design for the standard bathhouse (civ. eng. Albinas Paškevičius, 1941). [Vilnius Regional State Archives, f. 1171, ap. 4, b. 672, l. 1]

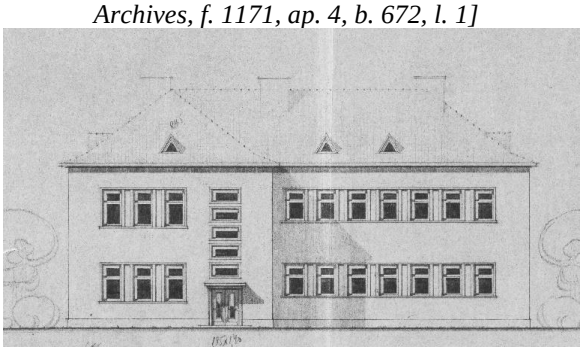

Fig. 5 Design for the standard 3–class primary school building (civ. techn. Jonas Karčiauskas, 1941). [Lithuanian Central State Archives, f. R–271, ap. 1, b. 75, l. 2]

been many times unnecessary, will have to be eliminated. <…> In the future, without a doubt, cheap and standard constructions will surpass all other types of constructions in our country" [16]. There were also plans "to industrialize and mechanize" planned constructions, with the mass–use of standardized factory–made building elements [38].

One of the earliest standard designs developed at the beginning of the Soviet occupation was the apartment buildings for the workers. The development of such standard designs began as early as August 1940 – just a couple of months after the beginning of the occupation. Their development was mainly carried out by the design office "Pramprojektas". The designed standard multi–apartment houses were to be masonry, mainly 2–3 stories high (Fig. 2). The buildings were supposed to have 8 to 24 apartments inside. During the period of occupation several different designs of such buildings were prepared. Other standard designs developed at that time were for small buildings. For example, at the end of 1940, architects of "Pramprojektas" developed standard designs for administrative buildings (Fig. 3). In addition, since 1941, central design offices had developed standard designs for masonry bathhouses of various sizes, which were planned to be built in smaller cities (Fig. 4). By the end of 1941 alone, at least 15 bathhouses were planned to be built in the country based on the new standard designs [13].

Another group of standard designs developed at that time consisted of projects for small primary school buildings. The development of such designs was entrusted to the newly established Construction Department of the People's Commissariat of Education of the Lithuanian SSR. Due to the lack of specialists (only 7 civil engineers and civil technicians worked there), the department was limited to drawing up small standard designs for 2 to 4–class buildings, which were developed at the beginning of 1941 (Fig. 5). Standard designs were drawn up based on local school design experience of the independent Lithuania. By the end of 1941, it was planned to build about 35 new primary school buildings, mainly in rural areas, based on the new standard designs [24]. It is likely that the standard designs developed by local Lithuanian architectural specialists at that time could have been the first step in the implementation of mass standardisation of the country's architecture.

However, although it was aimed to build most of the new buildings in the country based on standard designs, only a very limited range of them had been developed during the few months of occupation. There was a lack of organisation for the development of standard designs, and there was a shortage of building materials for their

implementation in practice [10]. Thus, in the spring of 1941 this situation was criticised in the general press, stating that local architectural specialists "are still insufficiently familiar with the Soviet literature in the field of building design, the standard designs developed in the Soviet Union are still not adapted in practice. Almost nothing has been done in the field of standardisation" [40]. As a result, it was planned that in the future the standard designs of the larger buildings would not be developed in the local design offices but ordered from the design offices operating elsewhere in the Soviet Union. For example, in the spring of 1941, standard designs for the construction of the new bathhouse in Vilnius and for the new polyclinic building in Panevėžys were ordered from the design offices in Moscow [42], [32]. In addition, there also were plans to build Pioneers house in Vilnius based on the design of the Pioneers house in Minsk [37]. As a consequence, such processes in the future could have led to the limitation of the creativity of local Lithuanian architectural specialists, as they could only adapt the standard designs to the local context [16].

Peculiarities of the developed building designs

After the reorganisation and centralisation of the design system, the main design offices started developing the designs for the buildings from the end of 1940. Since the standardisation of design did not take hold during this short period of occupation, therefore, in order to implement the planned construction plans, most of the new design projects were still individual and were intended for very specific buildings. Thus, in addition to standard designs for apartment buildings, the central design offices developed various individual designs. For example, in the period 1940–1941, in the design office "Pramprojektas" the designs for Panevėžys Technical School, Kretinga Hospital, Alytus Secondary School, Trakai Teacher's Seminary, Andrioniškis Sanatorium were developed [21]. Similar was the case in "Komprojektas", where public bathhouses, laundries, and houses of culture were designed [17].

Both standard and individual designs were developed mainly by Lithuanian architectural specialists who worked and managed the new design offices. Most of them had completed their studies in independent Lithuania and the Western countries, and started their professional careers in the years of Lithuanian independence. Therefore, in practice they focused on stylistic modernity. Several Polish architects who ended up in Lithuania after the partition of Poland and the return of the Vilnius region also worked in the new design offices.

At that time elsewhere in the Soviet Union the aim was to develop the trend of "socialist realism" in architecture, based on the model of historical styles,

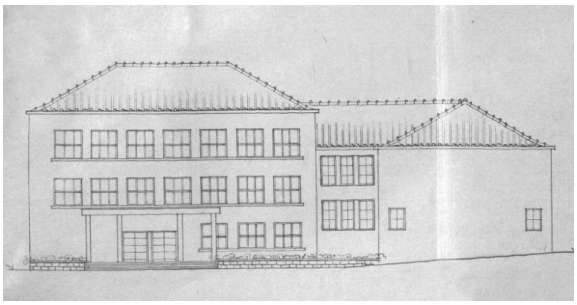

Fig. 6. Design for the Teacher's seminary and dormitory in Trakai (eng. arch. Tomira Maria Slonska, 1941). [Kaunas Regional State Archive, f. R–367, ap. 1, b. 18, l. 1]

Fig. 7. Design for the kindergarten in Vilnius (arch. Antoni Forkiewicz, 1941). [Vilnius Regional State Archives, f. 1171, ap. 4, b. 681, l. 2]

Fig. 8. Design for the Mother and Child home in Vilnius or Kaunas (eng. arch. Flora Romm, 1941). [Vilnius Regional State Archives, f. 1171, ap. 4, b. 704, l. 5]

which was "the basic creative method of Soviet architecture from the late 1930s" [1]. But in occupied Lithuania, this trend was not yet rapidly implemented in practice. However, after gathering the majority of local architectural specialists to work in central design institutions, the aim was to gradually "retrain" them to work under the new conditions. For example, at the beginning of 1941, specialists who worked in "Pramprojektas" had to attend special lectures, which taught not only architectural and construction matters, but also political education [39]. Trips of Lithuanian specialists to the Soviet Union were also organised to acquaint them with the constructions carried out

there [30]. Nevertheless, there were no further efforts to familiarise local specialists with the architecture of the Soviet Union. It is likely that the basis for implementation of the "socialist realism" in the architecture had not yet been established. In the field of architectural theory there were no serious discussions about the style of the new architecture. While in the general press there were only a few basic topics of Soviet architecture, presenting the construction of cities carried out elsewhere in the union, which were considered "examples of what and how should be built in socialist cities" or criticising the peculiarities of the architecture of independent Lithuania [3]. In addition, the Lithuanian SSR Architects' Union had not yet been established at that time (it was established in 1945, at the beginning of the second Soviet occupation), which existed elsewhere in the Soviet Union and had a great influence on architectural processes and the creative control of architectural specialists [6].

Thus, despite the occupation, some of the Lithuanian architectural specialists, in their work continued to adhere to the stylistic attitudes formed in independent Lithuania. As a result, stylistically, the building designs developed in the new design offices did not differ much from the Lithuanian architectural tradition of the late 1930s, inspired by modernism and the modernisation of historical styles. Modernity was to prevail in the architecture of most of the public and apartment buildings designed during the occupation. While the aesthetics were to be based on the simplicity of the exterior, which had to be dominated by minimalist geometric shapes such as wide windows and rectangular volumes with no plastic decor on the facades. (Fig. 6–7). The pitched roofs and traditional materials (mainly brick) of the new buildings had to give features of the local architectural tradition. In addition, some of the designed buildings could have been interesting examples of functionalism (Fig. 8). Similarly was with the industrial buildings, whose exteriors were designed "following rational solutions and utilitarian aesthetics <...> Such a modern structure was easily adopted and adapted by the Soviets" [7]. In some cases, attempts were made to give new buildings a "socialist" character by incorporating bas–reliefs of the hammer and sickle and the five–pointed star into the facades.

However, some architectural features of "socialist realism" can be recognized in the projects of the few buildings designed at that time. It was planned to decorate the facades of some of the newly designed, even modernist–looking buildings with symbols explaining their function. For example, the sculptural bas–reliefs of student figures on the facade of the new secondary school building in Alytus or silhouettes of bathing people on the facades of Šiauliai and Rokiškis bathhouses (Fig. 9). According to Katherine Zubovich–Eady, such symbols can be considered as one of the features of "socialist realism", when "the function of a building

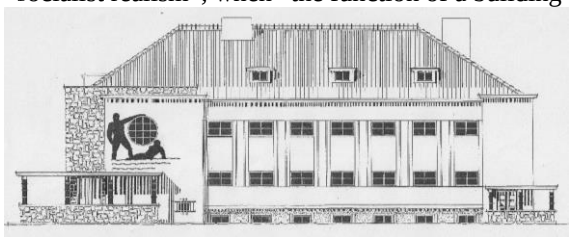

Fig. 9. Design for the bathhouse in Šiauliai (civ. eng. Albinas Paškevičius, 1941). [Vilnius Regional State Archives, f. 1171, ap. 4, b. 699, l. 17]

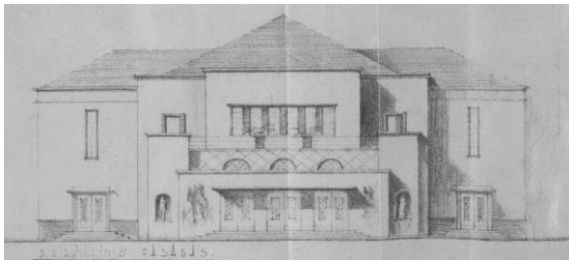

Fig. 10. Design for the conversion of the former Parish house into the People's house of culture in Marijampolė (eng. arch. Izaokas Trakmanas, 1941). [Kaunas Regional State Archives, f. R–367, ap. 1, b. 10, l. 103]

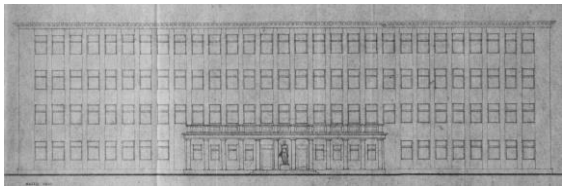

Fig. 11. Design for the conversion of the former Priests Seminary into the Technical School in Panevėžys (eng. arch. Flora Romm, 1941). [Kaunas Regional State Archives, f. R–367, ap. 1, b. 15, l. 4]

is explained in allegorical motifs on the façade" [41]. In other cases, the inclusions of classical architecture, characteristic of "socialist realism", were to be added to the exterior of some other buildings. For example, arched niches with sculptures were to be included in the frontal part of the former Parish house in Marijampolė, which was planned to be converted into the People's house of culture in 1941 (Fig. 10). In addition, an arcade with a sculptural composition of a woman's figure was to be included in the facade of the former Priests seminary in Panevėžys, which was planned to be converted into the Technical School in 1941 (Fig. 11). In this way, the aim was to give these buildings a more monumental appearance [23].

Such inclusions can be considered a local interpretation of the "socialist realism" in the architecture by some Lithuanian architectural specialists.Such a dual stylistic trend, which prevailed in 1940–1941 in Soviet–occupied Lithuania,

demonstrates that during the reorganization and centralization processes of the development of architecture, stylistic trends had not yet had time to change more radically. At that time, greater attention was paid to the implementation of the planned constructions in practice as quickly as possible. This was since the new regime did not yet actively intervene in the work of architectural specialists and only demanded that the buildings be designed as cheaply as possible [28]. Also, at least a part of the local architectural specialists held the opinion that they were still working for Lithuania, not the Soviet Union. A part of them sensed that the Soviet government "is temporary", as there was a reason to believe that Lithuanian independence could be restored in the future, because of the inevitability of the war between the Nazi Germany and the Soviet Union [19]. Therefore, quite a few of them continued to move forward with the stylistic modernity in the designs of the new buildings, characteristic of 1930s Lithuanian architecture.

However, despite the fact that a number of buildings were designed, in the spring of 1941 it gradually became obvious that the majority of the planned constructions could not be implemented soon. For the most buildings suitable plots still were not allocated, design offices were late in developing the final building designs, and there was a lack of necessary materials for constructions – "There are very big difficulties in carrying out constructions with materials, as many of them are almost impossible to obtain <...> The lack of construction materials delays the start of planned constructions" [20]. Thus, during the last months of the occupation, the majority of the planned constructions were stagnant or had not been started at all. Meanwhile, the only new constructions that took place at that time were mostly the apartment buildings and houses for the workers, which were started to be built in Kaunas, Vilnius, and other cities [28].

Despite that, it can be said that in the future, the aim was to further implement the sovietisation of Lithuanian architecture by limiting the influence of local specialists on the planned architectural processes. This is evidenced by the bitter fact that when mass deportations began in June 1941, around 240 or about 30 percent of all architectural specialists (mostly civil engineers and civil technicians) working in the country at that time were deported from Lithuania [34]. Such a reduction in the number of local architectural specialists in the future could have made a hugely negative impact on the development of architecture and its activity in Lithuania. Consequently, the architectural changes in the future could have been implemented more harshly and radically. However, the continuation of the changes in the field of architecture of that time were halted by the war with Nazi Germany in June of 1941, which also ended the first Soviet occupation of Lithuania. As a result, the majority of the buildings designed were not constructed.

Conclusions

The first Soviet occupation of Lithuania led to a number of changes in the field of architecture, which was done to implement sovietisation into this field. The new regime sought to expand the construction of various buildings. A part of them, based on the Soviet model, had to be of a new typology – intended for mass gatherings, public utilities, and for living, and were supposed to serve the needs of the new regime. Numerous new buildings, largely due to the planned standardisation, were planned to be built in a short period of time in the major cities and towns of Lithuania. To achieve that, the centralised design structure was implemented with the establishment of the central state–run design offices, and the construction departments under the various commissariats, in which the majority of the new buildings had to be designed. This can be considered the most significant change that took place in the field of Lithuanian architecture at that time.

After the establishment of the new design institutions, other architectural activities that took place during the occupation period were the development of the designs for the buildings that were planned to be built. Although it was aimed to implement the mass standardisation of the building design, a process that would have gradually suppressed the creativity of the local architectural specialists, only a limited range of standard designs were developed at that time. Thus, at least initially, a large part of the new buildings was to be built according to the individual designs.

Despite the planned sovietisation in the field of architecture, the developed building designs demonstrate that there was to be a continuation of stylistics oriented towards modernism, which began in Lithuanian architecture in the early 1930s. It was since the majority of the building designs of that time were developed by the local specialists, more familiar with the modernist–inspired stylistics, than to the stylistic trend "socialist realism", which prevailed elsewhere in the Soviet Union at that time. Thus, a number of the buildings designed would not have differed much from those built in the years of Lithuanian independence. Only in a few cases it was aimed to approach the "socialist realism" or give the buildings a more "socialist" character. It was because the proper basis for the change of style, due to the short period of the occupation, had not yet been established.

To summarize, regardless of the architectural activity that took place at that time, almost nothing significant was built, as the planned constructions and related processes did not proceed as rapidly as planned. As a consequence, the first Soviet occupation of Lithuania in the field of architecture failed to achieve the majority of the planned architectural and construction goals in practice.

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Kopsavilkums. Pirmās padomju okupācijas laikā, kas ilga no 1940. gada jūnija līdz 1941. gada jūnijam, Lietuvā, arhitektūras jomā, bija plānots ieviest pakāpeniskas izmaiņas. Lai gan okupācija bija īsa un ilga tikai gadu, pēc padomju parauga tika mainīta dizaina struktūra, tika plānots īstenot daudzas arhitektūras idejas, izstrādāti vairāki jauno ēku dizaina projekti. Tāpēc rakstā, galvenokārt balstīts izvērtējums uz arhīvu un vēsturisko materiālu bāzes, kur analizētas arhitektoniskās izmaiņas un procesa īpatnības Lietuvā.

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Guidelines for "Blue-Green" Urban Infrastructure: Adaptive Model and its Structural Elements

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Abstract. An author's methodological approach has been developed, based on the planning of a "blue-green" urban infrastructure for the conditions of a riverside city, as one of the possible ways to adapt settlements to climate change. An adaptive model of the "Blue-green" infrastructure of a riparian city is proposed, as well as a typology of its structural elements, purposes, and methods of application. This methodological approach develops certain provisions of the Sponge Cities practical urban planning strategy, applicable for versatile climatic conditions and successfully implemented since the 2000s in several Asian countries (Singapore, China, etc) and many European cities.

Keywords: «blue-green» urban infrastructure, adaptive model, riverside or riparian city (settlement)

Introduction

The modern field of landscape architecture (LA) theory and practice is determined by the multifaceted connections of landscape design with architectural design, urban and regional planning. It covers the organization of garden and park landscapes, the formation of urban open spaces, the planning of large open areas of regions as well as the state as a whole. Today, the LA is aimed at intensifying efforts to support the biosphere and solving current problems related to climate change, environmental protection, and biodiversity preservation, combined with the improvement of human living conditions. These facts are confirmed by the numerous new directions and practical urban strategies such as, for example, Green Architecture [40], Responsible Landscapes [7], Resilient Cities [30; 37], Sponge Cities [41], and even Smart Cities and Smart Water Landscaping. The main aim of these projects and their practical realisations is to create working landscapes in urban surroundings taking into account the natural laws of the existence of ecosystems of natural landscapes.

A number of declarative documents, developed and adopted by the international community in the last decade, clarify and concretize different sides and aspects of one of the most challenging global problem - the irreversible climate changes in our planet, which is, in particular, tightly associated with CO2 emissions into the atmosphere.

In this way, the 2030 Agenda for Sustainable Development and the following declarative documents of humanity such as, for example, The New Urban Agenda "Quito Declaration on Sustainable Cities and Human Settlements for All" (HABITAT III, 2016) - the result of the last global summit on urbanization - is devoted to shaping the implementation of the Sustainable Development Goals and the Paris Agreement on climate change for all kinds of urban forms (such as cities, towns, and village, etc.). This document determines global standards of achievement in sustainable urban development, rethinking the way we build, manage, and live in cities [31].

So, the main goal of all these documents and political efforts is to achieve sustainable and inclusive urban prosperity and opportunities for all. To this degree, the UN Sustainable Development Goals (SDG) 2030 Agenda outlines several issues related to the water component of the landscape. Taking into consideration the point of view of the water environment and the water component of the landscape, it pays special attention to the problems of conducting the «sustainable management of our planet's natural resources (conservation and sustainable use of oceans and seas, freshwater resources …. and to protect biodiversity, ecosystems and wildlife); substantially increasing of the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change; providing the universal access to «safe, inclusive and accessible, green and public spaces» [33]. That is why the harmonious interaction between areas of human settlement and the water environment in the world of climate change is now among the most urgent objectives.

In the author's concept of architectural-landscape interaction of coastal and water areas during their planning integration, which enables the development of modern urban planning strategies of planning organization and adaptation to climate change of

ecologically vulnerable coastal zones, the contact zones of land and water environment. As a way of understanding the "phenomenon of water" in nature, in landscape architecture, and urban planning the paradigm of mutual complement and modern interaction of coastal and water areas is formulated, which identifies the changes in society's attitudes towards natural water bodies [21; 23]. In this way, the coastal areas can be divided into seaside, riverside (or riparian), and lakeside areas in the most general way. In turn, the water areas are considered as territories covered by the waters of natural water bodies (in the composition of the water surface, the water column, and the underwater part of the shore), which are the object of architectural and landscape design and development; it was established that the boundaries of water territories should be determined from the water cut (in the boundary period or from the line of the greatest low tide along the shore) towards the water space and regulated by international and domestic legislation; according to the types of natural water bodies, lake, river and sea water territories are distinguished; these areas are designed independently or in conjunction with coastal areas [23; 25].

In the author's scientific research one of the models, «blue-green» infrastructure of coastal and water areas for the conditions of riverside settlements, is drawn up [21; 22; 23].

Literature Review

Considering the increasing role of landscape and green architecture in addressing the issues of adaptation of settlements to climate change, modern urban planning practice considers the issues related to the water component of the landscape as topical. The availability and free access to drinking water, which have always been at the heart of human evolution since prehistoric times [13], and today are the prevailing factors in the organization of modern life on the planet. The right to free access to clean drinking water as a necessity to sustain life is enshrined by the United Nations General Assembly (Resolution 64/292, 2010) [32].

Therefore, the practice of water-sensitive urban planning in Europe, Asia, and America demonstrated that there is a radical change in the standards for the architectural and landscape organization of waterside areas, related to various natural water bodies (a sea, a river, a lake) as well as an artificial one (a pond, a canal, a reservoir, etc) [1; 14; 18; 39]. New standards are aimed at developing adaptive planning measures for climate change, for the sustainable development of areas, and for the priority of natural and environmental aspects, which find their realization into practice in such countries as The USA, The United Kingdom, Canada, Spain, Belgium, France, China, Singapore and others [6; 10; 34; 38].

Given the latest trends in climate change, the state of the planet's water environment, and the need to preserve and restore freshwater resources, as a factor of life support for more than 8 billion people on Earth, it is vital to present the practical strategies, which would be aimed at solving the urgent environmental and urban planning tasks facing modern urban planning and landscape practice and related to the water environment and directly to the water component in the conditions of climate change. All these works are aimed at the complex process of discovering innovative approaches in urban planning of areas together with natural water bodies aimed at supporting water ecosystems and implementing adaptive measures for irreversible climate change by landscape and engineering methods.

In this context, the practical development strategy of Sponge City utilizes the principles of passive absorption, purification, accumulation, and use of precipitation (rainwater) in an environmentally friendly way reducing runoff threats and pollution. Sponge cities began to be widely developed since 2000 in countries such as China [17; 28; 41] and Singapore [27; 41], and several individual projects were implemented in the USA [24]. In Singapore, several ecological park projects have been implemented (since 2006) within the framework of the country's water resource purification program "Active, beautiful and clean water" [27; 41]. These are, for example, the parks "Bishan-Ang Mo Kio Park" and "Kallang River-Bishan Park" (2009-2012), the organization of which contributed to the removal of a concrete tray from the mouth of the Kallang River, the restoration of its natural ecosystem, the creation of green spaces and park areas, disposal of dismantled concrete (when creating bridges, observation towers, etc.) [4; 5]. Several projects have also been implemented in China [35; 36].

Identification of various organizational methods of "interaction" between the river and the city - in particular - the planning of a regional park along the river valley through the city and its suburban area; the organization of the "blue-green diameter" (belt) of the city as a system of historical parks, historical and modern buildings on both banks, pristine natural islands in the river valley; the formation of a system of open public spaces along the river, as well as the disclosure of the role of modern art installations in the dialogue between the community, the urban environment and water surfaces and the use of new technologies for creative such dialogue in the modern metropolis, are outlined in the author's publication [26]. The European approach to solving the tasks of cleaning and restoring natural watercourses in urban areas is presented in the

Water Plan of City project for Antwerp, Belgium (2019) [9].

As a response to the challenges of climate change, some countries in Europe, America, and Asia have chosen a clear orientation of their domestic policy on the renewal and protection of ecosystems of natural water bodies, as the basis for improving the overall ecological situation of their urbanized territories.

Topic

The main topic is devoted to the adaptation of the urban structure to climate change regarding new planning approaches in landscape architecture that can involve water bodies and open green spaces within cities with an already developed planning structure. The location of cities and settlements on rivers is the most common option in urban planning practice in Ukraine. This is also one of the most common cases of the location of cities in the European part of the continent because a significant number of European cities are planned and compositionally related to rivers. The problem of degradation of separate elements of river systems within cities (for example, small rivers or tides, etc.) is particularly acute. Unfortunately, this tendency has already become a characteristic of the urban planning practice of different countries.

Aim and objectives

The paper aims to develop an adaptation model of the "blue-green" infrastructure of a riverside city as one of the bases of the planning method of natural and hydrological protection of territories with their architectural and landscape organization. This goal presupposes the following objectives: a) identify the main problems of the architectural and landscape organization of coastal and water areas; b) develop a model of adaptation measures of architectural and landscape organization of coastal and water areas for the conditions of a riverside city; c) give a typology of structural elements of this adaptation model; d) provide practical recommendations for its application to urban planning practice.

Methodology

The specificity of the object (coastal areas and natural water bodies) and the subject (methodological foundations of the architectural and landscape organization of coastal and water areas) of the study, the complexity, and ambiguity of the problem determined the need for a comprehensive use of general scientific and special urban planning methods used for the research of this area, as well as the development of special research methods and methodological approaches, which are personally proposed by the author.

The work uses an interdisciplinary methodical approach to the study of the research problem involving various fields of professional specialization: landscape architecture, urban planning, architecture, design, hydraulic engineering, etc.; related sciences - geography, geology, hydrology, hydrogeography, limnology, and others. During the research, the following methods were used: statistical, literary, and cartographic analysis of raw data on water ecosystems; planning analysis of urban planning documentation and other materials; method of comparison (theoretical, empirical) of hydrographic and urban planning objects, concepts and terms; method of typological analysis of the country's water fund; system approach method; experimental modeling, visual and graphic analysis, etc. As an analytical basis, the research used: scientific works, literary sources, documents of the Council of Europe; materials and statistical data from the World Resources Institute, International Water Management Institute, Global Water Forum, State Water Resources Agency of Ukraine, State Statistics Service of Ukraine, scientific and project experience of domestic and foreign practice; normative and legislative acts, "Sponge City" strategy, etc., which determine the main directions of international and domestic activity regarding nature protection and urban planning policy about natural water bodies. To systematize and generalize the obtained data, the following methods were widely used in the work - theoretical solution of tasks from abstract to concrete, analysis and synthesis, generalization, concretization, etc.

With the help of methods of analysis (comparative, systemic, critical, analytical) and synthesis, systematization of existing theoretical and practical developments, the main problems of the architectural and landscape organization of coastal and water areas, which arise as a result of both natural and man-made disasters are determined: a) high degree of urbanization of coastal areas, b) vulnerability of water ecosystems, c) acceleration of degradation processes of natural water bodies, d) lack of reliable protection of urban areas from possible natural disasters, d) certain inadequacy of existing approaches to risk planning and management in coastal zones; e) the need to adapt these territories to climate change [23, p.151].

Among the main threats of climate change, related to the water environment of the planet, the following are highlighted: sea level rise, melting of glaciers, natural disasters, regular flooding of territories, and access to drinking water [21, p.164; 23, p.252]. All of them also became true to type for the areas of the European part of the Eurasian continent, as evidenced by such changes in the climatic conditions of the regions as heavy rains, rising water levels in rivers, flooding, sometimes catastrophic and not very expected in the adjacent territories during the off-season (especially in spring), the appearance of dust Boers, which appeared to be characteristic weather phenomenon

of many European countries, in particular, in Ukraine during recent decades.

The answer to questions is given in the proposed improved "methodology of architectural and landscape organization of coastal areas", the essence of which is to take into account the following aspects: the basics of engineering and technological solutions (unit 1) related to adaptation requirements to climate change; functional and planning requirements (block 2) and landscape-composition techniques (block 3), which provide for the organization of planning decisions with mandatory consideration of the historical and cultural potential of these territories (block 4). To achieve the "sustainability" of the development of these territories according to modern technological requirements, it is proposed to create a new level of "information and digital control and management" of the coastal territories in the city (block 5) [23].

To achieve the adaptive mobility of project solutions, the methodology of the architectural and landscape organization of coastal areas has been improved in the block of engineering and hydro technological measures due to the development of a new planning method for the natural and hydrological protection of territories. The method is aimed at: a) identifying planning criteria (environmental, systemic, and integration); b) developing planning approach mechanisms, and c) the development of "blue-green" infrastructure, which is considered an alternative to the traditional hydro-technical protection of coastal areas. The essence of the author's proposals is to create a "hybrid" system of protection and use ("exploitation") of coastal urbanized territories. The mechanisms of the methodical approach are divided into planning, "modeling", mathematical, and organizational [22; 24].

The adaptation model of the "blue-green" urban infrastructure was developed as part of the planning method of natural and hydrological protection in order not only to protect built-up areas from prolonged rains, floods, and other natural disasters to minimize its catastrophic consequences and losses through planning measures but also could be designed for the long term – to achieve more sustainable results for water ecosystems, especially – for freshwater ecosystems. In this case, the adaptive model of "blue-green" urban infrastructure, which was developed by the author, shows one possible way of responding to challenges, mentioned above. The proposed model is coherent with the practical urban planning strategy "Sponge City" [17; 28; 41], which expands modern methods and controls resource-saving and territory protection based on innovative technological solutions, and at the same time proposes several implementation measures of architectural andlandscape organization areas for the conditions of a European region with continental climate.

The adaptive model shows the creation of "blue-green" infrastructure of coastal areas in riparian settlements, which provides the following planning and adaptation solutions: a) measures to protect and stop water flow; b) means of passage and absorption of water currents; c) methods of redistribution of water flow; d) preservation of the function of protective strips along the river bed and water protection zone, Fig. 1.

In addition, the structural elements of the adaptation model are (can be): a) "water basins" (for water accumulation, flow regulation, protection of territories); b) "residential groups" (with the functions of absorption and redistribution of water); c) "water gardens" and "wet parks" (with the functions of accumulation, purification, protection); d) "blue streets" (with the functions of redistribution, transportation, regulation of water flow). It is recommended to organize "water pools" both in green areas and in built-up areas, and they can be combined.

The most typical variant of a natural reservoir can be illustrated by the example of a dendropark "Sofiyvka" in Ukraine – a pond located upstream of the river, the riverbed of which serves as a planning axis of the historic garden. This pond serves as the main water basin for water supply to numerous water compositions and jets of the park such as waterfalls, cascades, grottos, fountains, etc [16].

The storage tanks for water have been organized in prominent historical parks as one of the possible options for providing their water system with the required amount of water. Thus, one of the interesting examples from the history of landscape architecture is the historical underground reservoirs of the famous gardens of the Palace of Versailles in France. In 1672 in addition to the existing pools, three underground pools were created directly under the palace terrace. Their total capacity was 34,000 cubic meters of water [15].

Another example of artificial reservoirs is given by modern urban planning practice. In Rotterdam, for example, to redistribute rainwater runoff, the "water square" Benthemplein (Netherlands, 2011-2013) was created. With a total capacity of over 1.7 million liters, it also provides the possibility of gradual "discharge" (within 48 hours) of water into urban watercourses. Upon dry weather, this area functions as a public center with numerous cultural, recreational, and sports facilities [8].

Within the "residential groups," it is recommended to employ planar greenery landscaping, create "green roofs", organize "rain gardens" with options to control, redistribute and purify the rainwater, use solid "permeable pavement", utilize alternative eco-friendly energy sources, etc.

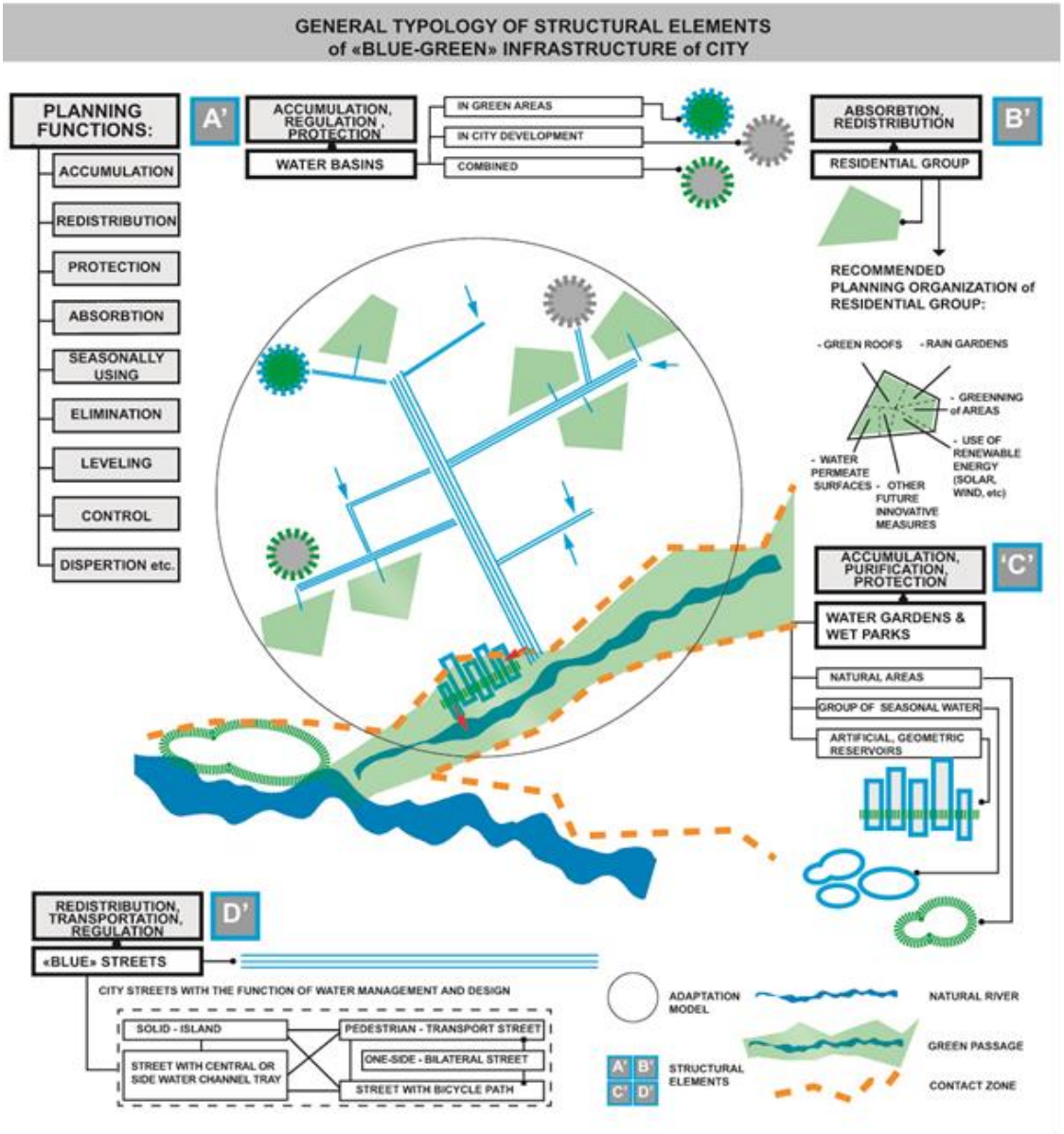


Fig. 1. The adaptation model of "blue-green" urban infrastructure [created by author]

In this aspect, it seems appropriate to look into the past and discover the methods from the practice of past years, such as, for example, the organization of a "tiny garden" in a residential group on the main street facade of the building. Such small gardens, called "polisadnik" in Ukrainian, were widely used in the practice of planning the historic district of Pechersk Lipki in Kyiv City, Ukraine. Many of them are preserved and can be seen today [2].

Green roofs are extremely widely used elements of planning solutions for modern buildings, both for dwelling and public functions. The developed technologies of these gardens are successfully implemented around the world: from grass lawns to vegetable & fruit farms on roofs. It is necessary to emphasize that green roofs are possible to organize for new construction sites as well as for the renewal of existing buildings, including unique sites of urban planning and architectural heritage. For example, in Toronto Downtown, the Banking Pavilion of the first complex of skyscrapers in the city by Mies van der Rohe (today TD Centre) received a green roof in 2009. The new design preserves the original roof grid pattern, which is a protected element of the designated heritage building. Though not publicly accessible, the green roof is visible to TD office workers and visitors from other TD Center skyscrapers [29]. Arranged on another Toronto city complex, Nathan Phillips Square Toronto City Hall Podium Green Roof (2009-2014) feature approximately 36,000 sq. ft. of new green roof, that surrounds the twin towers. This green roof is available to citizens throughout the year [20].

The next structural elements of the model to be discussed are the water gardens and wet parks. Water gardens and wetlands can be natural, in the form of a group of seasonal reservoirs or artificial. Wetlands are typically formed along large rivers, on the shores of large lakes, along the edges of lakes and streams, where they create a transition between

Fig. 2. The water gardens of geometrical shapes of the Haute Deûle River Banks Eco District by Atelier des paysages Bruel-Delma, Lille, France. 2012. Photos and design by Bruel-Delmar [3]

aquatic and terrestrial ecosystems; they are natural water filters, control flooding during prolonged rains, prevent soil erosion, slow global warming, etc. For example, the ecological quarters of the river Haute Deule in Lille have a series of man-made "water gardens" that support natural processes in the local water system (France, 2005-2018) [3, 34], Fig. 2. It is impossible not to mention a new type of city park, which appeared not long ago, in response to ongoing dramatic climate changes. One of the many such examples is the Sherbourne Common City Park in Toronto, Canada, with a "rain management" function: rainwater is collected, purified, and returned to Lake Ontario (2009) [19].

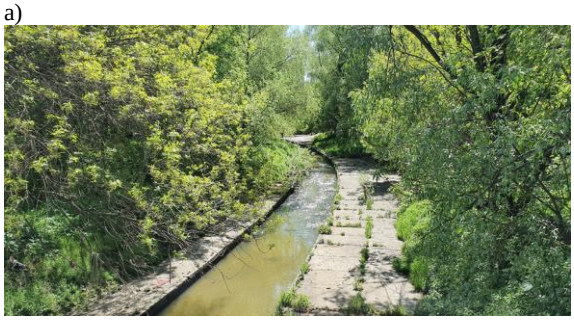
"Blue" streets, as a structural element of the "blue-green" infrastructure of the settlement, are most often urban, green streets with the function of "water management" (for redistribution, transportation, and regulation of water flow). According to their organizational scheme, they can be continuous or have "island" sections, with a central or lateral "water channel-tray", pedestrian or vehicular (one-way or two-way traffic), sometimes arranged with bicycle paths and various types of special landscaping. For example, such "blue" streets, which control the volume and pollution of stormwater runoff in urban areas, were implemented in the cities of Portland and Seattle, the USA.

The main topic is devoted to the adaptation of the urban structure to climate change regarding new planning approaches in landscape architecture that can involve water bodies and open green spaces within cities with an already developed planning structure. The location of cities and settlements on rivers is the most common option in urban planning practice in Ukraine. This is also one of the most common cases of the location of cities in the European part of the continent because a significant number of European cities are planned and compositionally related to rivers. The problem of degradation of separate elements of river systems within cities (for example, small rivers or tides, etc.) is particularly acute. Unfortunately, this tendency has already become a characteristic of the urban planning practice of different countries.

Results and Discussion

In the course of the growing role of LA in the process of adaptation of territories and development of settlements to climatic changes, numerous new approaches and methods have been developed and their wide application has already become an essential feature of modern project practice. One such approach is represented by the method of natural and hydrological protection of coastal areas, proposed by the author, which is based on the criteria of their planning (environmental, comprehensive, integration); on the scientific basis and practical mechanisms (planning, "modeling", mathematical, organizational) of its planning approach; determined the essence of the creation of a "hybrid" system of protection and use of coastal urbanized areas, where the development of "blue-green" infrastructure is considered as an alternative basis for modern hydro technical protection of coastal areas [24]. It was established that the following are included in the planning and adaptation measures for the architectural and landscape organization of coastal and water areas: a) measures to protect and stop the water flow; b) means of passage and absorption of water currents; c) methods of water flow redistribution; d) preservation of the function of protective strips and water protection zones. When planning the relevant territories, it is envisaged to create: a) "water basins" (for water accumulation, flow regulation, territory protection); b) "residential groups" (with technical possibilities of absorption and redistribution of water); c) "water gardens" and "wetlands" (with functions of accumulation, purification, protection); d) "blue streets" (for redistribution, transportation, regulation of water flow) [22; 23; 24].

a)



b)

Fig. 3. Lybid River in the city, a tributary of the Dnipro, Kyiv. 2022. a) A plot with a natural river in the area of Lysa Hora; b) A river in a concrete collector in the Telechki industrial district [photos by author]

Furthermore, the adaptation model of the "blue-green" infrastructure can serve as a basis for developing the planning of the degraded watercourse basin to flood the riverbed and restore the river ecosystem. Therefore, this model takes into account the most difficult urban situation, when the basin of a small river is completely densely built up, which is typical, for example, for the Lybid river valley in Kyiv (Fig.3), as well as for many other cities in the world, where small rivers - tributaries of large ones - exist in a degraded state. The development of the model might require its extension and further detailed tuning to meet the specific urban LA conditions.

Each of the structural elements of the model contributes to the sustainable development of territories and ultimately the restoration of freshwater ecosystems. So far, the so-called "technical proof" of their effectiveness, which can be confirmed by hydrological calculations and, over time, by the state of the water ecosystem, is a debatable issue. In the opinion of the author, considering the development of green roof technologies and the implementation of city programs to promote their construction, we can try to predict the economic and social "effect" of the implementation of the planning model, its contribution to the preservation and restoration of freshwater ecosystems in settlements in the face of climate change and rising temperatures, which will be positive.

Green roofs are implemented around the world in various countries and regions, very often with the support of local authorities and communities. The positive experience of such a northern country as Canada shows that the special program of green roof development can provide significant economic benefits to the cities. Toronto's leadership in green roof policy began with the development of a Green Roof Strategy (2006) for the city which lays the foundation for requiring green roofs on new development in 2009. As for today, the Green Roof Bylaw (which includes a Green Roof Construction Standard) and the parallel Eco-Roof Incentive Program are responsible for over 111,400 square meters of new green space. As of 2019, approximately 620 new green roof permits have been required under the bylaw, totaling over 501,000 square meters of new green roof area [12].

Widespread implementation of green roofs in Toronto provided significant economic benefits to the city, particularly in the areas of stormwater management and reducing the urban heat island and associated energy use for cooling. Thus, green roofs retain stormwater, improve air quality, lower ambient temperatures, reduce building energy use, and create attractive and useful outdoor amenities.

The numerous advantages of green roof implementation are confirmed by the following facts. The greening of just 5 percent of the city's area through green roofs lowered the citywide temperature by an estimated 1.5° to 2°C, with a greater temperature reduction in high-density areas and with a direct 4° to 5°C roof surface cooling effect. Each year, green roofs retain 12,300 cubic meters of stormwater runoff (equivalent to 50 Olympic-sized swimming pools), reduce polluting sewer overflows to allow for three extra beach days per year, and prevent 220 metric tons of greenhouse gas emissions.

The methodological approach was presented by the author at international conferences in Turkey (2016), Spain (2016), Bulgaria (2016); Ukraine (2016, 2020); in Poland (2016, 2021).

Conclusion

In conclusion, it should be emphasized that the revealing role and significance of rivers and their riverside areas in the architectural and landscape organization of cities and other settlements are among the most topical issues in modern urban and landscape practice.

The main problems of the architectural and landscape organization of coastal and water areas, which arise as a result of natural or man-made disasters, are identified in the work (high degree of urbanization of coastal areas, the vulnerability of water ecosystems, acceleration of degradation processes of natural water bodies, the need to adapt these territories to climate change, etc,) At the same time the most urgent in the face of climate change are such issues as a) methods and ways of protecting built-up areas from floods and unforeseen heavy rain showers; b) possibilities of redistribution and use of rain-run off and other waters; c) ways of increasing

the water content of the river bed in the context of climate change; d) restoration of degraded small watercourses in cities and towns, etc.

In these aspects, the adaptation model of "blue-green" infrastructure was developed by the author for a riverside city and its basic structural elements (such as water basins, residential groups, water gardens, and wet parks, "blue" streets) are identified. This model has provided planning and adaptation solutions (such as measures to protect and control the water flow; solutions for bypassing and absorbing water currents; water flow redistribution techniques, etc.). It is recommended to implement a "blue-green" infrastructure of coastal-water areas: linear (along the sea coast, large rivers, etc.), branched (at river basins with tributaries), circular (at lakes). This model has been developed as part of the method of natural and hydrological protection of urban areas.

According to providing practical recommendations for its application to urban planning practice, the following should be noted. The proposed model was developed for the conditions of the European region with a continental climate, considering the main points of the practical urban planning strategy "Sponge cities", (which was implemented in another climate). It is considered a basic one for riverside settlements for developing the planning of the degraded watercourse basin to restore the river ecosystem, with the prospect of its change, addition, and expansion in each case.

The proposed methodological approach, as well as each structural element of the model separately, have practical significance and can be used in the development of urban planning documentation at the local, regional, and state levels. The most sustainable effect can be achieved with integrated implementation, which usually occurs with the support of local authorities and the community (Canadian experience [12]).

Urban planning practices need to urgently invest in the protection and restoration of freshwater ecosystems shaped by rivers, lakes, wetlands, etc. and in this direction, the proposed adaptation model of "blue-green" urban infrastructure is very relevant. The prospect of further research may be affected by the development of similar basic models for the conditions of lakeside or seaside settlements, as well as for the option of a combined water system in the city.

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Kopsavilkums. Izstrādāta autora metodiskā pieeja, kuras pamatā ir analizēta zili-zaļās pilsētvides infrastruktūras plānošana upmalas pilsētas apstākļiem, kā viens no iespējamiem apdzīvoto vietu pielāgošanas veidiem klimata pārmaiņām. Pētījumā piedāvāts piekrastes pilsētas zili-zaļās infrastruktūras adaptīvais modelis, kā arī tā strukturālo elementu, mērķu un pielietošanas metožu tipoloģija. Konkrētā pētījumā izmantotā metodiskā pieeja rezultātā sniedz praktiskās pilsētplānošanas stratēģijas nosacījumus, kas piemērojami daudzpusīgiem klimatiskajiem apstākļiem un veiksmīgi ieviesti kopš 2000. gadiem vairākās Āzijas valstīs (Singapūra, Ķīna u. c.) un daudzās Eiropas pilsētas.

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Nature's Poetry Unveiled: Exploring the Symbolism and Design Philosophy of Chinese and Persian Gardens through Metaphor and Art

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Abstract. This paper delves into the symbolism and design philosophy of Chinese and Persian gardens, revealing the profound depths of their metaphorical and artistic expressions. As landscape architecture, gardens act as conduits for cultural transmission, embodying an understanding of the cosmic order and reflecting the passage of history. Focusing on pre-modern Chinese and Persian gardens, this study explores their design philosophy and characteristics. Chinese gardens prioritise the harmonious coexistence of humanity and nature, exemplified through a deep reverence for the natural world. Meticulous treatment of the landscape seamlessly integrates gardens with their surroundings, drawing inspiration from elements found in Chinese landscape painting. Persian gardens, on the other hand, showcase the distinctive Chahar Bagh layout, providing glimpses into an ideal cosmic order. Influenced by the beauty of Persian poetry, these gardens take on the essence of living poems, evoking a sense of tranquillity and allegorical meaning. Waterways, pavilions, and lush vegetation create captivating oases within the arid landscape, inviting relaxation. By analysing the architecture, symbolism, and design philosophy of both Chinese and Persian gardens, this study uncovers the remarkable similarities and differences that exist between them. However, these gardens extend beyond their physical manifestations, beckoning visitors to engage with metaphorical realms. The integration of poetry, painting, and various art forms enriches the multidimensional experience, eliciting profound sentiments and unlocking the transformative power of nature's poetry. Ultimately, Chinese and Persian gardens embody the very essence of nature's poetry, serving as bridges between built environments, humanity, and the natural world. Through the harmonious fusion of art, design, and the intricate relationship between humans and nature, these gardens inspire awe and reveal the timeless beauty that resides within nature's realms.

Keywords: Chinese garden, Persian garden, symbolic meaning, art, nature

Introduction

Landscape architecture and garden design represent the identity, and history of a nation, and they act as an interface to convey the meanings and identity to the future generations. Gardens as the most emerging type of landscape architecture have been evolved throughout the history of nations and represent the culture, customs, and belief of societies. According to Bacon, garden is defined as "the purest of human pleasures and the greatest refreshment to the spirits of man" [1]. Gardens are also presented in a similar way by Hunt as "concentrated or perfected forms of place-making" [2].

Gardens are not only perceived as green spaces, but also have symbolic meaning in each culture. In Bible, gardens are represented as "Eden", and "paradise on earth", and in Hebrew such Edens are translated as "unidentified region or country" [3]. Throughout time, ancient gardens have shifted in terms of layout, aesthetics, as well as function. However, they have been always inspired built environment practitioners as best practices, that consists of lessons to be learned for future designers.

Chinese and Persian gardens are both considered as ancient gardens, that have rich history, and their establishment dates back to ancient times. Chinese and Persian gardens, both, have several key design and philosophical features in common (e.g., interpretive constructs: enclosure, environs, space (and time), and pattern and perspective). The spatial segregation and connection between garden vistas and interior spaces are the other major characteristics for both gardens. The perception towards nature is the same for both cultures, as both see nature not as the object to be tamed and altered, but the model to be imitated and learned from [4]. In the design philosophy of both Chinese and Persian gardens, human is influenced by Mother Nature, and learn more about him/herself via nature, and thus become more resilient in living with harmony with nature and the entire world. This is in contrast with the approach in western garden design, where the philosophy behind the design underpins more towards a linear relationship, which means human is influenced by nature, but then he/she reacts to the environment, and thus identifies ways to live

with it via technology, modernity, and policy. Therefore, strong belief in a sense of unity with nature is another common design philosophy that can be seen in the generation of both Chinese and Persian gardens.

With our scholarly focus directed towards the enchanting landscapes of Chinese and Persian gardens, this paper explores how nature and natural elements are interpreted in the Chinese and Persian culture and translated into landscape architecture, bearing profound symbolic meaning and design philosophy within these ancient civilisations. These gardens, rather than standing in isolation, weave an intricate tapestry with various art forms, forging a symbiotic relationship.

To understand the significance of nature in these gardens, we delve into the cultural and philosophical foundations, and their interplay with painting and poetry. This study scrutinises the culture, philosophy, patterns, and their interrelation with other art forms. Through this multifaceted lens, it becomes evident that Chinese and Persian gardens, while externally distinct, share a fundamental philosophy in their approach to garden-making and the poetic interpretation of the relationship between humanity and nature.

This study involves qualitative research methods for examining the landscape design of pre-modern Chinese and Persian gardens with regard to the respective philosophy, symbolism, painting, poetry, and culture before drawing a comparison between them. Similarities and differences between Chinese and Persian gardens are highlighted. Intellectual contemplation of the intrinsic harmonious relationship between humanity and nature is also stimulated.

Chinese Gardens

The pattern and heavenly beauty

In pre-modern China, garden-making was characterised by a deep appreciation for natural forms and a departure from the pursuit of geometrical aesthetics and grid-based designs. Instead, the focus was on creating an environment that seamlessly blended with nature, with artificial interventions being imperceptible to the eye [5]. The Chinese character *tian* 天, which symbolises nature, is also associated with heaven. This association reflects a deep reverence for the natural world in Chinese culture, and this respect is reflected in all aspects of garden-making. “In the case of irregular terrain, the focus should be on exploiting the unique characteristics of the site to plan the garden layout. The use of orthogonal grids is not a necessary requirement and should not be a cause for concern” [6]. Even in instances where the site was disrespected, the term “*wuqiao zhiren*无窍之人”, meaning an ignorant person lacking the ability to intelligently adapt to the natural setting of the garden was employed.

Fig. 1. Garden of the Inept Administrator or Garden of Garden of the Unsuccessful Politician by Wen Zhenming [Metropolitan Museum of Art]

Although natural forms held great value, the Chinese garden culture did not involve simply copying them or reverting to a state of nature. Instead, it was grounded in a philosophy of the “unity and harmony between heaven (nature) and humanity”. Consequently, humans were not absent but rather an integral part of the garden design process. For instance, Wen Zhenming's (1470-1559 CE) drawing for the Zhuozheng Yuan (Garden of the Unsuccessful Politician or Garden of the Inept Administrator) featured human figures amidst the landscapes (Lu 2011). These human figures were painted as an integrated part of the scenery, as shown in Fig. 1. In the sense of “looking out and being looked at” [7], Human is also a type of scenery of the garden.

Relationship between Chinese gardens and Chinese landscape painting

If the pre-modern Chinese garden pursued intellectual, spiritual and imaginary interactions between man and landscape, it may be questioned how these interactions were realised. Chinese landscape paintings played an important role to facilitate such interactions. If a garden could evoke a feeling as if strolling in a Chinese landscape painting, it was regarded as a remarkable success.

The white walls are used as pieces of drawing paper. Use stones and rocks to draw. Select stones and rocks by learning from the cunwen 皴纹 (the texture drawn by the wrinkle method, an important drawing method used in Chinese landscape painting). Learning from the ancient brushwork to add more Huanshan pine and cypress, plum trees, bamboos [8].

Fig. 2. The rockeries outside of Celestial Lodge of Five Peaks, respectively on the northern and southern sides [photo by the first author]

Fig. 3. The rockery used as steps of Celestial Lodge of Five Peaks [photo by the first author]

Fig. 4. The zigzag corridor around the rockery courtyard [photos by the first author]

When Ji Cheng built a garden for the client Mr. Wu, he analysed why this commission succeeded. Ji accentuated that "the landscape is endowed with a feeling of Chinese landscape painting" [9].

This theory is echoed in *Hua shanshui fu* 画山水赋 (On Chinese Landscape Paintings) and *Linquan gaozhi* 林泉高致 (The Lofty Message of Forest and Streams) [10]. Li Cheng elaborates that the painterfirst defines the primary and secondary positions, and secondly tells the relationship according to the distance. Thirdly, the painter arranges landscape elements and finally draws out the height [of each element] [11].

This way of designing the composition of the Chinese landscape painting based on a hierarchical interpretation is further discussed by painters and theorists. Wang Wei notes that "the chief peak is better to be drawn with high alpine crags, while other mountains and hills are drawn to serve the chief peak following the overall ambience" [12].

Rockeries were the main scenery for wufeng xianguan 五峰仙馆 (Celestial Lodge of Five Peaks) of Liu yuan. The two longitudinal sides face two yards with rockeries (Fig. 2).

Both facades were enclosed by continuous lattice doors, which could be completely open, so people inside the lodge can enjoy the rockeries. Rockers were directly used as the steps of the lodge (Fig. 3)

On one side of the lodge was a zigzag corridor that opened to one of the rockery courtyards (Fig. 4). After a peripatetic journey through the corridor among rockers, one could reach the Celestial Lodge of Five Peaks.

Architecture and metaphor

Architecture played multiple roles in the pre-modern Chinese garden. Maggie Keswick comments architecture in the pre-modern Chinese garden–as metaphor. "In a Chinese garden, architecture is more playful than useful and, above all, more metaphorical"[13]. Architecture can be meaningful and playful in gardens.

Architecture served as metaphor implying other elements, which were described in a poetic manner, especially natural elements. "An essential aspect of the Chinese garden is its playful transformation of the animal and vegetable kingdom into architectural forms" [14]. The transformation could rely on the naming of architecture. A small-roofed arch bridge resembling rainbow was named *xiaofeihong* 小飞虹 (little flying rainbow, Fig. 5).

Buildings and architectural features were popularly named after the natural landscape near them. Beyond simply referring to the surrounding natural landscape, the naming reflected a poetic metaphor. *Yuanxiang tang* 远香堂 (Drifting Fragrance Hall or The Hall of Distant Fragrance) was built on the southern bank of a pond, where lovely lotus flowers were planted. The name "drifting fragrance" was quoted from Zhou Dunyi 周敦颐 (1017–1073 CE), who was a prestigious philosopher and literatus of the Northern Song dynasty (960–1127). Zhou assimilated lotus flowers to a respectable person with great virtue. The lotus flower still kept fresh, pure and clean with "drifting fragrance", although it grew out from dirty mud at the bottom of a pond. "The further away one is, the purer is the fragrance. Upright and elegant, it establishes itself cleanly.

Fig. 5. Xiaofeihong 小飞虹 (little flying rainbow) [photo by the first author]

Fig. 6. Linear geometry of Fin Garden, Kashan, Iran [photo from authors archive]

It can be viewed from far away but cannot be toyed with" [15]. Zhou used the life of a lotus flower to describe a spiritual harmony that was worthy to pursue. In the same vein, a respectable person of great virtue could still keep his/er stainlessness and rectitude as the lotus flower no matter what s/he would encounter [16]. The Drifting Fragrance Hall was not only a place for enjoying the lotus pond, but also implied a spiritual harmony by referring to an early literatus.

For Ji Cheng, designing architecture according to the specific context and surrounding scenery was very important. He emphasised this strategy on various stages of building for a garden, from selecting a site to build a building. Ji explained that in a garden, both the location and orientation of built environment elements had less constraints, so it was important to judge case by case according to the specific context and circumstance [17].

Landscape element and transcendence of nature

The principle of how to integrate natural landscape elements into traditional Chinese garden is following the natural form but transcending the nature through artistic treatment. For example, water is a natural element that was commonly used among traditional Chinese gardens. The status of the water in traditional Chinese garden was demonstrated with how important its attribute would enhance solid substances. The relationship between water and stone corresponds *xu* (the empty or void) and *shi* (the full or solid). A chapter in *Treaties on Superfluous Things* was dedicated to elaborate water and stone. "Stones evoke historical reminiscence while water calm down people with tranquillity. Water and stones are indispensable for the garden" [18]. Professor Chen Congzhou defines the water as a part of *tianqu* (natural interest) that was similar to clouds, shadows, sound and radiance [19]. Why these elements were assorted as a category was they represented *xu*, the empty. In the traditional Chinese painting, blank areas were usually applied to show water or clouds [20]. Chen continues to elaborate the *xu* (empty) is what the *shi* (full) relies upon [21]. A metaphor further explained how Chinese traditional view of landscape design perceived water. "Stones are the spine and bones of the mountain while water and spring are the blood. If there are no 'bones', the mountain would be too soft to stand. If there is no 'blood', the mountain would be arid and bleak" [22].

Persian Gardens

The pattern and Chahar Bagh

Since the ancient Achaemenids Persian Empire (550-330 BCE), the Persian Garden has been characterised by the *Chahar Bagh* pattern. *Chahar Bagh* means four gardens in Persian with reference to the pre-Islamic belief in a four-part world [23]. Such quadripartite geometric structure with pavilions located at the intersection of axes is regarded as a prominent feature of the Persian garden [24].

The notion of the quadrilateral *Chahar Bagh* remains intact in the Islamic era due to the four gardens of paradise mentioned in the *Quran:*

And for him, who fears to stand before his Lord, are two gardens.

And beside them are two other gardens [25].

The *Chahar Bagh* pattern has been continuously using for more than two millenniums. Despite various locations and site conditions, such unique

pattern is still adopted in garden design consistently, involving the use of right angles, the sub-division into four sections, two axes perpendicular to each other and general symmetry.

The Persian garden layout is dominated by linear geometry reflecting the cosmic order of the world with a pool of life in the centre [26]. Having waterways as main axes, this symbolises the Garden of Eden or *Jannah* (paradise) of abundance watered by four flowing rivers [27]. The four-folded garden layout refers to the four principal elements of sky, earth, water and plants [28]. The Persian garden is designed to exemplify heaven and realise the dream of life in paradise on earth. It provides a comfortable microclimate amid harsh desert conditions and is a magnificent retreat away from the dusty and noisy outside world [29].

Relationship between Persian gardens and Persian poetry

The Persian garden is closely associated with Persian poetry and literature. The Persian lyric poet, Hafez (1325-1390 CE) in the *Divān* (collected poems of Hafez) introduces the transcendental world as a paradisiac garden with rose bed, fruits and birds:

From the grace of Eternity without beginning I am expecting the Elysian garden (CCCXII/7).

From Paradise's fruits what relish might find/ He who hasn't bitten the apple of a darling's chin? (CCXXIV/ 9). A cage like this is unworthy of a sweet singer like me/ I will go to the rose bed of Paradise because I am the bird of that Garden (CCCXXXIV/2).

Hafez highlights the binary of paradise and the earth by drawing a stark contrast between "Holy Rose Garden" with "snare of accidents" or "the abode of desolation":

I am the bird of the Holy Rose Garden. What description shall I give of separation:/ Of how I have tumbled into this snare of accidents? (CCCX/2)

I was an angel and my home was the highest Paradise./ Adam brought me into this temple of the abode of desolation (CCCX/3).

Despite the dichotomy of paradise and the earth, according to Hafez, it is still possible to set up a materialistic garden on the earth to bear a resemblance to the transcendental paradise:

Now that the rose has come into the meadow, come from non-existence into being,/…The world in the season of the lily and the rose has become like Paradise Sublime,/ How the rose gets mounted, Solomon-like, on air, when/ in the morning the bird enters with the psalmody of David! (XLVII/1)

In Hafez's poems, the allegorical use of garden imagery is a recurring theme [30]. The tranquillity in landscape, the soothing sound of flowing water, the fragrance of flower blossoms and the relaxing music of singing birds all evoke the vegetative imagery of paradise [31].

Fig. 7. Chehel Sotoun pavilion and garden in Isfahan, Iran [photo from authors archive]

Fig. 8. Shazdeh Garden, Mahan, Kerman, Iran [photo from authors archive]

Architecture and context

Located in the hot and arid climate of Iran, Persian gardens are surrounded by solid boundary walls with layered mud bands and rammed earth (*chineh)* for protection against unpleasant winds and harsh conditions [32]. The external appearance of Persian gardens may look simple and be compatible with the surrounding earthy environment, however, the space enclosed by boundary walls displays elaborative decoration and a variety of materials, ranging from tiles with various colours to stone, timber, mud brick, stucco and lime.

Pavilions are the primary architectural form in Persian gardens. They are often located at the intersections of axes and serve as focal points of interest in the whole garden composition and layout [33]. As a prominent architectural element, pavilions are highly decorated, including the use of lobulated arches and other ornamentation [34].

Landscape elements and oases in desert

The survival of Persian gardens in a desert environment heavily relies on water availability. The crucial factors for due consideration are only the source and collection of water, but also how to distribute water, manage water consumption and irrigate the garden in such a hostile context [35]. For a sloping site, water can be distributed by

Fig. 9. Landscape of the Akbarieh Garden, Birjand, Iran [photo from authors archive]

gravity to minimise the use of energy. Waterways in Persian gardens contribute to the microclimate by creating cool and refreshing breeze.

Similar to water, plants are key landscape elements of Persian gardens. Providing umbrageous and tall trees along waterways is an effective way to reduce the rate of water evaporation. They also attract birds, filter the breeze, provide shades, increase evaporative cooling, mitigate solar penetration to the ground and regulate heat of the sun [36].

Discussion

The artistic allure of both pre-modern Chinese and Persian gardens extends beyond their physical attributes. These gardens engaged in a dynamic interaction with other forms of art, giving rise to a multi-layered and immersive experience. The integration of poetry, painting, and other artistic elements adds depth and richness to the gardens, evoking sentiments, metaphoric meanings, and a sense of transcendence.

In pre-modern Chinese gardens, the pursuit of natural morphology was evident in the tangible domain, encompassing patterns, built forms, and the presentation of landscapes. However, the true essence of the relationship between humanity and nature, the intangible aspect, resided in a more abstract realm. The literati, through their intellectual interpretations and imaginary interactions with the landscape, bestowed poetic meaning upon even the most mundane natural elements. A tree, a drop of rainwater, or a pavilion were transformed into profound artistic symbols. Garden-making, akin to painting or strolling through a Chinese landscape painting, went beyond the physical attributes of nature to focus on its artistic characteristics.

The literati deeply appreciated the artistic qualities of elements within the garden. For instance, water, offering emptiness and tranquillity, held greater value than its physical properties. It was seen as a mirror-like surface that reflected the surrounding scenery, creating a sense of harmony and poetic contemplation. Stones, on the other hand, were seen as embodying solidity and permanence. They were carefully selected and positioned to represent mountains or rocky landscapes, creating a microcosm of nature within the garden. The hierarchy of elements corresponded to the layers of scenery in different positions within the landscape. Mountains represented the grandeur and majesty of nature, while rivers and streams symbolised the flow of life and the passage of time. The architecture within the garden was often playful, metaphorical, and more concerned with evoking emotions rather than utilitarian purposes. Pavilions and bridges were designed to harmonise with the natural surroundings, blurring the boundaries between the man-made and the natural.

In addition to the physical elements, the literati infused the garden with literary and philosophical ideas. Poetic inscriptions, calligraphy, and paintings were incorporated into the garden's design, adding layers of meaning and aesthetic beauty. The literati drew inspiration from classical Chinese poetry, landscape paintings, and philosophy, infusing the garden with profound artistic significance. They sought to create a spiritual retreat, a realm where they could connect with nature, reflect on the transient nature of life, and contemplate the deeper truths of existence. The tangible physical garden, therefore, was a vehicle for the literati to pursue a domain beyond the mortal world. It was an opportunity to transcend the material and engage with nature on a spiritual and imaginary level.

Similarly, Persian gardens, known as earthly paradises, not only provided glimpses of the ideal cosmic order and beauty but also served as a significant inspiration for poetry. The intertwining of literary gardens and real gardens created a mutually enhancing interrelationship. Every element and scene within the garden could be endowed with allegorical meaning and literary beauty. The Persian garden, known as the *Chahar Bagh*, was designed with a quadrilateral layout divided into four parts by water channels representing the principles of sky, earth, water, and plants. The integration of gardens with other art forms, such as poetry and calligraphy, facilitated deeper philosophical and moral contemplations about virtues and the intricate relationship between nature and humanity.

Poetry played a central role in Persian garden design. The garden became a living poem, where every element and feature contributed to its poetic beauty. The gardens were often adorned with inscriptions of poetry and verses from classical Persian literature, creating a harmonious interplay between words and the natural environment. Each garden had its own narrative, its own story to tell. The design elements, such as the arrangement of trees, flowers, and water features, were carefully selected to reflect the themes and emotions expressed in the accompanying poetry. The gardens became immersive spaces where visitors could engage with literature, connect with their cultural heritage, and experience the beauty and serenity of the natural world.

Conclusion

In conclusion, the artistic experience provided by pre-modern Chinese and Persian gardens transcends their physical manifestations. Both gardens encapsulate a desire for a harmonious interconnection between humanity and nature. They embodied design principles that gave rise to a poetic and metaphorical realm, evoking profound sentiments and imbuing metaphoric meanings through the elegant integration of elements from diverse art forms.

The pre-modern Chinese garden conceals meticulous designs and artificial interventions beneath a seemingly natural and harmonious landscape, inviting visitors to immerse themselves in a spiritual and imaginative journey. Persian gardens, on the other hand, present a symmetrical and controlled arrangement, providing a glimpse of the ideal cosmic order while inspiring poets to explore the beauty and allegorical potential of the gardens.

By integrating other art forms, these gardens become multi-dimensional, stimulating intellectual contemplation and eliciting a range of sentiments. The literary interpretations, metaphoric expressions, and the integration of poetry and painting enhance the overall artistic experience, allowing visitors to transcend reality and engage with nature on a profound and imaginative level.

The pre-modern Chinese and Persian gardens serve as testaments to the enduring human longing for a space that intertwines built environments with the natural world. Their artistic allure lies in their ability to offer a transcendent milieu, where visitors can reimagine the cosmic world and partake in a poetic, profound, and enriching aesthetic experience. The interplay between nature, art, and human imagination in these gardens creates a harmonious fusion that awakens the senses, evokes contemplation, and provides solace in the beauty and serenity of the natural world.

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Kopsavilkums. Pētījums ietver informāciju par Ķīnas un Persijas dārzu simboliku un dizaina filozofiju, atklājot to metaforisko un māksliniecisko izpausmju dziļumus. Koncentrējoties uz pirmsmodernajiem ķīniešu un persiešu dārziem, šajā pētījumā tiek pētīta to dizaina filozofija un īpašības. Ķīniešu dārzos prioritāte ir cilvēces un dabas harmoniska līdzās pastāvēšana, ko raksturo dziļa cieņa pret dabisko pasauli. Rūpīga ainavas apstrāde nemanāmi integrē dārzus ar to apkārtni, iedvesmojoties no elementiem, kas atrodami ķīniešu ainavu gleznieciībā.

Analizējot gan ķīniešu, gan persiešu dārzu arhitektūru, simboliku un dizaina filozofiju, pētījums atklāj ievērojamās līdzības un atšķirības, kas pastāv starp tiem. Tomēr analizētie dārzi sniedzas ārpus to fiziskajām izpausmēm, mudinot apmeklētājus iesaistīties metaforiskās jomās. Dzejas, gleznieciības un dažādu mākslas formu integrācija bagātina daudzdimensionālo pieredzi, izraisot dziļas sajūtas un atraisot dabas dzejas pārveidojošo spēku. Galu galā ķīniešu un persiešu dārzi iemieso dabas dzejas būtību, kalpojot par tiltiem starp apbūvēto vidi, cilvēci un dabas pasauli. Pateicoties harmoniskai mākslas, dizaina saplūšanai un sarežģītajām attiecībām starp cilvēku un dabu, analizētie dārzi iedveš bijību un atklāj mūžīgo skaistumu, kas mīt dabas jomā.