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ZNANSTVENI ČASOPIS ZA ARHITEKTURU I URBANIZAM

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SVEUČILIŠTE U ZAGREBU, ARHITEKTONSKI FAKULTET

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Meanings | Značenja

PROSTOR *m* space, room; (*površina*) area; (*zona*) tract; (*prostranstvo*) extent, expanse; (*za kretanje/manevriranje*) elbow-room, playroom, leeway, scope; (*prostorije, smještaj*) premises, accomodation | **životni** ~ living space; **stambeni** ~ housing; **školski** ~ school space; **poslovni** ~ office space/premises; ~ **za noge** legroom; *prema raspoloživom* ~**u** on a space available basis; *fig* **pružati** ~**za** offer/give scope for; **posvetiti (pokloniti)** ~ (*u novinama*) devote (give) space to; **zbog pomanjkanja** ~**a** because of limited space; **radi uštede na** ~**u** to save space; **povreda zračnog** ~**a** violation of airspace, aerosp; **istraživanje** ~**a** space exploration

ŽELJKO BUJAS (1999.), *Veliki hrvatsko-engleski rječnik | Croatian-English dictionary,* Nakladni zavod Globus, Zagreb

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The journal PROSTOR publishes primarily scientific papers in the field of architecture and urbanism including papers from other scientific disciplines if they thematically fall within its scope. PROSTOR aims to serve as a communication medium for all concerned with scientific, technical, and spatial problems (global topics, or local topics compared with the European case studies, or connected with the European context) dealing dominantly with architecture and urbanism as well as cultural studies, environmental studies, human geography, and urban studies.

PROSTOR covers the following scope of research: architecture; architectural/building engineering; urban planning; design; art history; the philosophy, art, and science of architecture designing; green buildings; building physics; building materials; building construction; building structures; construction management; building/facility management; the linkages and interactions between the architecture/urban planning and archaeology, ethnology, anthropology, sociology, geography, geodesy, and forestry; the linkages and interactions between the built environment and ecology, natural resources, climate, local communities, public policy, and economic development.

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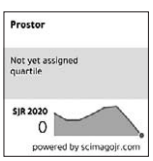

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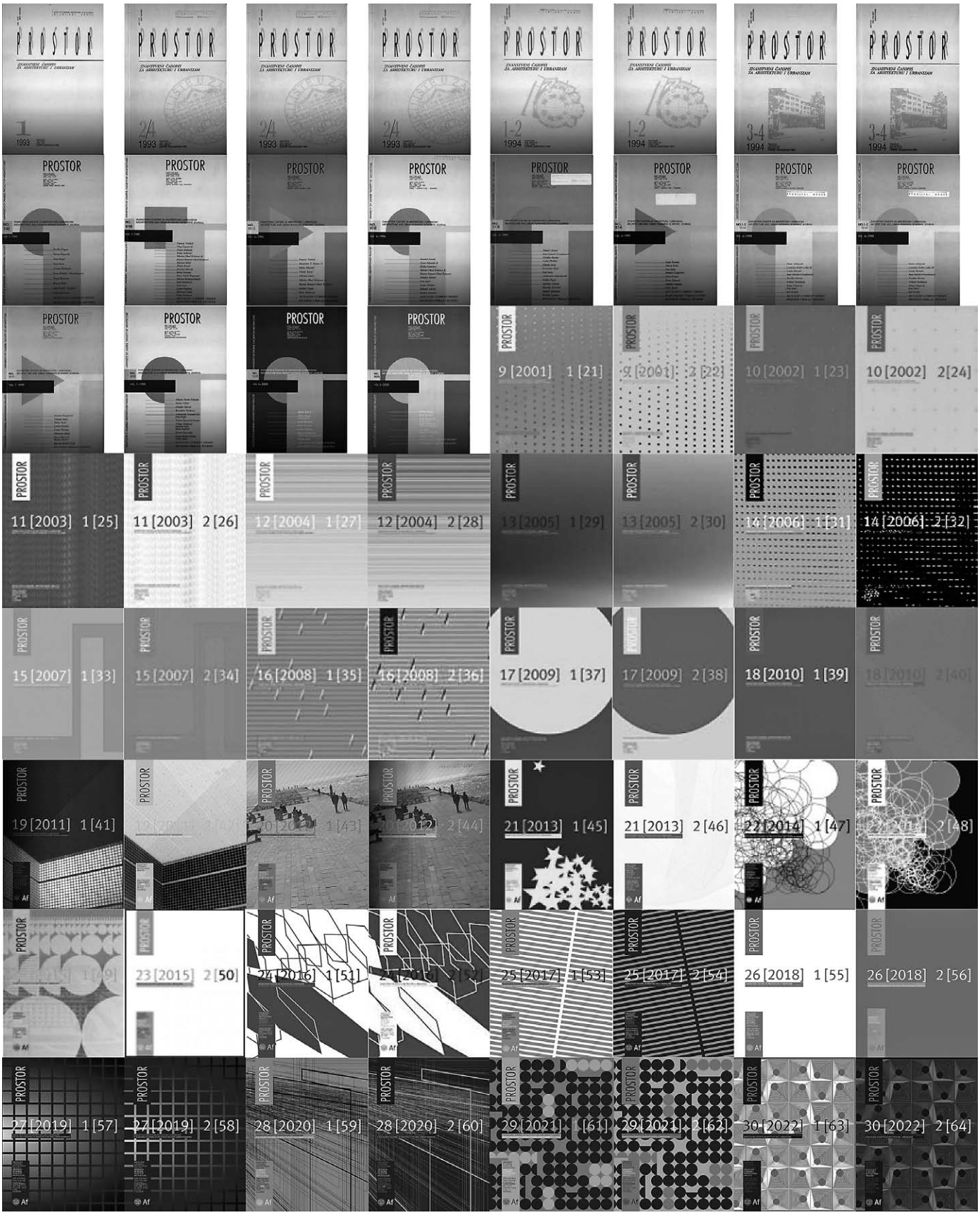
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Editors' Foreword to the 30th Anniversary Volume

This year, 2022, marks the 30th anniversary of the scholarly journal PROSTOR.

We are pleased to be the current editors, reaching this significant milestone for the journal, so we can write this Foreword and highlight some of the journal's achievements and the 30th 'birthday extras' we have organized for its special year. In noting that some of us are only the latest in a long line of Editors, we are delighted to point out that our executive editor prof. Ariana Štulhofer, Ph.D. is celebrating 20 years of her work in the magazine!

We have invited members of the previous and present journal's Editorial Board to select one paper from PROSTOR's archive, which reflects not only personal favorites but also key moments and 'turns' in the discipline. The selected articles can be accessed on the journal's website (OJS).

PROSTOR continues to thrive in its third decade. Over the years we have published 63 issues with more than one thousand papers! We have written about the history of our journal on some previous occasions - on the 20th anniversary (in issue 44,) and recently to mark the jubilee of the 60th volume. We now have around 400 scientists registered in our database and they deserve credit for building up the profile of the journal PROSTOR. An enormous effort has been made to make PROSTOR a high-quality journal it is today.

I conclude my Editorial with words of gratitude to all members of our editorial board, authors, reviewers, and readers, who have supported the Journal throughout the years. Working on the Journal is a team effort, and I have the honor to collaborate with a dedicated and enthusiastic group of colleagues.

With best wishes for a fruitful 2023 to the entire PROSTOR's community,

Assoc. prof. Ana Mrđa, Ph.D. MBA
Editor-in-chief

Scientific Papers

The Editorial Board provides at least two independent reviews by prominent Croatian or foreign scholars for all the scientific contributions published in the journal PROSTOR.

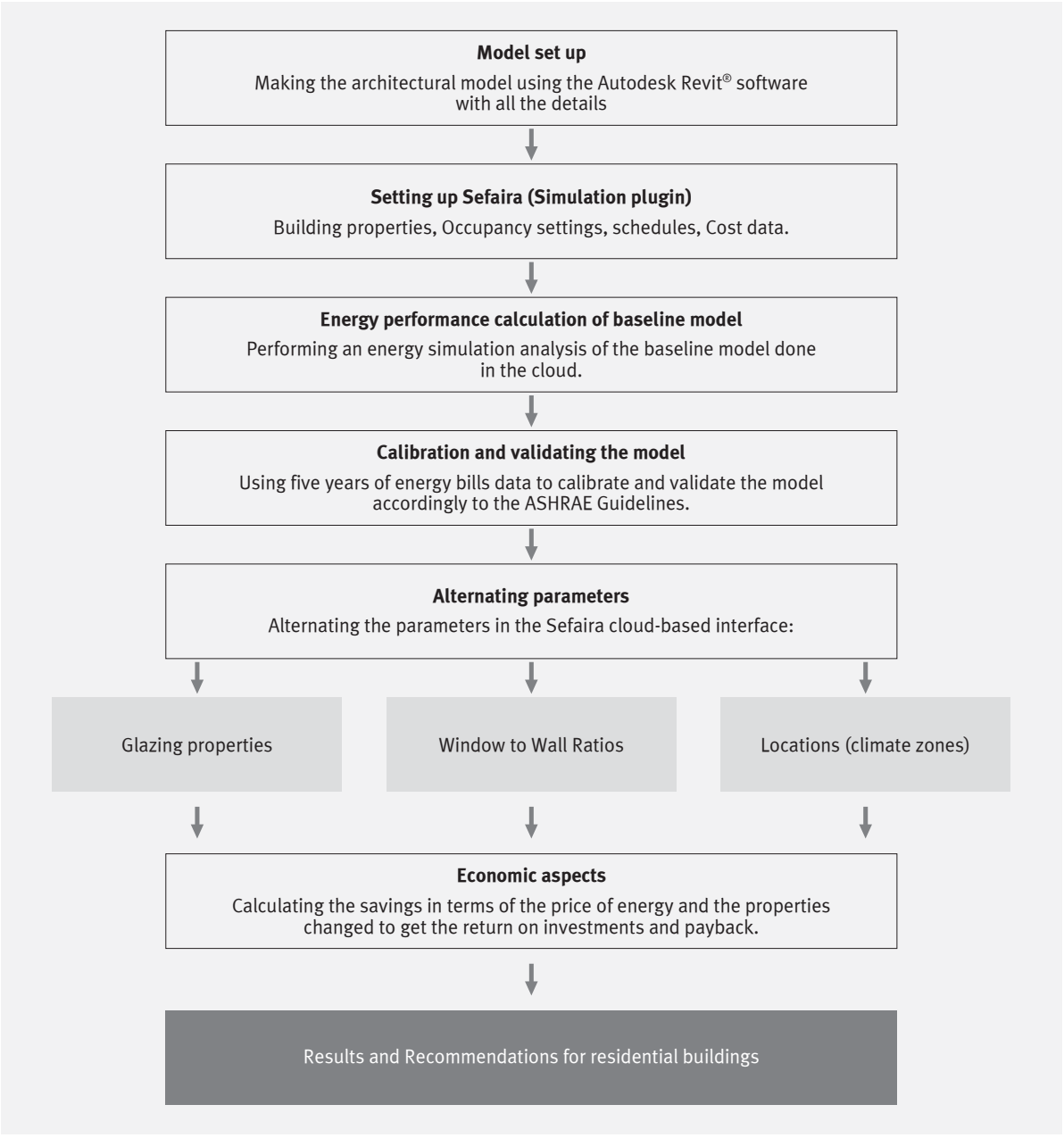

Fig. 1 Summary of the methodology used

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The Impact of Glazing Types and Window-to-Wall Ratios on Energy Consumption in Semi-arid, Mediterranean and Arid Climates

GLAZING TYPES
NET ZERO ENERGY
PAYBACK PERIOD
RESIDENTIAL BUILDINGS
WINDOW-TO-WALL RATIOS

A reduction in energy consumption and energy efficiency improvement in buildings have become one of the main objectives in national and international energy policies. In an optimization process, and in order to find the most influential parameters to achieve net zero energy, several ameliorations need to be made to residential buildings. In this paper, two measures are discussed; the effects of locally available glazing types and window-to-wall ratios, tested under three different Algerian climates; semi-arid, Mediterranean and arid-climate. For the purpose of calculating energy use intensity savings, optimal values and payback periods for each of the mentioned measures the building information modelling software Autodesk Revit® and the energy simulation plugin Sefaira have been used. According to the findings, double glazing with Argon has the greatest potential for lowering the energy use intensity, whereas the window-to-wall ratios has a significant effect on the energy consumption of buildings in the studied climates, and the optimal ratio for a given orientation varies according to the type of glazing used. Moreover, very high payback periods were found compared to other countries, and only a few studied variables could be achieved with profitability. This paper is helpful for professionals who are responsible for decision-making during the design process of energy-efficient residential buildings.

Introduction

Global warming, resulting from increasing carbon emissions, has become the most pressing issue for the planet. The onset of the COVID-19 pandemic and its measures made people spend most of their daily lives indoors and use active comfort tools, pushing the building industry as one of the largest energy consumers in the world even further. Today this industry accounts for almost one third of the total energy consumption and CO2 emissions (IEA, 2021). According to the International Energy Outlook (IEO), this consumption will increase by 42% by 2040 (EIA, 2016).

Mainly due to economic and population growth, energy demand is expected to be higher than ever in developing countries in Africa and Asia. In the meantime, energy efficiency technologies are not receiving sufficient attention. In Algeria, due to the shortage and lack of housing, typical and standard building production prevails in most regions and climate zones of the country (Ministère de l'Habitat, 1997). Either in relation to the type of architecture and design or the building materials, studies focus more on quantity rather than quality. Resulting in buildings far from those that would meet required criteria in terms of environmental issues or user needs. Consequently, the residential building sector is responsible for more than 30% of CO2 emissions and 36.6% of the national final energy consumption, which reached 17.6 million TOE in 2020, with an increase of 17% compared to 2017 (Ministère de l'énergie, 2020).

Nowadays, the reduction of energy consumption and the improvement of energy efficiency in buildings are mandatory objectives in energy policies at regional, national and international levels. The process of energy reduction went through several paradigms during the last century, such as bioclimatic, environmental, green, and sustainable architecture (Attia, 2016). It kept evolving in an attempt to lower energy consumption, with examples such as low energy buildings (BBC), high energy performance (HPE), passive house, up to neutral or positive energy buildings (BEPOS). The final objective of these concepts is buildings that can be self-sufficient in energy without relying on external sources.

Within this framework, the topic of the Net Zero Energy concept is receiving increasing attention in the building sector. Torcellini et al. define the Net Zero Energy Building as *"a building that has reduced energy consumptions in order to be balanced between the energy demand and the energy supply from renewable energy technologies"* (Torcellini *et al.*, 2006). Albadry et al. also define it as a building with zero energy consumption over a year, with lowered electrical heating demands, and renewable energy supplies, and sum up the characteristics of NZEB stated by the EPBD, which are: a high energy efficient building with a demand for energy reduced to nearly zero or with very low energy demand, fulfilling the rest of it with renewable energy resources (Albadry, Tarabieh and Sewilam, 2017).

Nonetheless, it's not simple to tackle the building as a whole because it is composed of multiple components and layers. Treating each component individually is crucial to achieve high energy performance, and starting with the building envelope is the way to go. The envelope affects the energy flows in and out of the building, thus it should have a well-balanced ratio between its opaque and transparent elements (Marino, Nucara and Pietrafesa, 2017). Openings and windows, are used to afford views and daylight, as well as to provide good thermal enclosure for buildings, whereby they are regarded as one of the most important parts of the building envelope (Troup *et al.*, 2019). Regardless of the regulatory frameworks that exist in Algeria (DTR C3.2/4), most building envelops are not designed to fit the local climates nor the energy efficiency measures (Ministère de l'Habitat, 1997).

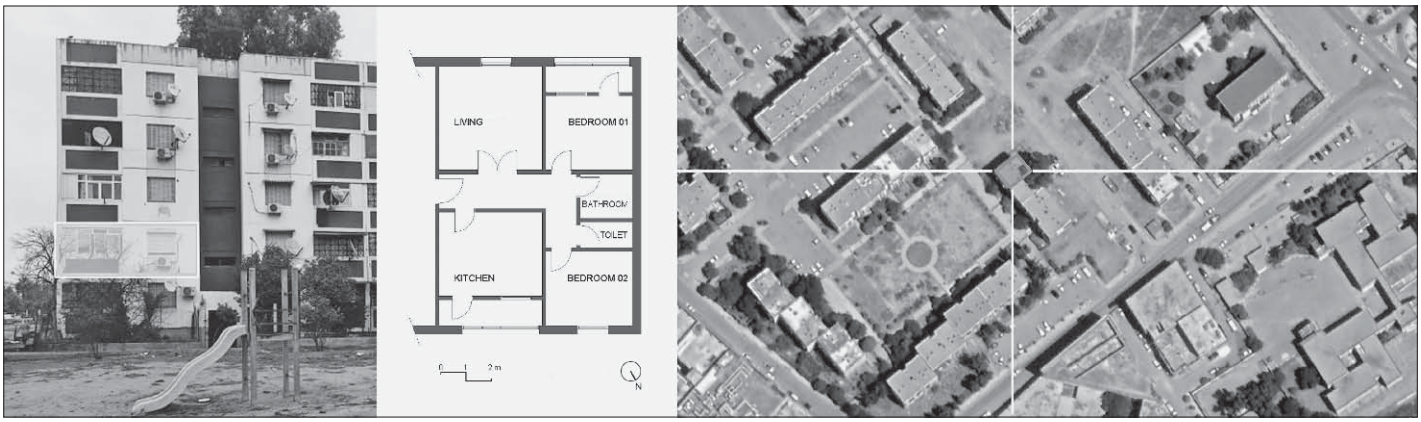
However, several studies investigating the glazing types have been carried out on an international stage. Lee et al. identified a num-

ber of window properties that should be studied, such as thermal transmittance (U-value), visible transmittance (Tvis), and solar heat gain coefficient (SHGC), and evaluated these properties with different WWR in five typical Asian climates (Shanghai, Seoul, Manila, Taipei, and Sapporo), resulting in a design guideline for selecting windows that are energy efficient and optimised for each climate (Lee *et al.*, 2013). Westphal's and Andreis's results have confirmed that energy consumption and performance are highly affected by the glazing properties and configuration. In MENA countries (Dubai UAE, Cairo Egypt and Algiers Algeria) Tarabieh et al. investigated three types of glazing that are supposed to be available on the market in order to seek out their performance and return in an office building. The results demonstrated that the SHGC was the most effective factor in saving energy compared to the U-value and pointed out that any study of energy efficiency should include the payback and return on investment to investigate the economical effectiveness of these energy efficiency measures (Tarabieh, Mashaly and Rashed, 2017). Hassouneh et al. pushed the research even further and analysed a variation of eight types of glazing to find the most appropriate type for an apartment building in Amman, Jordan and noted that the usage of different glazing types combination in each orientation can be more energy efficient (Hassouneh, Alshboul and Al-Salaymeh, 2010). In a similar way, Alhagla performed a series of simulations in the Egyptian climate and ascertained that different glazing types with higher U value and transmission tend to be more beneficial in terms of energy savings (Alhagla, Mansour and Elbassuoni, 2019). In a case study of a patient room located in Bologna Italy, Cesari et al. demonstrated that with the appropriate glazing properties such U-value and SHGC (around 1 to 2 $W{\cdot}m^{-2}{\cdot}K^{-1}$ and 0.55 respectively), the adoption of wider window glazing can be done, enabling a reduction and optimization of overall energy consumption and needs for both winter and summer (Cesari *et al.*, 2018).

Furthermore, previous simulation-based research and investigations tried to determine if window-to-wall ratios (WWR) have an impact on the energy efficiency of buildings, and if there is an optimal WWR for each climate, type, and function of the building. Troup et al. carried out a statistical investigation on the CBECS dataset in the USA and found that, on average, the EUI of buildings will increase accordingly to the increase of the WWR (Troup *et al.*, 2019). Cesari et al. confirmed that a higher percentage of WWR increases energy loads, but it can be significantly reduced when used with the appropriate shading system and glazing types (Cesari *et al.*, 2018). In this matter, Alsehail & Almhafdy pointed out that WWR is an essential factor in the energy and thermal performance of buildings, yet the study implies that it can be influenced by other factors such as climate, type of window, degree of insulation, shading devices and many more. In other words, modern glazing technologies can help to increase the value of WWR without increasing the energy consumption of a building to a certain state (Alsehail and Almhafdy, 2020). Westphal and Andreis also studied the influence of WWR and façade configuration in the energy consumption of air conditioning in five Brazilian locations and found that the WWR can be significantly increased when using a better glazing system in terms of U-value and SHGC, with a low impact on energy the consumption of buildings (Westphal and Andreis, 2016).

Several results about the effects of WWR in their respective climates can be found in the literature. Marino et al. investigated the existence of an optimal WWR for office buildings in twelve different cities in Italy and the differential impact of insulation features, luminaires, and switchable shading devices on this parameter. The results of various simulations showed that there is an optimal WWR between 23.5% and 25.9% but that there are no significant changes to the optimal WWR when the individual factors mentioned previously are used separately (Marino, Nucara and Pietrafesa, 2017). Harmaati and Magyar demonstrated that in the Serbian climate, an office building's energy consumption can be reduced by 83% when appropriate WWR and glazing types are used (Harmati and Magyar, 2015). Chiesa et al. performed a similar series of simulations in office buildings with a constant rate of occupation for two different European climates (temperate and Mediterranean), and suggested that the optimal WWR can be found for both locations at around 30% (Chiesa *et al.*, 2019). Mahdavi et al. investigated the differential impact of WWR using parametric studies in the hot climate of Zahedan, Iran, and concluded that an optimal WWR of 40% with good orientation can reduce the energy consumption significantly and also has a potential of decreasing the carbon dioxide production to half (Mahdavi Adeli, Sarhaddi and Farahat, 2019). Chi et al. conducted a series of parametric changes in terms of orientations (18 intervals) and WWR (8 intervals) in China, to find their optimal values and their effects on indoor temperatures, daylight factors, and mean indoor air velocities and found that the optimal WWR for north and south walls is 40% and 35% respectively (Chi *et al.*, 2020).

More recent pieces of research have focused on the economic aspect of achieving the NZE



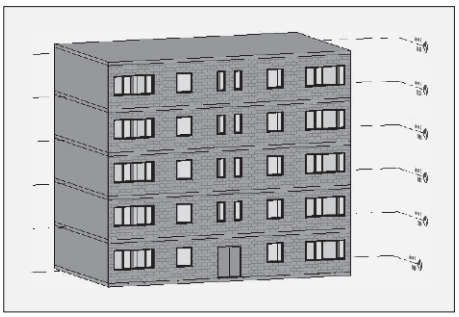


Fig. 2 Case study building: (a) case study building façade real picture, (b) plan of the case study apartment, (c) site plan with case study building located

Fig. 3 Simulated building model developed using Revit

concept, as well as its strategies. Several researchers found that the cost issue is one of the biggest problems in achieving NZE buildings. There are only a few studies that investigated these cost barriers (Hu, 2019; Taherahmadi, Noorollahi and Panahi, 2021). Albadry et al. mentioned that saving money on projects is one of the motivators for investors to pursue advanced energy methods (Albadry, Tarabieh and Sewilam, 2017).

This paper aims to fill gaps in the knowledge about windows and fenestration elements such as the glazing type, window-to-wall ratios (WWR), and payback periods (PBP). The research was conducted in a residential building whose characteristics, configuration, and structure represent a typical and standard reference case of the Algerian building stock, in three different cities; Constantine, Algiers, Ghardaïa, and different climate zones; semi-arid, Mediterranean, and arid. The first part of this research uses a simulation software, Sefaira plugin integrated to Autodesk Revit®, to gather information about the effects of locally available glazing types in different WWRs on energy consumption and energy use intensity and to seek out their optimal values. The second part aims to determine the financial return and the feasibility of such measures and find their optimal values accordingly to the economic aspect.

Methods

• **General description** – In an optimization process, and in order to find the most influential parameters on energy consumption with the aim of achieving NZE residential buildings; several ameliorations need to be made. In this study, two measures were chosen. The usage of three different types of glazing, which are simple clear glazing, double clear glazing with no fill, and double clear glazing filled with Argon. The WWR varies from 10% to 90%. The study was conducted in three types of climates: semi-arid climate which hosts the case study building in the city of Constantine, Mediterranean climate in the city of Algiers and arid climate in the city of Ghardaïa. All with the purpose of calculating their EUI and return on investment using Sefaira and Autodesk Revit®. Performing such a comparative analysis required the following work phases, as resumed in Fig. 1.

• **Description of the building case study** – A reference building was selected to conduct different building simulations, the case study is a simple rectangular multi-family residential building containing five levels and two apartments in each, as shown in Fig. 2 (a). Located in EL Khroub, Constantine, Algeria (coordinates: 36°15'20.7"N, 6°41'39.7"E, altitude: 603 m). The building is oriented 30° from the North/South axis. This building was chosen because it is one of the most common types of residential buildings in the Algerian territory. Each floor contains two apartments. The first one is a 75 m² apartment with two bedrooms, a kitchen, a living room, a bathroom and a toilet. The second one is an 85 m² apartment with three bedrooms, a kitchen, a living room, a bathroom and a toilet. The case study apartment illustrated in Fig. 2 (b) is a 75 m² apartment located on the second floor, containing a bedroom and a living oriented South/East, and another bedroom and a kitchen oriented North/East, with simple glazing aluminium windows and a WWR of 22%.

• **Simulation software** – The criteria for selecting the simulation tool and the modelling software were based upon the fact that glazing types and WWR are the main elements of this study. Because of its BIM benefits in automatically calculating areas and costs, as well as its widespread use and adoption among architecture firms, students, and professionals, Autodesk Revit® was chosen as the modelling software. It was used in combination with the simulation tool Sefaira, which is based on EnergyPlus, and offers a simple workflow, the ability to change parameters,

Table I The main simulation building's characteristics

		Thickness in m	λ Thermal Conductivity in W m^{-1} K^{-1}	R Thermal Resistance in m^2 K W^{-1}	U-Value in W m^{-2} K^{-1}
External wall	Plaster	0.02	0.35	0.06	0.95
	Hollow Brick	0.1	0.48	0.21	
	Air gap	0.05	0.11	0.45	
	Hollow Brick	0.15	0.48	0.31	
	Cement	0.02	1.15	0.02	
Internal wall	Plaster	0.02	0.35	0.06	3.10
	Hollow Brick	0.1	0.48	0.21	
	Plaster	0.02	0.35	0.06	
Floor	Floor tile	0.01	2.1	0.00	5.63
	Mortar	0.02	1.15	0.02	
	Slab	0.2	1.45	0.14	
	Mortar	0.02	1.15	0.02	
Roof	bitumen	0.02	0.23	0.09	4.13
	Slab	0.2	1.45	0.14	
	Mortar	0.02	1.15	0.02	
Windows	Aluminium	0.10	/	/	5.68

Table II Occupancy and operation schedules

Issue	Sefaira settings
Occupant density	15.0 m^2/person
Equipment power density	15.0 W/m^2
Light power density	8.6 W/m^2
Heating setpoint temperatures	20 C°
Cooling setpoint temperatures	28 C°
Outside air rate/person	8.1 L/s.person
Infiltration	1.45 L/s-m
Operating hours	24h/24h
Days Schedules	7 days per week

and the ability to simulate on a cloud-based platform.

• **Simulation model characteristics** – The main simulation building's characteristics cited in Table I are the most commonly ones used in the Algerian territory according to the (DTR C3.2/4) and to the case study (Ministère de l'Habitat, 1997). They will remain unchanged in different simulation variations only to seek out the effect of the location, glazing types, and WWR on the energy behaviour of the building, which is the main focus of the study.

• **Occupancy and operation schedules** – The occupancy and operations schedules used are resumed in Table II.

• **Simulation variables: Glazing types, WWR** – The aim of this research is to seek out the differences between using various types of windows both in terms of energy and economic savings, as well as to verify the existence of an optimal value of the ratio of the glazed surface (S_w) to the wall surface (S_f) defined in Eq. (1) with an equal interval of 10% from 0.1 (10%) to 0.9 (90%).

$$WWR = \frac{S_w}{S_f} \quad (1)$$

After conducting several interviews with window manufacturers in local markets, we concluded that the three most common types of windows and glazing used in Algerian residential buildings and easily available on the local market are: simple clear glazing, double clear glazing without gas fill, and double clear glazing with Argon fill. Both windows with krypton gas and triple glazing windows are neither used nor found on the market. We conducted our research to alternate between

Table III Type of windows used in the simulations

	Single Glazing Window (Simple)	Double Clear Glazing Window with No Fill (Double)	Double Clear Glazing Window with Argon (Double Ar)
Section			
Specification	6 mm Clear	4 mm Clear / 16 mm Air / 4 mm Clear	4 mm Clear / 16 mm Argon / 4 mm Clear
U-Value in W m^{-2} K^{-1}	5.68	2.83	1.40
SHGC	0.90	0.74	0.61
Tvis	0.86	0.80	0.60

FIG. 4 LOCATION OF THE STUDIES CITIES

TABLE IV CLIMATIC CONDITIONS IN STUDIED CITIES

	Altitude (m)	Gh (kWh/m²)	Dh (kWh/m²)	Bn (kWh/m²)	Ta (C°)	Td (C°)	FF (m/s)	RR (mm)	RD (days)
Constantine	650	1724	673	1791	15.9	8.4	2.6	485	94
Alger	25	1659	740	1538	18	12.7	2.8	600	92
Ghardaïa	468	1983	722	2055	22.7	5.1	3.6	145	23

the different types that are commonly found on the market, illustrated in Table III.

Furthermore, the purpose of the proposed energy analysis is to calculate the changes and variations that these values of WWR and glazing types might undergo under different weather and climate conditions.

- **The weather conditions** – Taking into consideration its vast territory and altitude disparity, as well as different climate zones in Algeria, three cities were chosen for this study as illustrated in Fig. 4. Constantine, Algiers and Ghardaïa which represents semi-arid, Mediterranean and arid climates respectively. The climate data and elevations were imported from the climatological software Metronome 8 as shown in Table IV.

The first climate zone is the location of the case study building, which is in the city of Constantine, specifically in El khroub 36° 16' 00" N, 6° 41' 00" E, 650m altitude, with a semi-arid climate. This climate is characterised by large temperature oscillations; hot and humid in summer and cold and wet in winter, where the average temperature and precipitations are 15.6 C° and 469 mm. The second climate zone is a Mediterranean climate represented by the city of Algiers 36° 46' 34" N, 3° 03' 36" E, which is characterized by a warm and dry summer with high humidity, and a mild winter with 18.2 °C as a yearly average temperature, alongside with high precipitations with a mean of 615 mm per year. For the third city of Ghardaïa the climate is arid, characterised by a hot and dry summer with high temperature differences between day and night, as well as between summer and winter. The average temperature is 21.1 °C and the precipitation is rare, with an average of 66 mm per year.

- **Model calibration and validation** – In order to produce correct results and validate the energy simulation, the outputs of the simulation tool, including energy consumption and demand, were compared with the values obtained from five years of utility bills from the case study building. The validation was done according to the recommendations of the ASHRAE Guideline 1 4-201 4 (ASHRAE, 2014), using both Mean Bias Error (MBE) and Coefficient of Variation of the root mean squared error value to calculate the level of potential error between the measured and predicted data. The methodology of calibration and validation was developed using Eq (2) and Eq (4).

$$MBE = \frac{\sum_{i=1}^{n}(Q_{pred\,i} - Q_{data\,i})}{n\overline{Q_{data}}} \quad (2)$$

$$RMSE = \frac{\sqrt{\sum(Q_{pred\,i} - Q_{data\,i})}}{n} \quad (3)$$

$$CV(RMSE) = \frac{RMSE}{\overline{Q_{data}}} = \frac{\sqrt{\sum(Q_{pred\,i} - Q_{data\,i})}}{\overline{Q_{data}}} \quad (4)$$

Where:
MBE: Mean Bias Error
RMSE: Root Mean Squared Error
CV(RMSE): Coefficient of Variation of the root mean squared error
$Q_{pred\,i}$: predicted value during period i
$Q_{data\,i}$: measured value during period i
Q_{data}: measured avg during the period

In our case, the measurements of the MBE and CV(RMSE) were conducted and we achieved the results resumed in Table V.

- **Payback period (PBP)** – As stated by previous studies, the cost and the economic aspect are one of the greatest obstacles to the achievement of NZE buildings, making money savings the investors' motivator to pursue advanced energy methods, with only a few papers studying these aspects compared to environmental and comfort criteria (Hu, 2019) (Taherahmadi, Noorollahi and Panahi, 2021). (Albadry, Tarabieh and Sewilam, 2017). The payback period (PBP) study was chosen to establish whether or not different alternatives are profitable. The PBP can be calculated with the Eq (5), using the costs of the initial investment (USD and DZD), divided by annual savings or benefits (USD/year or DZD/year), which can be resumed through the following formula:

$$PBP = \frac{\text{Initial investment}}{\text{Annual savings}}(\text{years}) \quad (5)$$

In our case the initial investment is the window type prices and the annual savings or benefits in terms of energy from changing dif-

Table V Model Calibration According to ASHRAE Guideline 14-2014

	MBE	(CV)RMSE
ASHRAE Guidelines 14-2002	≤5%	≤15%
Error value of the model	-0.16%	6%

Table VI Algerian Energy Prices in DZD and USD

Type / Price	DZD	USD
Electricity	4.179	0.0297
Gas	0.324	0.0023

Table VII Type of windows prices

(a) Prices in DZD

Type /Price	Price 01	Price 02	Price 03	Price 04	Price 05	Average
Single Clear	16000	15000	15000	14000	19000	15800
Double Clear	20000	19000	22000	16500	22000	19900
Double Clear with Argon	22000	20500	22500	17500	23000	21100

(b) Prices in USD

Type /Price	Price 01	Price 02	Price 03	Price 04	Price 05	Average
Single Clear	113.6	106.5	106.5	99.4	134.9	112.18
Double Clear	142	134.9	156.2	117.15	156.2	141.29
Double Clear with Argon	156.2	145.55	159.75	124.25	163.3	149.81

ferent types of windows are calculated with the help of energy simulation and then multiplied by the price of energy. This can be summarised with Eq (6).

$$\text{Annual Savings} = \\ = \text{Energy savings} \times \text{Cost of energy} \quad (6)$$

For the calculation of energy prices Algerian government rates were used as demonstrated in Table VI.

To get an accurate and average price for the three types of windows, different local window manufacturers were asked for their prices for the square meter, and the results are illustrated in Table VII.

- **Profitability (P)** – To find out if the changes made are worth it economically, profitability (P) should be calculated, considering the building's life cycle and windows life span (BL), in our case, 30 years were considered together with its PBP. P is determined by Eq (7).

$$P = \frac{BL - PBP}{BL} (\text{years}) \quad (7)$$

With:
BL: Building life (years);
PBP: Payback period (years).

Results and Discussion

Glazing Type

The energy analysis simulation showed that in the semi-arid climate of Constantine, replacing a single clear glazing window with a double clear glazing window with an air gap ensures a saving of 20.81 kWh/m²/y and using double clear glazing filled with Argon gas, increases the savings to 30.77 kWh/m²/y, which means that the savings in total will be 1560.75 and 2307.5 kWh per year respectively, scoring the highest benefits in comparison with other climates.

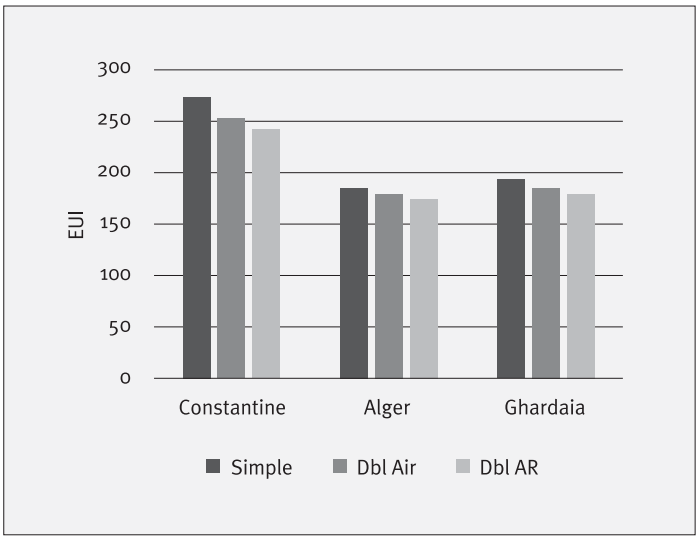
However, changing the locations to the Mediterranean climate, Algiers in this case, using the same two design variables made a saving of 5.8 kWh/m²/y and 9.85 kWh/m²/y which means 435 and 738.75 kWh yearly savings, respectively.

In the last case scenario, using the arid climate of Ghardaïa, the previous variables change, resulting in a saving of 7.63 kWh/m²/y made for the double clear glazing windows, which equals 572.25 kWh yearly and 13.52 kWh/m²/y for the double clear glazing windows filled with Argon gas, which equals 1014 kWh yearly.

These findings in the three different climates confirm that in terms of energy savings double clear glazing windows with Argon gas are the optimal option, followed by the double clear glazing windows with no fill, and in the last place come the simple glazing windows. Thus, there isn't a big difference between the double clear glazing windows with no fill and the double clear glazing windows with Argon gas. Its maximum is reached in the semi-arid climate of Constantine with a value of 9.96 kWh/m²/y and its minimum in the Mediterranean climate of Algiers with a value of 4.05 kWh/m²/y, which means respectively 747 and 303.75 kWh yearly, confirming the findings in other studies like (Tarabieh, Mashaly and Rashed, 2017) and (Alhagla, Mansour and Elbassuoni, 2019).

Window-to-Wall Ratio

Multiple energy simulations were carried out to find the most suitable WWR Eq. (1) with



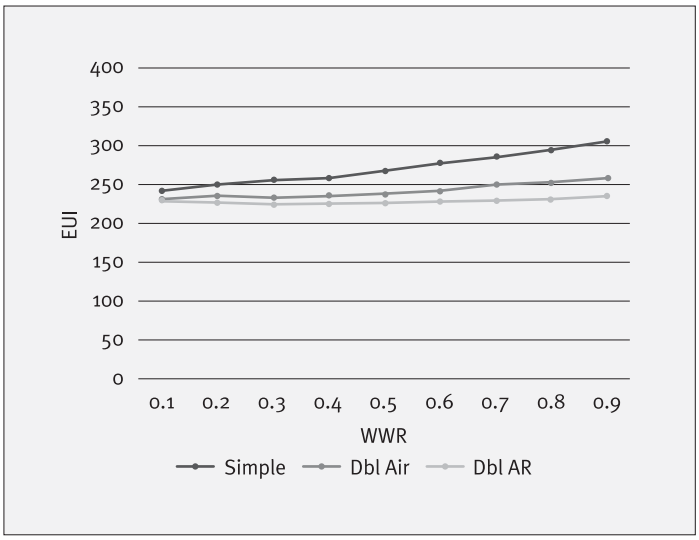


Fig. 5 EUI for types of glazing in the studied climates

Fig. 6 EUI of different WWRs in the semi-arid climate

equal intervals from 0.1 (10%) to 0.9 (90%) for the three types of window glazing.

For the semi-arid climate simple glazing windows show that minimum energy consumption can be reached with 10% WWR and a linear relationship with the EUI. A large difference in consumption can be seen between greater and smaller WWR percentages (10% and 90%), reaching a maximum of 63 kWh/m²/y (4725 kWh yearly). Using the double clear glazing windows with no fill as an alternative can decrease the overall EUI for different values, and reduce the difference between the minimum and maximum WWR to approximately half in comparison with simple glazing windows at 29 kWh/m²/y (2175 kWh yearly).

The second alternative, which is double clear glazing windows filled with Argon gas, has the optimum energy consumption decrease potential. It decreases the overall energy consumption and the difference between the smallest and biggest WWR percentages (10% and 90%), to only 6 kWh/m²/y, which is 450 kWh yearly.

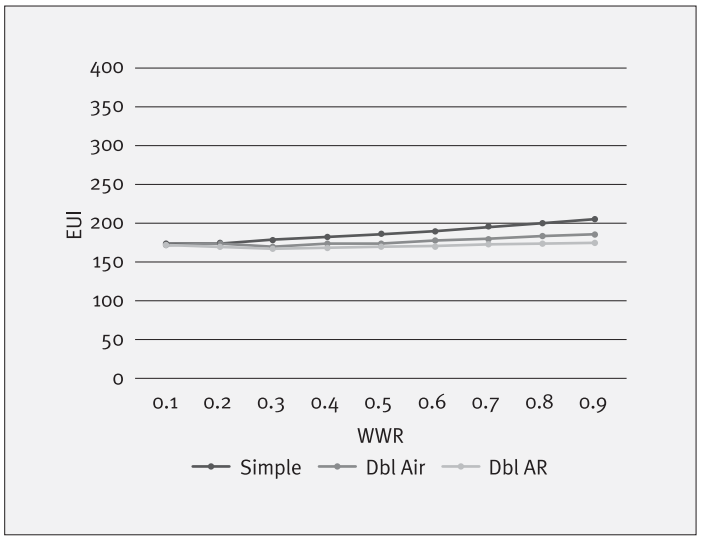
The results obtained from the Mediterranean climate show that there are no significant differences between different types of glazing windows in the lowest WWR values, with a 1.96 kWh/m²/y difference between simple glazing and double clear glazing (147 kWh yearly), and 2.32 kWh/m²/y difference between simple glazing and double clear glazing with Argon (174 kWh yearly).

Interestingly, the EUI of the double clear glazing windows with no fill and the double clear glazing windows with Argon gas were observed to be decreasing from 10% until reaching their peak at 30% and 40%, with a saving of 0.62 kWh/m²/y (46.5 kWh yearly) and 4.13 kWh/m²/y (309.75 kWh yearly) respectively.

In the same way, the results from the arid climate show similarities with the previous climates as it has almost the same EUI in smaller WWR with a small difference of 2.74 kWh/m²/y (205.5 kWh yearly) for the double clear glazing windows with no fill and 3.79 kWh/m²/y (284.25 kWh yearly) for the double glazing windows with Argon gas. Only for this climate did the double glazing windows with Argon gas reduce the EUI until reaching a WWR of 30%, making a saving of 0.62 kWh/m²/y (46.5 kWh yearly).

These results suggest that in the three different climates the simple clear glazing window is the one achieving the least energy consumption reduction, and that the two others types are close in their energy efficiency, which further supports the idea that there are differences between the energy consumption comportment in the three climates when used with different types of glazing and WWRs as found in several other studies such as: Tarabieh, Mashaly and Rashed, 2017; Alhagla, Mansour and Elbassuoni, 2019; Troup *et al.*, 2019; Marino, Nucara and Pietrafesa, 2017.

As in the semi-arid climate with the smallest WWR of 10% in this case, there is a slight difference between single glazing and the two other double types of glazing. In other words, it's clear that for single glazing the optimal WWR is the lowest one as energy consumption keeps rising when we increase the WWR. Thus, there is a part between 30% and 40% where it stabilizes. It seems that there is only a slight difference for the double glazing types with 10%. This gap will increase when the WWR increases. We can notice that the optimal WWR for the double clear glazing window with no fill is 30% while it's 40% for the double clear glazing window with Argon gas. It is somewhat surprising that energy



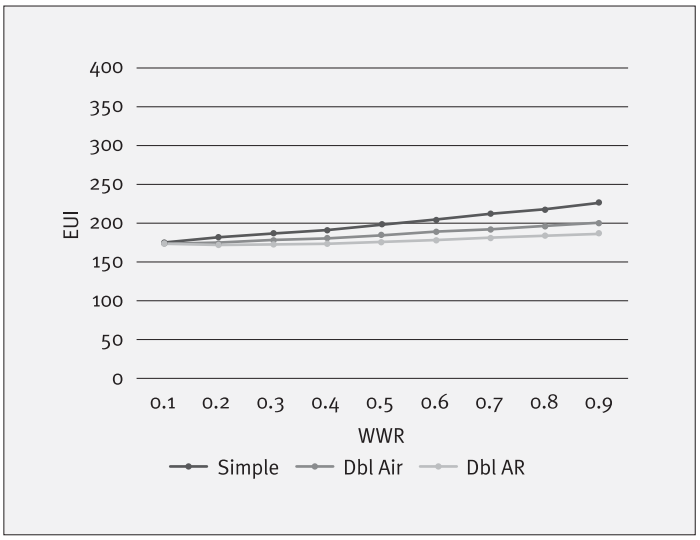


Fig. 7 EUI of different WWRs in the Mediterranean climate

Fig. 8 EUI of different WWRs in the arid climate

consumption with different WWRs doesn't increase a lot when the double clear glazing window with Argon gas is used. These findings can suggest that this type is most suitable when high WWRs are needed.

For the Mediterranean climate it seems that the results are much closer for all three types of glazing. The single glazing optimum WWR can be increased with 10% to reach 20% in comparison with the semi-arid climate, but the optimal WWR for the double glazing remains the same at 30% and 40% for the double clear glazing windows with no fill and the double clear glazing windows with Argon gas respectively. This finding confirms that double clear glazing windows with argon gas keep energy consumption stable with different WWRs and have the smallest gap between the greatest and smallest WWR compared to the other two climates.

For the arid climate, the results show some similarities in the pattern of energy consumption but have some differences in terms of optimal WWR. As we can see, the optimal WWR for both single and double clear glazing windows is 10%, while we can reach a 30% value for the double clear glazing windows with Argon gas. We can also notice that the double clear glazing windows with Argon gas has the biggest gap in energy consumption between 10% and 90% WWR, which is double in comparison to what we found in the semi-arid climate and almost four times the results of the Mediterranean climate.

Payback period

• Payback period for Constantine – When analysing the PBP data for the city of Constantine, which has a semi-arid climate, we can notice that the PBP is smallest when energy is set to the electricity price (in the case of using an electricity-powered HVAC system), with a peak reaching 7.31 years, and the highest payback time is when it is set to the gas price (in the case of using a gas-powered HVAC system) with a peak reaching 95.33 years. When the energy price is set to accommodate the energy mixture in the Algerian HVAC systems, as a combination of gas and electricity, the PBP is between the two previous results, reaching 28.99 years at its maximum. Interestingly, as far as the glazing types go, it seems that the double clear glazing windows filled with Argon gas have the shortest payback time when compared to the double simple glazing windows with no fill. This is with the three types of energy prices (Table VIII).

• Payback period for Algiers – For the city of Algiers and the Mediterranean climate, it is apparent from these tables that the payback time is really high, reaching astronomic results for the gas price table (342.04 years at its peak) and 19.96 years at its lowest point when calculated with electricity. For the type of glazing, it seems that the double clear glazing windows filled with Argon gas show the best results in terms of payback for the three types of energy usage methods (Table IX).

• Payback period for Ghardaïa – The results for the city of Ghardaïa and its arid climate indicate similar results, with electrical energy showing the best payback time with a peak of 19.93 years compared to the two other types of energy, reaching 79.07 and 260.01 years for gas and the mixed energy type. Turning now to the glazing type, the double glazing windows filled with Argon gas have the best payback time for the three types of energy reaching 14.54 years at its best for electricity and 189.70 years at its maximum for gas (Table X).

Table VIII Payback period calculations for the semi-arid climate of Constantine

	EUI kWh/m²/y	Saving per m²	Yearly Savings in kWh	Price per m²	Glazing Area m²	Window Prices In $	Price Difference In $	Price Electricity In $	Payback for new in years	Payback In years
Simple	274.12	/	/	112.18	11.76	1,319.24	/	/	/	/
Double	253.31	20.8	1560.8	141.28	11.76	1,661.45	342.22	46.82	35.48	7.31
Double Ar	243.35	30.8	2307.8	149.80	11.76	1,761.65	442.41	69.23	25.45	6.39
	EUI kWh/m²/y	**Saving per m²**	**Yearly Savings in kWh**	**Price per m²**	**Glazing Area m²**	**Window Prices In $**	**Price Difference In $**	**Price Electricity In $**	**Payback for new in years**	**Payback In years**
Simple	274.12	/	/	112.18	11.76	1,319.24	/	/	/	/
Double	253.31	20.8	1560.8	141.28	11.76	1,661.45	342.22	3.59	462.84	95.33
Double Ar	243.35	30.8	2307.8	149.80	11.76	1,761.65	442.41	5.31	331.90	83.35
	EUI kWh/m²/y	**Saving per m²**	**Yearly Savings in kWh**	**Price per m²**	**Glazing Area m²**	**Window Prices In $**	**Price Difference In $**	**Price Electricity In $**	**Payback for new in years**	**Payback In years**
Simple	274.12	/	/	112.18	11.76	1,319.24	/	/	/	/
Double	253.31	20.8	1560.8	141.28	11.76	1,661.45	342.22	11.80	140.75	28.99
Double Ar	243.35	30.8	2307.8	149.80	11.76	1,761.65	442.41	17.45	100.93	25.35

Table IX Payback period calculations for the Mediterranean climate of Algiers

	EUI kWh/m²/y	Saving per m²	Yearly Savings in kWh	Price per m²	Glazing Area m²	Window Prices In $	Price Difference In $	Price Electricity In $	Payback for new in years	Payback In years
Simple	185.42	/	/	112.18	11.76	1,319.24	/	/	/	/
Double	179.62	5.8	435	141.28	11.76	1,661.45	342.22	13.05	127.31	26.22
Double Ar	175.57	9.85	738.75	149.80	11.76	1,761.65	442.41	22.16	79.49	19.96
	EUI kWh/m²/y	**Saving per m²**	**Yearly Savings in kWh**	**Price per m²**	**Glazing Area m²**	**Window Prices In $**	**Price Difference In $**	**Price Electricity In $**	**Payback for new in years**	**Payback In years**
Simple	185.42	/	/	112.18	11.76	1,319.24	/	/	/	/
Double	179.62	5.8	435	141.28	11.76	1,661.45	342.22	1.00	1660.62	342.04
Double Ar	175.57	9.85	738.75	149.80	11.76	1,761.65	442.41	1.70	1036.80	260.38
	EUI kWh/m²/y	**Saving per m²**	**Yearly Savings in kWh**	**Price per m²**	**Glazing Area m²**	**Window Prices In $**	**Price Difference In $**	**Price Electricity In $**	**Payback for new in years**	**Payback In years**
Simple	185.42	/	/	112.18	11.76	1,319.24	/	/	/	/
Double	179.62	5.8	435	141.28	11.76	1,661.45	342.22	3.29	505.02	104.02
Double Ar	175.57	9.85	738.75	149.80	11.76	1,761.65	442.41	5.59	315.30	79.18

Table X Payback period Calculations for the arid climate of Ghardaïa

	EUI kWh/m²/y	Saving per m²	Yearly Savings in kWh	Price per m²	Glazing Area m²	Window Prices In $	Price Difference In $	Price Electricity In $	Payback for new in years	Payback In years
Simple	193.34	/	/	112.18	11.76	1,319.24	/	/	/	/
Double	185.71	7.63	572.25	141.28	11.76	1,661.45	342.22	17.17	96.78	19.93
Double Ar	179.82	13.52	1014	149.80	11.76	1,761.65	442.41	30.42	57.91	14.54
	EUI kWh/m²/y	**Saving per m²**	**Yearly Savings in kWh**	**Price per m²**	**Glazing Area m²**	**Window Prices In $**	**Price Difference In $**	**Price Electricity In $**	**Payback for new in years**	**Payback In years**
Simple	193.34	/	/	112.18	11.76	1,319.24	/	/	/	/
Double	185.71	7.63	572.25	141.28	11.76	1,661.45	342.22	1.32	1262.33	260.01
Double Ar	179.82	13.52	1014	149.80	11.76	1,761.65	442.41	2.33	755.36	189.70
	EUI kWh/m²/y	**Saving per m²**	**Yearly Savings in kWh**	**Price per m²**	**Glazing Area m²**	**Window Prices In $**	**Price Difference In $**	**Price Electricity In $**	**Payback for new in years**	**Payback In years**
Simple	193.34	/	/	112.18	11.76	1,319.24	/	/	/	/
Double	185.71	7.63	572.25	141.28	11.76	1,661.45	342.22	4.33	383.89	79.07
Double Ar	179.82	13.52	1014	149.80	11.76	1,761.65	442.41	7.67	229.71	57.69

Table XI Profitability in the studied climates

		Electricity Energy			Gas Energy			Mixture (81% Gas; 19% Electricity)		
		BL in years	PBP in years	P	BL in years	PBP in years	P	BL in years	PBP in years	P
Constantine	Double	30	7.31	76%	30	95.33	-218%	30	28.99	3%
	Double Ar	30	6.39	79%	30	83.35	-178%	30	25.35	16%
Algiers	Double	30	26.22	13%	30	342.04	-1040%	30	104.02	-247%
	Double Ar	30	19.96	33%	30	260.38	-768%	30	79.18	-164%
Ghardaïa	Double	30	19.93	34%	30	260.01	-767%	30	79.07	-164%
	Double Ar	30	14.54	52%	30	189.70	-532%	30	57.69	-92%

Table XII Payback Period of Algeria compared to France and USA in USD

	EUI kWh/m²/y	Total Saving kWh yearly	Price kWh of energy FR in $	Price kWh of energy US in $	Price kWh of energy DZ in $	Price Window per m² (FR) in $	Price Window per m² (USA) in $	Price Window per m² (DZ) in $	Payback FR in years	Payback US in years	Payback DZ in years
Simple	274.12	/	0.200	0.109	0.008	79.45	100	115.53	/	/	/
Double	253.31	1560.75				130.53	150	145.64	1.92	3.46	28.99
Double Ar	243.35	2307.75				227.01	255.06	158.54	3.76	7.25	25.35

It is worth noting that in all of the climates studied, there is a significant difference in the payback periods depending on the type of energy: electricity, gas, and a combination of both, which can be explained by the difference in prices, as electricity costs thirteen times more than gas. Surprisingly, when compared to each other, the results indicate that the semi-arid climate of Constantine is the one with the shortest payback period, followed by Ghardaïa and then last comes the Algiers climate. For all these climates and with the three types of energy the double clear glazing windows with Argon gas seem to be the most suitable option with the shortest payback period overall.

Profitability

Interestingly, with electrical energy, the results obtained showed really good profitability possibility with the different climates and glazing types, with the best results for the city of Constantine, reaching a 79% P for the double clear glazing windows with Argon gas, and the worst for the city of Algiers, amounting to a 13% P for the double clear glazing windows with no fill. However, for gas all these results were negative. None of the cities nor the glazing types could achieve profitability, reaching a peak of -1040% for the double clear glazing windows with no fill in the city of Algiers and a minimum of -178% for the double clear glazing windows with Argon gas in the city of Constantine. For the last type of energy combination, it is apparent from the table that only a few of the results can be profitable for the city of Constantine with barley minimum results. Further results are summarised in Table XI.

Comparison to other countries

As seen on the field and in the literature review, developing countries are far behind in terms of the usage of energy saving technologies (passive or active). An investigation was made to seek out the different prices for energy and windows in different parts of the world, more specifically in France as a representative country of Europe and the United States of America as a representative of America, as summarised in Table XII. This comparison was made to point out the difference in payback times between developed and developing countries and to see if it is one of the points that is keeping these countries from using more energy savings strategies when comparing them to our previous research results. One unanticipated finding was that Algerian energy prices are really low compared to other countries, approximately 14 times lower than in the USA and they are 31 times lower than French rates. In terms of the price per square metre of windows, Algerian prices appear to be the highest for simple glazing windows and double clear glazing with no fills, and the lowest for double clear glazing windows filled with Argon gas. When comparing the Algerian payback time results with the USA and France results, it can be seen that the Algerian payback time is longer than in the two other countries, with respectively 8 and 15 times more for the double clear glazing windows with no fill and 4 and 7 for the double clear glazing windows with Argon gas.

Overall, a profit can be made for all cities if energy usage is set to electricity, and no profit can be made if energy usage is switched to gas. Only Constantine can make a profit out

of the combination of the two types of energy with the two types of glazing. This study is in accordance with (Missoum *et al.*, 2016) who studied PV system application in bioclimatic houses, and confirms that the payback periods of different strategies used to achieve NZE proves them to be hardly economically profitable.

Conclusion

The current study's main goal was to determine the effects of glazing types and window-to-wall ratios on energy consumption in three Algerian climates: semi-arid, arid, and Mediterranean, using energy simulation tools Autodesk Revit® software and Sefaira plugin, Three types of glazing with different U-value, SHGC and visual transmittance, with a series of WWR from 10% to 90% were tested. According to the simulation, the results can be summarised as follows:

– First, after conducting several investigations with local windows manufacturers, single glazing, double clear glazing with no fill, double clear glazing filled with Argon gas windows were identified as the ones that are widely available and can be found locally for a reasonable price.

– Second, according to the comparison of the three types of glazing, double glazing windows with Argon gas have the greatest potential for energy savings and are the most stable in terms of energy efficiency when increasing the WWR in all the studied climates.

– Third, the WWR has a significant effect on the energy consumption of residential buildings in the studied climates. The optimal WWR for a given orientation can't be selected without considering other elements of intervention, like in our case, the type of glazing.

– Fourth, the payback periods of the different types of glazing are really long when compared to other countries, and that is due to low energy prices in Algeria. Only a few studied cases could be implemented with profitability depending on the life time of these elements and their warrantee.

– Fifth, shorter payback periods could be achieved if the price of the building elements is lowered or the energy price subvention is removed.

– Sixth, because of the nature of economic strategies that are heavily dependent on fossil fuel exports, the amount of energy that is saved from energy efficiency measures and renewable energies could be calculated at the government level as an equivalent of exported energy to other countries.

[Written in English by the authors]

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Abdelhakim Walid Makhloufi, Ph.D., with several years of experience in the field joined and tutored by Dr **Samira Louafi** both working in the speciality of Architecture and environment in the laboratory Laboratory of Bioclimatic Architecture and Environment, having previous many publications and conferences as cited in the google scholar profile.

Conceptualization AWM and SL; methodology AWM and SL; software AWM; validation AWM and SL; writing – original draft preparation AWM; review and editing SL; visualization AWM; supervision SL; project administration AWM.

Both authors have read and agreed to the published version of the manuscript.

Abbreviations

ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
BIM	Building Information Modelling
BL	Building Life (years)
CV (RMSE)	Coefficient of Variation (Root-Mean-Square Error)
EUI	Energy Use Intensity
HVAC	Heating, Ventilation, and Air Conditioning
MBE	Mean Bias Error
PBP	Payback Period (years)
P	Profitability
TOE	Tonne Oil Equivalent
WWR	Window to Wall Ratio
NZEB	Net Zero Energy Buildings
NZE	Net Zero Energy
EPBD	Energy Performance of Buildings Directive
DTR	Regulatory Thermic Document
U-value	Thermal transmittance (W $m^{-2} K^{-1}$)
Tvis	Visible Transmittance
SHGC	Solar Heat Gain Coefficient
MENA	Middle East and North Africa
CBECS	Commercial Buildings Energy Consumption Survey

Fig. 1 Ankara Train Station

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The Art Déco Influence in the Modern Turkish Architecture of the Early Republican Period

Art Déco
Atatürk
Early Republican period
Modern Turkish architecture
Republican ideology

With the proclamation of the Republic, Atatürk, the founder of Modern Turkey, wanted a new model of politics that would bring about the establishment of the "nation state", also symbolized by architecture. Having decided to make a transition to modern architecture in Turkey, Atatürk invited academics from Germany and Vienna to achieve this. Consequently, by the 1930s, architecture followed a functionalist-rationalist path in both public buildings and in residences. Another architectural style that wielded a lot of influence on the trends in the Modern Movement in this period was Art Déco. The plastic effect of mass in Art Déco was accompanied by purism.

The purpose of this article is to explore the characteristics of the Art Déco style in modern Turkish architecture, tracing it back to the 1930s, the time when a culture of architecture first began to form in Turkey, as Art Déco, in combination with rationalism, proved to be an influential force in Republican Turkey. The effect of this style on the composition of structural masses shall be described through examples of public and residential buildings. At the same time, an attempt shall be made to explore the connotations of contemporaneity, progress, technology, and industry as expressed in the vocabulary of the Republican ideology that embraced the mass aesthetic of the formal style that was Art Déco.

INTRODUCTION

With the proclamation of the Republic (29 October 1923) by the founder of modern Turkey, Mustafa Kemal Atatürk, the people of Turkey went through various social, cultural and economic changes. The Kemalist regime, named after the founder, leaned toward modernization and was established on progressive premises that reflected a highly modernist ideology that Atatürk wished would penetrate all segments of society. Accordingly, Atatürk sought to symbolize the new political model and the establishment of the "nation state" in the country's architecture. Upon the establishment of the nation state, goals were set in the way of renewing the image of the government and symbolizing the successful formation of the Republic. The architectural style that prevailed in the past evolved into a highly modernist perspective with the emergence of the new political ideology (Uluğ, 2004). Consequently, in the period of the institutionalization of the Republic, Atatürk aimed to apply the slogan of bringing the country "up to the level of contemporary civilization" to the physical environment as much as it was possible. In establishing the nation state, he looked for some kind of a symbolic movement that would emphasize the country's liberation and exult in the independence of its people. He chose contemporary architecture as the symbol of the new nation state and the new regime, a force that would replace the styles of the past (Batur, 1994).

In the first years of the Republic, the dominant architectural concept was a reflection of the "First National Architecture" launched by the architect Kemalettin and his colleagues. Ataturk, the founder of the Republic, however, was more interested in opposing national historicism to make way for the modern architectural style that was emerging in Europe. The modern architecture of the times was imported into Turkey as a visible symbol of the desired separation from the country's Ottoman-Islamic past and the adoption of a westernized program that was modern and secular, ready to create a brand new nation (Bozdoğan, 2001). Modern architectural concepts were only just beginning in Europe and there was no group of architects in Turkey that was prepared to defend this movement. Atatürk rejected the idea of a "national architecture" and instead supported the potential of modern architecture in terms of representing the new Republic. This decision was of revolutionary dimensions in that era. In his attempts to build a new nation, Atatürk's rejection of national architecture can be explained by his own interpretation of nationalism. His view was that national unity should be established not through historical continuity but through efforts to project Turkey into the future and surpass levels of contemporary civilization (Tekeli, 2011). Atatürk made the decision to make a transition to modern architecture in Turkey and in order to realize this, extended official invitations to numerous architects from abroad (Nicolai, 2011; Holod, Evin, Özkan, 2005). This group that was expected to reflect the progressive ideals of Kemalism in public spaces was led by German, Austrian and Swiss architects and professors. It was in this way that with the advent of the 1930s, a rationalist and functionalist concept of design was born (Batur, 1986). The project of modernist architecture in the 1930s soon began to dominate the new regime's construction program, at first applied in the case of public buildings that symbolized the state. The signatures of foreign architects thus began to be seen in the architectural culture of the early Republican period in Ankara, the capital of the new Republic. Among the European masters, Clemens Holzmeister (1886-1983) appears before us as one of the most powerful architects of the period. Known as "Atatürk's architect," Holzmeister created monumental specimens of functional modern architecture in the major public buildings of the new capital (Balamir, 2010). The new idealized architectural style created became a prominent representative of the architectural applications and narrative of the period. The style was used on a large scale in public buildings, replacing the Ottoman-Seljuk Revivalism that signified the National Architectural Renaissance.

Identifying with the new political order and ideology, the Modern Movement, among its other goals, aspired to modernize education. This ideal became a part of the Republic's official architectural narrative that espoused the "new" as opposed to the "old" pedagogy of architectural education. In this context, a young university academic from Vienna, the architect Ernst Egli (1893-1974) was appointed by Atatürk to head the Fine Arts Academy (Batur, 1986). Among his other accomplishments, Egli achieved deep-rooted changes in the university curriculum, provided successful students of architecture with the opportunity to study on scholarship in Europe, contributing to the modernization of design on the part of Turkish architects. In this aspect, Egli made a profound impact on the development of architectural professionalism in Turkey. In 1936, Egli passed on his duties to Bruno Taut (1880-1938). Taut reorganized the school curriculum, focusing on the principles of rationalist functionalism in European modernism (Bozdoğan, 2001). The modernist changes at the Academy formed the profile of the Republic's first generation of architects.

The 1930's thus constituted the first stage of modern architectural thought and as such, encompassed the various styles of German National Socialist architecture, Vienna purism, and the cubism of Le Corbusier. The International Style became dominant in the works of this period (Batur, 1986). Another architectural style that wielded an influence on the trends in the Modern Movement in this period was Art Déco. Some Art Déco forms and plastic elements of form were accompanied by purism in Art Déco.

The purpose of this article is to explore the characteristics of the Art Déco style in modern Turkish architecture, tracing it back to the 1930s, the time when a culture of architecture first began to form in Turkey, as Art Deco, in combination with rationalism, proved to be an influential force in Republican Turkey. The effect of this style on the composition of structural masses shall be described through examples of public and residential buildings. At the same time, an attempt shall be made to explore the connotations of contemporaneity, progress, technology, and industry as expressed in the vocabulary of the Republican ideology that embraced the mass aesthetic of the formal style that was Art Déco.

Methodology

This article presents the characteristics of the mass construct of the public and residential buildings erected in the Art Déco architectural style at a time when this form, together with the concept of rationalism, begun to influence Turkish architecture. It is the period from the early 1930's onward. The research has yielded a typology based upon the mass organization of selected major structures that were built in the period that is identified as the Art Déco Period in literature. Another aim of the paper is to explore the connotations of contemporaneity, progress, technology, and industry, as expressed in the vocabulary of the Republican ideology that embraced the mass aesthetic of the formal style that was Art Déco. In that, the paper relies on the contributions to the literature of key authors who have studied the architecture of the period (Sözen, 1984; Aslanoğlu, 2001; Bozdoğan, 2001; Hasol, 2017; Alpagut, 2010) in creating a typology of the major structures of the period, based on a historical approach to architecture. While there have been studies that have provided a general analysis of the buildings of the period, this article discusses the mass constructs of these buildings within a defined typology. Today, it is disheartening to witness the dismal state of the architectural legacy of the 1930's Turkey and to know that most of the buildings that were clearly the cultural icons of the Republic have been demolished. This is why the author has had to refer to visual archives and to the publications of the main authors mentioned above as references.

Art Déco architecture

Art Déco was introduced to the world at the "International Exposition of Modern Decorative and Industrial Arts" that opened in Paris in 1925 (Messler, 1996), appearing at first sight to be a popular and decorative style that embraced a variety of crafts, from furniture to objects for daily use, graphic arts, painting, sculpture and even clothing. It also evolved into an exciting architectural style that made its entrance at the beginning of the twentieth century. With its decorative, industrial and architectural dynamics, the style created a "Déco aesthetic" that became a part of the modern architectural movement (Klein, McClelland, Haslam, 1991). Déco architecture offered a new perspective on the rationalism and functionalism that had resulted from the purely stylistic and abstract concepts of mass and space that the modern architectural movement had introduced. Art Déco became a dominant force in architecture from the 1930s onwards.

The Art Déco movement styled the exterior plastic form of buildings, incorporating local arts in architectural decoration. The native arts of the French colonies of Africa, the decorative motifs and architecture of Egypt and of the natives of North America, especially the Mayas, were part of the repertory of the Art Déco style (Hillier, Escritt, 1997). Another resource the movement drew from was Cub-

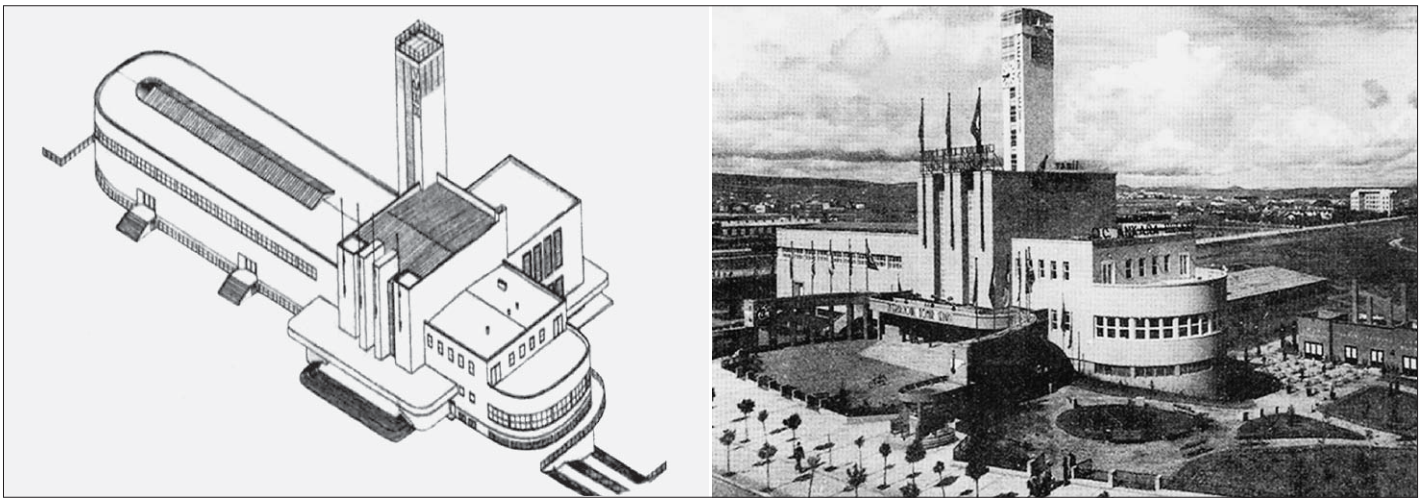


FIG. 2 ANKARA EXHIBITION HALL BUILDING: AXONOMETRIC PERSPECTIVE (LEFT)

ism. Art Déco's cubist, geometrical, graduated and pyramidal and zig-zagging forms catch the eye in the general organization of structures.

The Déco style began to change as the Great Depression drew nearer. As the world entered the age of machinery, every kind of design took on an industrial form – from automobiles to trains, from commercial and residential buildings to even home appliances. The Streamline Moderne style of design that emerged assumed an aesthetic quality with its horizontal lines and curved accents, radiating an aerodynamic flair. The Streamline Moderne version of Art Déco, which also used local motifs amid a modernist decorative outlook, points to a unique aesthetic rhetoric that came to be known as Streamlining Déco (Polatkan, Özer, 2006: 93). Streamlining softened the sharp contours of Art Déco. Rounded wall surfaces lent a new aesthetic style to the plasticity of the Déco form. The style brought about an aerodynamic emphasis that introduced curved surfaces and softened corners (Hillier, Escritt, 1997). Buildings were influenced by streamlined transatlantic liners. Bayer defines streamlining design as "Streamline Moderne" (Bayer, 1999).

The 1930s saw the spread of Art Déco architecture to all parts of the world. Both the classic Art Déco and its streamlined modern version came to be widely popular in Turkish society (Batur, 1984). From the 1930s onwards, the plasticity of Art Déco forms was a dominant part of modern Turkish architecture. Block form compositions were made up of both horizontal and vertical lines, patterns that were widely employed in both public and residential buildings. Rounded corners and entrances accompanying prismatic masses and vertically composed asymmetrical designs were reflections of the conceptual designs of the era.

ART DÉCO IN THE EARLY REPUBLICAN PERIOD

Art Déco started to have an impact on Turkish architecture as an addition to the rationalist architectural style from the 1930s, an era in which a culture of modern architecture that would be known as Modern Turkish Architecture began to be created in the Early Republican Period. Public and residential buildings that represented the modern aesthetic of the Early Republican Period revealed seven kinds of block forms in Déco. Since examples of public buildings are so few, each type will be described with one example.

1 – LONG AND SHORT DÉCO FORMS PERPENDICULAR TO EACH OTHER

The first construct in this group brings together two masses perpendicularly, one long and the other short. In this scheme, the main mass is long and lies parallel to the street or avenue, and either one or both sides of the block form an end in circular fashion, creating a modern, streamlined effect. The short mass cuts through the long form asymmetrically on the short axis. This short block forms the entrance façade of the building, which is emphasized by means of vertical elements. The structure thus appears as an asymmetrical composition of both horizontal and vertical forms.

A major structure which exemplifies this construct is the Ankara Exhibition House built in 1933-34 and designed by the architect Şevki Balmumcu. First used as an exhibition hall, the building was later converted into an opera house that was designed by Paul Bonatz. The design was the winning entry in a competition that was organized in 1933 by the National Economy and Savings Society. The specifications for the competition required a

Fig. 3 Florya Atatürk Kiosk: land side (left), seafront with its rounded corner (right)

design in the modern style. A total of 62 candidates from in and outside of the country participated and since the project entered by one of the two semi-finalist architects, Paolo Vietti Violia, was found to be too expensive, the decision was taken to implement the project of the other finalist, Şevki Balmumcu (Sözen, 1984). This was a period in which the major public buildings of the newly established Republic of Turkey were designed by foreign architects, so the decision to realize the project by a Turkish architect was met with great excitement.

The building consists of two block forms cutting into each other perpendicularly and stretching out in parallel to the street (Fig. 2). Situated on Ankara Boulevard, the structure's long, horizontal main mass finishes in circular form on both ends. This long mass is cut into asymmetrically on the short axis by a shorter mass that forms the entrance side of the building (Aslanoğlu, 2001). The short block form constituting the facade has three vertical elements that contain the components of various installations (water tanks, heating and air conditioning; Bozdoğan, 2001). Behind these is again a square-planned, high tower that accentuates verticality. The row of long and narrow windows on the long and horizontal mass strengthens the horizontal effect and also emphasizes the opposition of horizontal and vertical in the whole of the building. The building, with its horizontal lines made up of asymmetrical and simple geometrical forms, reveals corner ovals that reflect the character of Streamlined Déco. Thus, the building's composition of horizontal and vertical masses presents an asymmetrical balance. The entrance and main hall have rounded corners and are made up of cylindrical forms. Şevki Balmumcu has used these rounded forms in the rooms of the building as well (Ergut, 2011). Constructed in reinforced concrete, the building's front facade is covered in "Ankara stone", as in other public structures (Sözen, 1984). The other sides of the building are covered in ivory-colored plastering. The structure is an icon of Kemalist architecture and cultural ideology and has been the subject of many postcards, photographs and posters representing the Republican Period (Bozdoğan, 2001). Conceived on the scale of a large public building, the structure boasts a modernist aesthetic. The first photography exhibition on the premises was held in 1936.

Another well-known example of the same kind of mass construct is the Florya Atatürk Kiosk designed by Seyfi Arkan. A graduate of *Sanay-i Nefise Mektebi* (School of Fine Arts), Arkan worked for his first five years after graduation in the office of the architect Peolzig (Batur, 1994). Known as the first real Turkish modernist, Arkan was assigned the design of the Florya Atatürk Kiosk by Atatürk himself. In adjacent location to the Florya Public Beach, the building, rising on pillars set in the sea, was erected in 1936. The single-story structure is in rectangular form and is modeled on an L-plan. Its flat terrace roof displays a simple, geometrical, rationalist style in which the architect has made use of a mass composition of two rectangular forms cutting each other perpendicularly (Batur, 1994). The first long and rectangular form has been placed parallel to the sea and contains offices, a salon, guest rooms and bedrooms. The rooms in this section of the house face the scenery and have spacious terraces with metal handrails in front. One end of the rectangular form has been rounded and is where the salon is located (Fig. 3, right). The salon facade is made completely of glass. The shorter mass of the structure, perpendicular to the long form and the shore, comprises the entrance (Fig. 3). This is where personnel and service areas are situated. A verticality ema-

FIG. 4 ANKARA TRAIN STATION MUSIC HALL: VERTICAL BANDS OF ORNAMENTATION AND METAL RAILINGS (LEFT)

nating from the main mass of the building dominates the shoreside of the short form. The building is joined to the shore with a 90 m bridge, giving the impression of a transatlantic ship floating on the ocean. The long and open corridors on the land side of the building resemble a ship's deck, and the single row of circular windows are like portholes, the image of a transatlantic vessel being completed with white metal handrails on the "deck". Described by the well-known Turkish architectural historian, Sibel Bozdoğan, as the "ship building", the structure is a small example of modernist, rationalist understanding. Its horizontal and vertical lines exude an asymmetrical mass organization (Bozdoğan, 2001).

2 – A DÉCO FORM WITH A VERTICAL CONNER ANNEX

As seen in the second Déco style of form organization in public buildings, one corner of the main rectangular mass situated parallel to the street or avenue has been designed in circular fashion. This time a vertical tower or clock tower has been added to the side of the main mass in an effort to disrupt the horizontality of the building and give it a vertical emphasis. The Ankara Train Station Music Hall is yet another important example of how vertical and horizontal masses can achieve geometrical balance. This building was constructed at the command of Ataturk from 1935-1937 as a place to host foreign guests at the Ankara Train Station in the new and invigorating social atmosphere of the country. It was designed by Şekip Akalın. The structure adjacent to the Ankara Train Station remained a center of recreation for business travelers and tourists in the capital city up until the 1960s. The music hall was one of Ankara's most exclusive entertainment venues and hosted many international orchestras and revues. There is a large music hall on the ground floor of this building, which comprises two stories over a basement floor. With one of its corners being a circular and horizontal mass, adjacent to it is a vertical clock tower set upon a square plan that is 32 m high (Fig. 4, right). The sub-basement and the entrance staircase are covered in Ankara stone; the upper floors are plastered with EdelPutz, a characteristic material of the times. With a flat roof, the top floor of the structure projects outward. The horizontal bank of windows on the ground floor have been decorated with colorful bands of horizontal ornamentation unique to the Deco style, a technique used to relieve horizontal monotony (Fig. 4, left). On top of the clock tower are vertical grooves to further emphasize verticality, another technique characterizing the period (Hasol, 2017). The metal railings of the entrance terrace of the building are again reminiscent of the aesthetics of transatlantic machinery (Fig. 4, left; Bozdoğan, 2001).

Another building that exhibits the same mass construct is the Ankara Çubuk Dam Water Filtering Station that represents a major example of the new industrial and technological advances taken by the new Republic's waterworks and energy power plants. It was built in 1935 and was a symbol of the Republic's intention to establish robust cities with modern infrastructure. The Çubuk Dam was constructed to provide Ankara with clean water, becoming an important technological icon of the modernity of the Republic and an indicator of its technological progress. The architectural features of the water filtering station of the Republic's first dam were modern. As in the Train Station Music Hall Building, one corner of this structure too is rounded and the simple geometrical horizontal mass stands adjacent to a vertical clock tower (Fig. 5). In both structures, the vertical clock tower renders an asymmetry that balances the oval-cornered purist horizontal forms. Comprising in this way a horizontal mass with a rounded corner and a vertical tower, the composition

of the filtering station has a reinforced concrete frame that is covered with EdelPutz plaster; the windows are covered with Ankara stone above and below.

3 – A Déco mass with two oval forms at the corners

Employing a modern style in line with Kemalist architectural ideology in the Early Republican Period, the third Art Déco mass construction technique applied to public buildings featured horizontally oriented prismatic buildings with rounded corners. The most grandiose of this type is perhaps the main entrance gate to the Ankara Train Station, designed and built from 1935-37 by the Turkish architect Şekip Akalın to greet visitors to the capital (Fig. 1). The railroads were among the most important state enterprises in the Early Republican Period, having a symbolic status as the roads that were taking the Kemalist Revolution to all parts of the country. The railroad policies were the means by which the new regime would be moving on towards achieving its goals (Bozdoğan, 2001). The new train station buildings built at the beginning of the 1930's reflected the standards of modernist aesthetics. All of the station buildings of the period displayed symmetrical, flat-roofed geometrical mass compositions with simple, purist, vertical and horizontal forms (Bozdoğan, 2001).

Built in the spirit of this concept, the most famous of the train station buildings is the Ankara Train Station. This was designed by the architect Akalın, who had been inspired by the Stuttgart Railroad Station on one of his trips to Europe (Hasol, 2017). With its facade looking onto the Station Square and stretching out in a northwest-southeast direction, this horizontally lined structure was built to replace the old station and was designed with a rationalist approach that reflected the volumetric composition of Déco. The train station exhibits a symmetrical and horizontal mass that has been situated in parallel to the railway. The rhetoric of the mass reflects the new Déco aesthetic, as defined by the two stairway towers on two sides of the colonnaded entrance, projecting outward in the form of a semi-circle, standing higher than the main mass and situated on a vertical plane (Fig. 1). The colonnade is in the front of the structure's entrance hall, is 12 m high and 23×33 m wide. The horizontally lined station building's windows are aligned on a horizontal line while the windows on the high, vertical stairway towers on the two sides of the entrance are long and in vertical form so as to increase the vertical effect (Fig. 1). The vertical concrete bands between the windows are also designed to produce the same effect.

Fig. 5 Çubuk Dam Water Filtering Station

Fig. 6 The Liquor Factory Monopoly Building: the entrance pavilion to the factory

Another application of the plastic horizontal-vertical mass composition can be seen in the windows of the colonnaded entrance, which are rendered in vertical form to further the same concept. The same desire to add a vertical effect to a horizontal mass with colonnades is reflected here. As an extension of the nation-state ideology that was on the rise in parallel to political developments in Europe, the structure was built to create a monumental effect that reflected the power of the state. The statues of eagles are demonstrations of this intention (Hasol, 2017). The building, constructed in reinforced concrete, is covered in Ankara stone, a characteristic element of decoration of the era.

Another structure of the era that uses the same mass construct is the Liquor Factory Monopoly, one stronger symbol of the visual and spatial objectification of Republican modernity. The building is a technological icon of the Kemalist transformation and a prominent example of the image of industry and advanced technology in the Republic. Designed in simplicity, the building is undecorated, purist and its geometrical spaces portray the ideals of the national industrialization movement of the 1930s. Together with its annexed complexes, the site stands out as a small-scale factory town. Located in Istanbul, the factory is one of the fifteen that were included in the Republic's 5-year industrialization plan. It was built in 1931 by the French architect Robert Mallet-Stevens on the request of Atatürk and is an example of the industrial structures of the Early Republican Period. Fully built on the frame of reinforced concrete, the structure carries the lines of Art Déco and was designed with a purist approach. The main production building is symmetrical in relation to the building's central axis. There is a central section that, together with its two side wings, offers a horizontal dominance to the building. The entrance pavilion features horizontal lines and rounded guardhouses, arranged symmetrically, on

FIG. 7 ANKARA HIFZISIHHA INSTITUTE CHEMISTRY-BACTERIOLOGY LABORATORY BUILDING (LEFT); TÜRKKUŞU SCHOOL (IN THE MIDDLE); ISTANBUL UNIVERSITY OBSERVATORY (RIGHT)

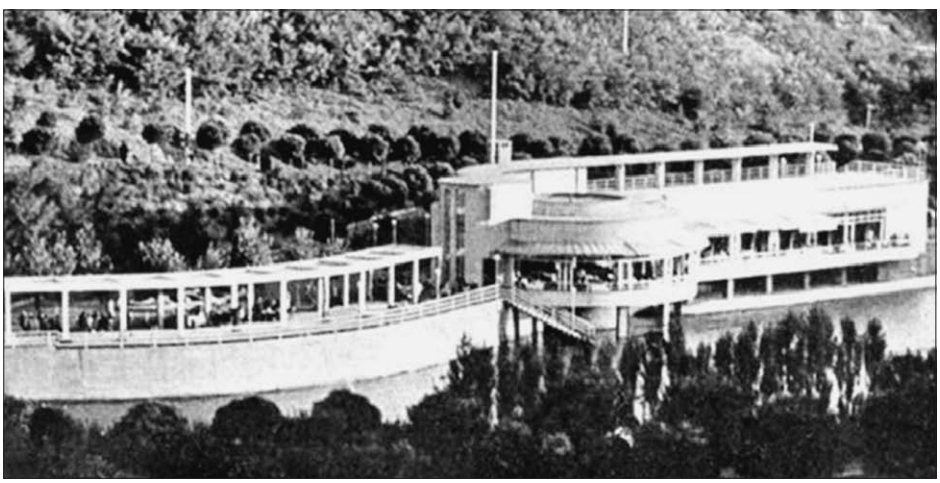
each of the two sides of the entrance (Fig 6). The design is functional and the flat roof-terraces of the guardhouses have metal railings in front as a reference to the modernist architectural culture that favored the aesthetic of the features of transatlantic machinery (Bozdoğan, 2001). The main entrance block to which the guardhouses are joined are also flat-roofed and in horizontal rectangular, prismatic form. Above the prismatic mass are high, vertical chimneys of concrete on each side, accentuating the horizontal-vertical emphasis. Déco lines are concentrated in the inside of the factory building.

4 – A SHORT DÉCO FORM PROJECTING TOWARD THE FRONT FAÇADE IN A SEMI-CIRCLE

In still another mass plastic construct of the era that features Déco lines, a short form was placed at the symmetrical axis of the main mass that consisted of a horizontal, long rectangular prism. This short form projected toward the front in a semi-circle, but straight out toward the back. In the resulting asymmetrical effect, the short mass on the symmetrical axis is higher than the main form.

One of the powerful examples of this technique is the Türkkuşu Building, built as a center for glider and parachute training. The structure is a product of Atatürk's desire for the country to progress in the area of aviation; it was designed in 1936 by Ernst Egli. A photograph of the building is featured in numerous postcards of the day and the structure was built in parallel to Atatürk Boulevard in Ankara. Consisting of a two-story rectangular prism on top of a basement floor, the building has a flat roof in the center from which a short mass rises and projects toward the front in the form of a semi-circle as from the second floor (Fig. 7, in the middle). This semi-circular projection breaks the structure's horizontality; the projected mass is higher that the main mass of the building. While the usual application was to place a semi-circular form on the symmetrical axis of the main mass, having it project outward as from the first floor, Egli instead added his own signature interpretation to the construct by letting the semi-circular shorter mass project towards the front, beginning on the second floor.

FIG. 8 ANKARA ÇUBUK DAM RESTAURANT-MUSIC HALL



Another building in which the same mass construct is used is the Ankara Hıfzısıhha (Public Hygiene) Institute Chemistry-Bacteriology Laboratory Building. This institute was built in 1928 to promote public health and the building was used in the manufacture of vaccines. It was built in 1930 by the Austrian architect Theodor Jost. The architect designed the building in the Déco aesthetic in parallel to the street and in the form of two masses perpendicularly traversing each other asymmetrically. The short mass of the horizontal long rectangular form is situated on the symmetrical axis of the prism. It projects outward toward the front in a semi-circle fashion while it projects in a straight line toward the back of the building. This mass is also higher than the main structure in order to break the horizontality. Standing on top of this block is a relief of Hygenia, the daughter of the Greek god of medicine, Asklepios, created by the Austrian sculptor, Wilhelm Frass (Sözen, 1984).

A variation that is similar in mass formation is the Istanbul University Observatory that was designed by Hikmet Holtay from 1934-1936.

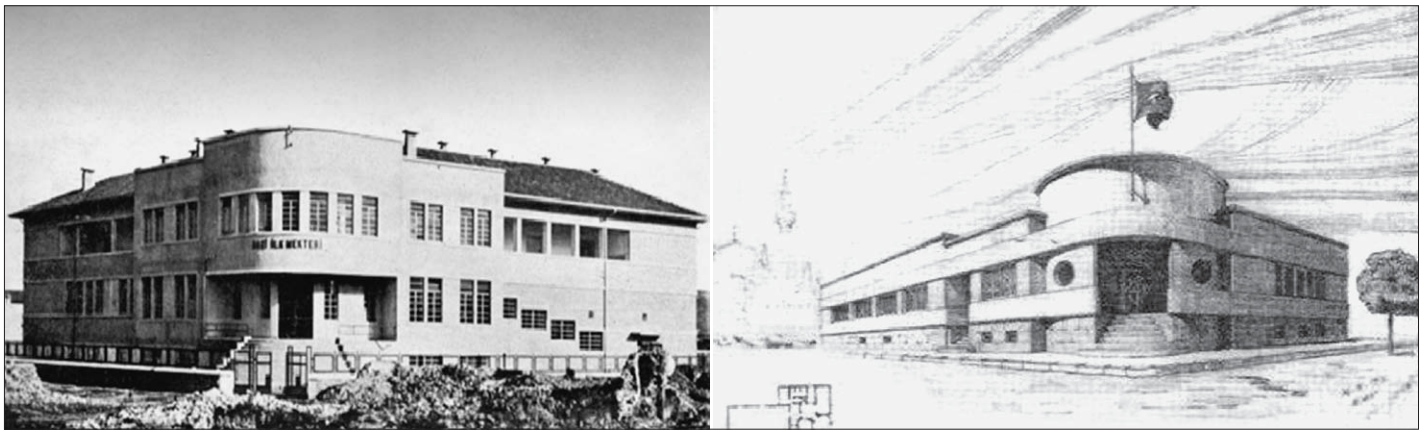


Fig. 9 Izmir Gazi School (left); Yalova Community Center (*halkevi*; right)

The building, designed for astronomical observations and research, is an indicator of the importance given to science in the period of the Republic. The short mass of the structure has been placed on a symmetrical axis and its circular observatory tower looking toward the front projects outward (Fig. 7, right). There are stairs at the edge of the back facade that projects straight outward. In this example, the short mass projects outward from the rectangular prism that forms the main mass. The terrace railings of the flat-roofed structure are of wrought-iron, in keeping with the trend of the times.

A different variation of this mass construct can be found in the Çubuk Dam Restaurant-Music Hall at the Ankara Çubuk Dam. The capital of the New Republic, Ankara, enjoyed the construction of many parks, sports facilities, sports fields and public recreation areas. These played an important role in the building of the new nation and they reflected the concepts of "youth" and "vigor" that had come to symbolize the culture of the Early Republican Period. These areas also represented the new societal ideology and the end of the traditional oppressive separation of men and women in a westernized Republic (Bozdoğan, 2001). The Çubuk Dam and its modernist composition is a major example of this. The Çubuk Dam Restaurant-Music Hall facility, located at the water's edge of this overpowering dam, is covered in Ankara stone and was designed by the French architect Theo Leveau in 1938. With its finely sculptured landscape, the structure is situated inside a park and its terrace stretches out on a curvilinear plane parallel to the dam, consisting of horizontal forms on both sides (Fig. 8). A shorter mass was placed on a symmetrical axis exactly in the middle. On one end of this form, there is the music hall, which projects over the water in a semi-circle. Here too the transatlantic aesthetic of the art déco style is evident. Once again it reflects the progressive narrative of the modernist leaning of Republican architecture.

5 – A Déco form with a circular section at the center

This new architectural concept that defines the aesthetic norms of modern public buildings in the Republican period can also be frequently seen in the school buildings and the community centers *(halkevi)* of the era. The scheme used in these structures consists of horizontal lines, flat roofs, and a circular section in the middle of two purist prismatic forms. This section can be an entrance hall or in some cases, a conference room or library.

The mass aesthetic of rounded corners at the entrance is displayed in the community center *(halkevi)* buildings, which were an important group of structures that represented the cultural institutions of the Republic. These buildings were at the same time ideological symbols of the Republic and a representation of an important theme of architectural culture in the 1930s. This was why these structures were designed with the new aesthetic tectonic of modernism. That the first two female architects of the Republic, Leman Tomsu and Münevver Belen, were credited with their *halkevi* projects further emphasizes how much these facilities epitomized the secularism of the Republic. Their focus was on education and they functioned as centers for meetings and socializing (Bozdoğan, 2001). The two most well-known community centers of the period, in which architectural archetypes of the modern Republic are evident, were the Yalova Halkevi building designed by Sedad Çetintaş in 1937 and the Sivas Halkevi project created by Emin Necip Uzman and Nazif Asal (Fig. 9, right). In both buildings, there is a circular section in the middle of two horizontal forms. This section was an entrance in the Yalova Halkevi building and a library in the Sivas Halkevi building.

FIG. 10 IZMIR FAIR THRACE PAVILION (LEFT); MAIN ENTRANCE TO THE FAIR (IN THE MIDDLE); MINISTRY OF EDUCATION CULTURE PAVILION (RIGHT)

The same use of mass was also used in some school buildings of the era. In 1934, Necmettin Emre designed the Izmir Gazi Elementary School and Erhan Çamlıbel the Izmir Bornova Agricultural School. The rounded corners and the mass plasticity of the rounded entrances to the buildings are typical examples of the period (Fig. 9, left).

6 – A DÉCO FORM WITH A VERTICAL EMPHASIS ON THE ENTRANCE

Another typology in the Art Déco modernist stylistic mass repertory encompasses a vertical emphasis on a streamlined horizontally-oriented long form. The vertical emphasis can be seen in the ziggurat-like or zig-zag compositions on the entrance axis. This emphasis exhibited in the entrance mass of the long horizontal block is a composition that breaks the horizontality of the structure. The vertical composition of the building is accentuated by the zig-zag and ziggurat-like lines, an element that was particularly seen in the buildings of the Izmir International Fair in 1938. This fair, a Republican venue, exhibited technological and economic progress in terms of the modernist architectural environment (Bozdoğan, 2001). The fair symbolized the spectacular progress brought about by the Turkish Reforms initiated by Atatürk and the determination and tenacity with which a new nation was created from scratch. In the words of Atatürk, "However big political and military victories may be, if they are not crowned by economic victories, they cannot be sustained and will wither away with time." This declaration is the proclamation of the goal of "full independence" by the founder of the modern Turkish Republic (Sözen, 1984).

All the modernist pavilions and stands of the international fair were designed by the leading local and foreign architects of the period (Orel, Çeçen, 1939). The structures in the fair exhibited the Déco mass concept of vertical emphasis. Among the most well-known ones was the Ministry of Education Culture Pavilion designed by Bruno Taut. The mass organization in this building features a zig-zag vertical emphasis (Fig. 10, right). The Trakya Pavilion by an anonymous architect also features a Déco form with parallel lines and vertical zig-zags that project over the main form with its rounded corners and long, horizontal main mass (Fig. 10, left). The fair architect, Ferruh Örel, designed the main entrance gate in which the Déco construct of vertical emphasis was also used (Fig 10, in the middle). On the ground level, an open colonnaded entrance with horizontal lines and vertical columns made of metal (flag posts) give the structure a modern aesthetic that reveals the vertical Déco effect.

FIG. 11 İSMET PASHA GIRLS' INSTITUTE

7 – BALCONIES WITH ROUNDED CORNERS

Another form of the Déco mass architectonic used in modern Turkish architecture is the design where a horizontal or vertical rectangular prism constitutes the main structure, which has balconies that are rounded at the corners. In line with the conceptual understanding of the age, this arrangement of mass, simply designed, has a flat roof and the rectangular form reveals balconies that are rounded at one end.

The most advanced of this construct can be seen in the İsmet Pasha Girls' Institute designed by Ernst Egli in 1928-1930. Education for girls was one of the most important subjects of the advanced policies adopted in the Republican Period. Accordingly, many girls'

high schools and girls' institutes were constructed in this period, all designed to become the visual showcase of the country's modernization movement and a symbol of the contemporary woman (Alpagut, 2010). This was the first girls' institute established as part of this aspiration. The structure represented the two powerful symbols of Kemalist reforms – architecture and women – integrating the aesthetic and paradigmatic individuality of the two concepts in a single building (Bozdoğan, 2001). The four floors built over a basement run horizontally in parallel to Atatürk Boulevard; on two sides of the main mass are vertical blocks on each side that balance out the visual effect. These vertical blocks are five stories high and they contain stairs, storage facilities and toilets (Alpagut, 2010). Flat-roofed and with continuous exterior sills, the building's balconies reflect the Déco mass form (Fig. 11). The first-floor balcony stretches out from side to side and has rounded corners, strengthening the horizontal effect of the main mass. The vertical service blocks on either side of the structure have long and narrow windows that accentuate the vertical effect of the service tower. The flagpole, which Egli deliberately placed on top of the building, enhances the vertical effect (Alpagut, 2010). The vertical stairway towers on the sides create a balanced composition with their symmetrical arrangement on the front and back facades. The building points to a modernist aesthetic with its functional, undecorated and simple conceptualization.

The formal mass form emerging from the vertical or horizontal rectangular prisms with their round-cornered balconies is a style that is widely used in residential buildings as well. The concept of the family that was living a modern life was one of the other elements of the Republican ideal. Turkish architecture came under the influence of modern architectural styles in the Republican period, starting to exhibit functionalist trends in residential buildings. Beginning in the 1930s, the traditional Turkish house, which was made of nondescript rooms, was converted into a structure composed of spaces individually styled according to their order of importance in the house, and with particular characteristics that served a specific function (Batur, 1983). The differentiation between the rooms of the house was now founded on functionality instead of the traditional system of basing differences on the hierarchical ranking of individuals using the room. The living room, sitting room, bedrooms, maid's room, kitchen, bath and toilet were treated as independent spaces that began to be arranged to serve different needs. The traditional interiors made way for modern and western styled elements of comfort characterized by furniture, lamps and electrical apparatus (Alsaç, 1973).

It was due to this trend that westernized elite members of society chose to build a host of houses and apartment buildings constructed in the modernist style to symbolize the new lifestyle of the modern Turkish family. The houses, villas, apartment buildings and rental blocks popping up in Istanbul's Taksim, Cihangir and Maçka districts were seen to display a streamlined Déco form of design, sometimes with rounded balcony corners and sometimes with rounded entrances. The most well-known examples of the streamlined aesthetic with its rounded corners that were built in the 1930s were the Tüten Apartment and Ayhan Apartment buildings in Istanbul as well as the Sönmez Apartment Building and the Rental Apartments of the Children's Welfare Agency (Sözen, 1984).

The owner of Tüten Apartment in Taksim/Istanbul was the tobacco merchant Sabri Tüten. It was designed in 1936 by Adil Denktaş as an 8-floor reinforced concrete structure in the form of a vertically rectangular prism. On one corner of the structure is a semicircular salon that has a semicircular balcony in front with a continuous sill (Fig 12, down). The row of widows on the front of the salon finishes in the corner in semicircular form. The circular windows of the wet spaces and service areas looking toward the front of the building reference the portholes of streamlined ships. The rounded balconies and rounded windows of the vertical mass create a horizontal effect while the vertical windows form a horizontal-vertical asymmetry.

A handsome example of the mass plasticity of rounded balconies can be seen in the Children's Welfare Agency Rental Apartments (Fig. 12, in the middle), built by the architect H. Hüsnü in 1934 on Ankara Yenişehir Avenue (Sözen, 1984). The structure's balconies project outward toward the front from the main mass and have rounded corners.

This period saw the design of a large number of villas that had the same rounded corners and balconies constructed in the repertory of the modernist style. The best example in this vein is the villa in Bebek, Istanbul designed by Edip Erbilen in 1937. Revealing a mass composition of rounded circular corners and balconies on a horizontal mass, the structure is flat-roofed and has a large terrace with continuous sills (Fig. 12, up). The metal railings of the balconies are again a reference to the aesthetic of transatlantic ships.

Discussion

Modernism, or the Modern movement, is accepted as the official historical origin of modern architecture in the West, recognized as a revolutionary canon of aesthetics that represents a defined stylistic discipline. Cubic forms

Fig. 12 A Déco Villa in Bebek (up); Children's Welfare Agency Rental Apartments (in the middle); Tüten Apartment Building (down)

and geometrical shapes of reinforced concrete, steel and glass contributed to a new understanding of architecture that was accompanied by a lack of.

In the 1920s/30s, the first stage of the Modern movement, the world witnessed a variety of different forms of architectural expression, such as German National Socialist architecture, Viennese purism, Le Corbusier's cubism and Art Déco. Although features that were considered concise statements of the modernist aesthetic emerged in modern Turkish architecture almost at the same time as in the rest of the world, Déco was the overpowering style that made its imprint on the Republican Period. Besides its own distinct elements, Art Déco was also accompanied in this period by purism, especially in mass plasticity. Art Déco architecture emerged in Turkey as a definitive preference for a westernized, modern and secular new state and was first applied in the 1930's by German and Central European architects who were invited to Turkey for this purpose. These structures, which refer to the technology of the industrial age and its machinery, reflected the modernist and stylistic compositions as well as the aesthetics of the age of machinery in the culture of architecture in Turkey in the 1930s.

Art Déco appeared in the Early Republican Period as the canonical aesthetic of the modern architecture movement, as manifested in the program of stylistic buildings that took over the architectural scene. Déco-styled buildings provided both the capital of the New Republic and the buildings of its cities with a modern perspective and silhouette that represented one of the best interpretations of modernity in architecture.

The curves and turns of the new architectural style, guided by Kemalist idealism, the rounded corners accompanying prismatic masses, the balanced opposition of the horizontal and vertical, as well as the references to the streamlined beauty of transatlantic carriers, offer dimensions of aesthetic and spatial expression that exemplified the construction program of the Early Republican culture. Reflecting also the aesthetics of the age of machinery, these buildings were not only perceived as modern but also represented the artistic images of the modern architectural movement of the modernist Utopian culture of the Republican period.

The Déco style, with its particular emphasis on mass construct, was widely employed in Turkish architecture in public and residential buildings of the period. In this article, we have analyzed seven types of mass composition that appear in the mass organization of the buildings, which we have classified as: long and short Déco forms perpendicular to each other, the Déco form with a vertical corner annex, the Déco mass with two oval forms at the corners, the short Déco form projecting toward the front façade in a semi-circle, the Déco form with a circular section at the center, the Déco form with a vertical emphasis on the entrance, and balconies with rounded corners. The mass compositions made up of horizontal and vertical elements, the asymmetrical constructs and zig-zags comprised the leitmotifs of the forms that distinguished the Art Déco of this time. Besides these, accompanying the prismatic forms are other Déco characteristics of the period such as rounded corners and entrances, asymmetrical forms consisting of vertical elements, and the concept of the vertical corner annex. The gray and white purism in the facades of modern architecture differed from examples around the world, replacing modern materials such as terra cotta and stucco with local resources such as Ankara stone or enlisting the use of the German technique of EdelPutz in plastering. The characteristic flat roofs or roofs hidden inside parapets and the uninterrupted lines of horizontal sills were other elements of the period's stylistic repertory. The visual effect of architecture and style of the period was homogeneous.

CONCLUSION

The structures at stake formed the urban fabric of the 1930s and pointed to the ideology that the Republican regime assigned to them. They became the modern city's aesthetic objects and gave shape to the principles and expression of the new concept of architecture. The Déco style represented Modernism in Turkey, as well as rationalism and practical functionality, creating a paradigmatic narrative of the modernist aesthetic that the Republican ideology wanted to dominate the cities and architecture as a whole.

These structures came to be the architectural icons of Republican Modernism and formed the backbone of the modernist perspective in Republican architecture. In buildings where the rationalist-functionalist and modernist approach combined with the Déco mass aesthetic, they were accepted as westernized instruments of stylistic expression. In the ideological climate of the times, the architecture that represented the Republican period of reform rationalized modern formulations, carrying a common aesthetic language that identified these buildings as "Republican". The Déco masses that were used in these prestigious buildings, which were a formal and rationalist interpretation of Republican ideology, also represented an evocative reference to contemporary life, progress, technology and industry.

[Translated by Emine Mizyal Adsız]

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Illustration sources

Figs. 1, 4, 6, 7, 11	Sözen, 1984
Fig. 2	Bozdoğan, 2001 (left); Sözen, 1984 (right)
Fig. 3	Author
Fig. 5	Hasol, 2017
Fig. 8	Bozdoğan, 2001
Fig. 9	Sözen, 1984 (left); Bozdoğan, 2001 (right)
Fig. 10	Bozdoğan, 2001 (left); Orel and Çeçen, 1939 (in the middle); Yılmaz at al., 2015 (right)
Fig. 12	Hasol, 2017 (in the middle and down); Erbilen, 1937 (up)

Biography

Alev Erarslan, Assoc.Prof.Dr., art historian, completed her university education at Istanbul University, Faculty of Letters, Department of Near Eastern Languages and Cultures. She carried out her master degree on Mesopotamian Vernacular Architecture, in the Department of History of Art at Istanbul Technical University. She earned a doctorate degree in the Department of History of Art at Istanbul Technical University on urbanization processes in Anatolia. She has been actively involved in various survey and archeological projects being undertaken by the universities archeological institutes. Erarslan continues to study the rural and vernacular architecture of Anatolia. She is currently an associate professor at the Department of Architecture at Istanbul Aydın University, Faculty of Architecture and Design.

This is a single author study and all contributions were made by the author herself.

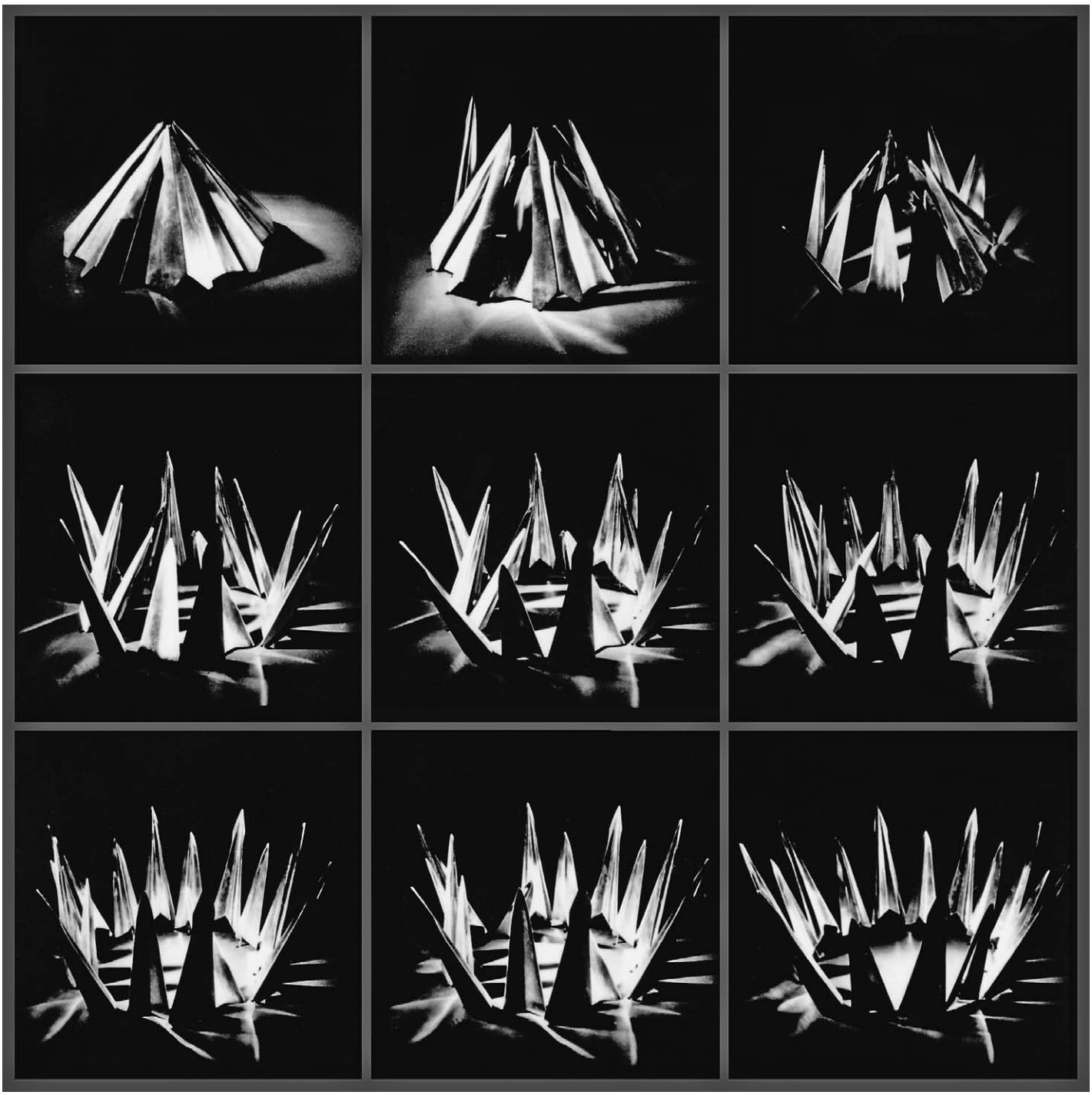

Fig. 1 Church of St. Peter in Split, Andrija Mutnjaković, 1970

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Conceptual Definition of the Term Experimental Architecture

Ambiguity of Terminological Attributions

EXPERIMENTAL ARCHITECTURE
FUTURIST ARCHITECTURE
PAPER ARCHITECTURE
RADICAL ARCHITECTURE
UTOPIAN ARCHITECTURE
VISIONARY ARCHITECTURE

Academic literature lacks an unambiguous term to describe architectural and urban planning projects that are borderline feasible, firmly bound to reality but simultaneously also liberated from it, representing an inevitable component of the development of architecture as a discipline. This paper analyses the most commonly used terms in literature, illustrating them with examples and setting forth logical relationships between them as well as the context within which they are positioned. At the same time, the research sets the relationship between Croatian and international experimental architectural practices.

Introduction

Experimental and exploratory architecture is pejoratively often called paper architecture (Armstrong, 2019: 43), and academic literature offers a variety of adjectives in attempts to describe it: experimental, utopian, radical, futurist, visionary, etc. It is, therefore, unsurprising that sometimes several terms are used in the same text:

"...Earning a reputation as **innovators** and **visionaries**, these **pioneers** convinced their clients that they were involved in **exciting projects**, and some of these practices were transformed into *brands*. At a certain point, the **speculative** aspects of these **experiments**, which suggested ways to transforming society by, for example, providing housing for workers, increasing public freedoms and fostering social solidarity, became tangible and returned **new ideas** to the realm of practice." (Armstrong, 2019: 6; Kaminer, 2011: ch. 6).

An example of the use of various terms to describe an architect and his work in Croatian architectural discourse is Andrija Mutnjaković, whose projects were characterized as **visionary** (Glavan, 1975: 17), and **utopian** (Pasinović, 1969: 31), while he was called a **futurist** architect (Cvetkova, 1991: 4). Mutnjaković first and foremost considered himself a visionary researcher, whose projects are a reality – it is just a question of time when they will be implemented (Cvetkova, 1991: 4). However, when describing his own projects and those by some of his contemporaries, he used the unifying term **experiment** (Galović, 2014: 18).

The research addresses the problem of terminology in the domain of *experimental architecture*, starting from the pluralism of its designations, used both in literature and in projects descriptions written by authors themselves. Given that experimental architecture commonly incorporates an extremely wide domain of social issues, the pluralism of its attributes, often overlapping in their meaning, is a logical outcome. Following that logic, the research attempts to distinguish the conceptual determinants of the used terms for the purpose of better understanding them. The goal of the research is, therefore, a more precise and solid definition of the designator's relationship to the architectural corpus implied by its domain. On the one hand, this is achieved by linking the projects and their accompanying designations through an analysis of contextual levels within which sets of projects are situated, and on the other hand, a cross-comparison of denominators-differentiated groups. The research has been carried out with regard to Croatian architectural practice, establishing its comparative relationship with the culmination of the world experimental architecture of the second half of the 20th century.

Experimental architecture

The term "experimental architecture" was introduced in broader terms by Peter Cook in 1970, in his book *Experimental Architecture*. At the very beginning of this work, Cook debates the impossibility of comprehensive and simultaneous prediction of the future in a broader field, and thereby also the possibility of fruitful discourse that would be prompted by architectural thought or a project which clearly set limits on experimental architecture. Experimental projects generally deal with one aspect or a narrow facet of the future, while even in projects that are called experimental, Cook saw a major difference between the import of an image or form and the fundamental idea which precedes it. The discussion is dominated by a simplified view in which each new idea in architecture must result in a new form and vice versa, thus precluding any serious debate about experimental architecture, as Cook summarizes: "There is no real experiment, only built form which is unorthodox, or drawing which is unfamiliar" (Cook, 1970: 29).

Lebbeus Woods, an architect and founder of the Research Institute for Experimental Architecture, concludes with regret that experimental architecture has all but disappeared. According to Woods, today, there is little architecture or design that truly experiments, i.e., that plays with the unknown. The single

defining feature of an experiment is that no one knows what its outcome will be. The experimenter is looking for something, has a hypothesis to prove, but ultimately everything may result in something unexpected. Architecture is averse to this kind of risk (Woods, 2015: 34).

For Rachel Armstrong, a scientist and a pioneer in developing design based on "living technologies", experimental architecture is a visionary branch of architecture and a form of practical research. In a series of different projects, Armstrong explored how interdisciplinary experimental practice changes architecture as a profession. Designs that can be described as closest to the concept of experimental architecture are those in which implementation entails the use or implies an intention to use new technologies and materials that are produced and tested, their properties observed as potential future construction materials, etc. Results of such research and experimentation with, for example, living programmable organisms that have certain architectural properties, become tools for new, similar research. For Armstrong and her associates, the experimental component largely proceeds in laboratory conditions, which classifies her work as an experiment virtually by definition. Even though results of these experiments are only the beginning of something that certainly awaits us in the future, for now one may say that the experiment mostly pertains to the discovery of new construction elements, which are in this specific case based on living organisms, programmable, ecological, etc. (Armstrong, 2019: 49-50).

In the interview "Design in the Digital Age" (Goldberger, 2014), Rem Koolhaas states that architects create the uniqueness in a very repetitive world and that materialized architecture is always the "beta version", pointing to the developmental and research component of the discipline.

Several decades earlier, an internationally renowned Belgrade professor, architect, and theoretician Ranko Radović asserted that each valuable work of architecture was simultaneously in and of itself a sort of experiment, i.e., high-risk research. Uncertainty, an attempt, is inherent to large-scale architecture; the wings of the new, untested, are visible (Radović, 1969: 25).

By definition, an experiment is a procedure involving controlled observation and measurement of phenomena that is conducted in order to verify a scientific hypothesis as well as something that is experiential, exploratory, grounded in experience, confirmed by testing (Anić et al., 2002: 355). Insofar as we should attempt to literally translate such a definition into the language of architecture, this would imply those projects that have nonetheless been implemented either in whole or in part in order to record certain observations, results or reactions. Since the physical implementation of experimental projects is generally not even contained in the basic idea of the project's creation, rendered designs that would correspond to this definition of experimental architecture are relatively few in number, just as their scale is small. Such examples are most often ephemeral and implemented using simple materials and tools. These are frequently pneumatic and similar constructions that are not financially demanding, so their designers were able to implement them on their own. Authors such as Ant Farm have even published handbooks of a sort for constructions based on their own experiences and observations (Ant Farm, 1971). There are examples in interiors, smaller residential units (domes, modules, etc.) but also at larger scales, among the pavilions for the World Expo, containing more complex structures and sizes.

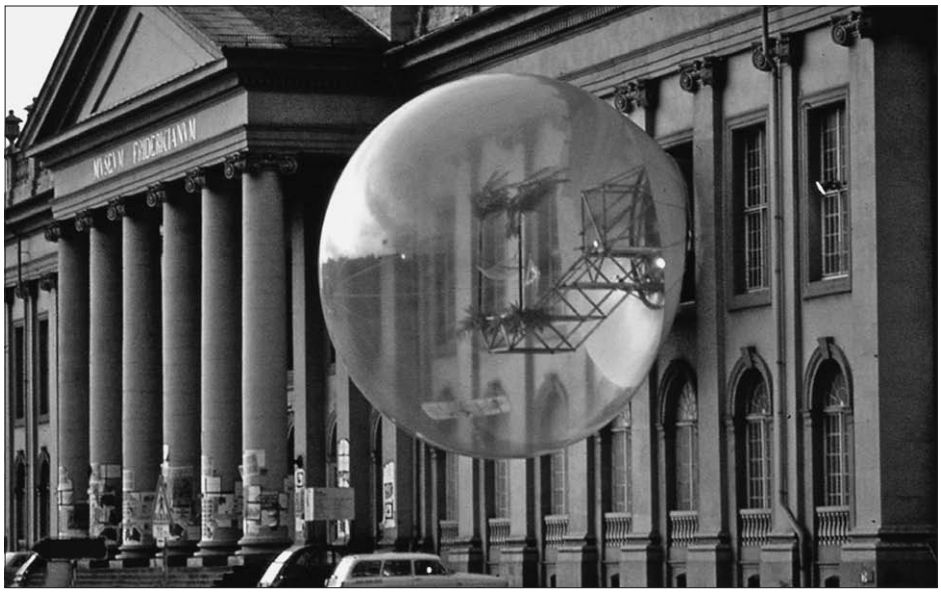


Fig. 2 Oasis no. 7, Haus-Rucker-Co., 1972

An example of such an ephemeral project was the Oasis no. 7, installed on the façade of a building as part of the Documenta 5 exhibition in Kassel (Fig. 2). Like many other projects by the Austrian architectural collective Haus-Rucker-Co., this was also a temporary architectural intervention in which the basic element was a transparent, inflatable structure with a diameter of 8 m. Utilizing small scale and carefully chosen materials, this structure was oriented toward the bodily experience of the individual inside, and the examination of new possibilities for communication between architecture and the city and

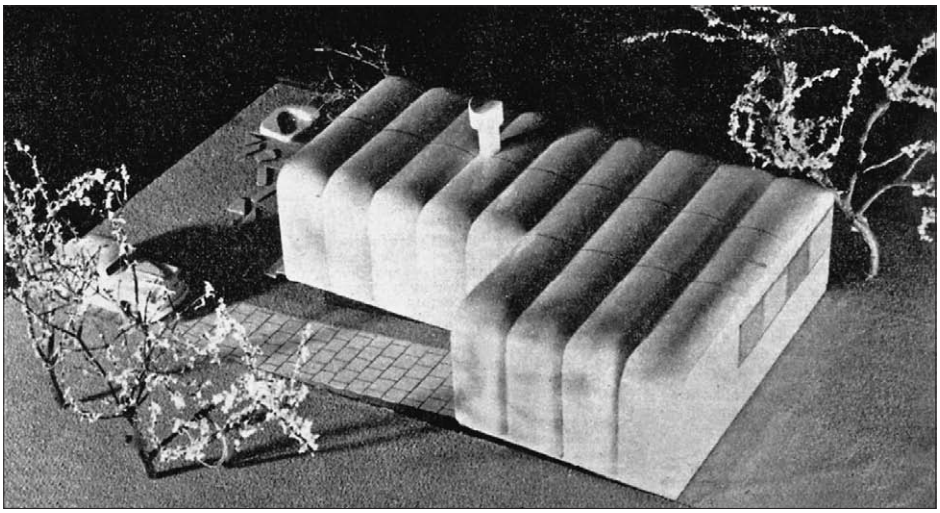


Fig. 3 Synthetic house, Juraj Neidhardt, 1966

citizens outside. These projects, thanks to the simplicity of their rendering, made it possible for the interaction between people and their environment to assume new meanings and alter our understanding of the physical environment through a new sensory experience.

Another project that emerged as a genuine experiment related to the context of Croatian architectural practice was the Synthetic House by Juraj Neidhardt in 1966. This project constituted an attempt to respond to the high demand for new housing units by means of inexpensive production of prefabricated individual family homes with the aid of the "material of the future" (polyester). In the execution of his idea, Neidhardt sought the assistance of the Materials and Construction Testing Institute in Sarajevo and the Construction Institute in Zagreb. The elements were crafted and tested in Zagreb (Fig. 3). Neidhardt himself confirmed that this was truly an experiment when he said: "...If this campaign succeeds..." – clearly indicating that the outcome was uncertain, and added that: "This will, however, require much more persistence and experimentation" (Neidhardt, 1966: 4).

Starting from opposite premises, yet both experimental in essence, projects Oasis no.7 and the Synthetic House illustrate the broad domain of the concept of architectural experimentation.

Utopian architecture

Another oft-used term is utopian architecture or utopian project. The term "utopia" designates any unattainable idea, dream, fancy or aspiration to overcome actual reality and build a new, ideally conceived reality from individual elements. Furthermore, utopias are distinguished from unrealistic efforts (fantasies) by the logical tie between actual phenomena, causes, conditions and constants (Grubiša, Tatarin, 2015). The term's definition points to the conclusion that the achievement of utopian projects is impossible.

The view that the realization of utopias is impossible is also shared by the sociologist R. Levitas, an important researcher of utopias. She observes that a colloquially understood utopia contains two meanings: a good, but non-existent and therefore impossible, society. In the same book, she further observes that many problems which beset utopian scholars arise from the absence of a clear definition of the term which would separate its specialist academic use from the meanings present in everyday language (Levitas, 1991: 2).

Utopias foresee improved living conditions which should replace the current ones, which is why their concern is narrowly linked not only to the future, but also ensues from the present and past. Given their ties to past events and places, as well as the present ones, and the attempt to respond to them, this is a far more complex process than the conventional view of utopia as the simple invention of a "new approach" (Coleman, 2007: ch.2,11). That the term utopian is understood very broadly is confirmed by R. Martin who talks about "ghosts" or outlines of utopia, seeing utopia as an event; recurring historically as a thought rather than as a thing, a place, or even an ideal (Singh, Martin, 2013: 80). Spanish architect Miguel Fissac considered architectural utopia a source of creativity, but with the caveat that an architectural utopia must follow an authentic orthogenesis like any project that shall be implemented tomorrow (Fissac, 1975: 14). Thus, in his view the utopian project is one for which there is no intention of realization.

In his book *Hrvatska arhitektura dvadesetog stoljeća – Neostvareni projekti* [Croatian Architecture of the 20th Century – Unbuilt Projects], Croatian architect and theorist Tomislav Odak called Le Corbusier's Plan Voisin an urban planning/architectural utopia that Le Corbusier himself never believed would be realized (Odak, 2006: 12). In the book *Utopijske vizije arhitekture grada* [Utopian Visions of the Architecture of the City] by Croatian architect Ivan Juras, most designs are unrealized projects, demonstrating that for that author, the concept of utopian is closely linked to the unbuilt (Juras, 1997). With the passage of time, from the moment they emerge, projects are more easily declared utopian, such as, for example, the Synthurbanism by Croatian architect Vjenceslav Richter (Fig. 4), which belongs to the group of techno-utopian urbanisms or urban utopias (Kulić, Mrduljaš, 2017: 120). However, Richter

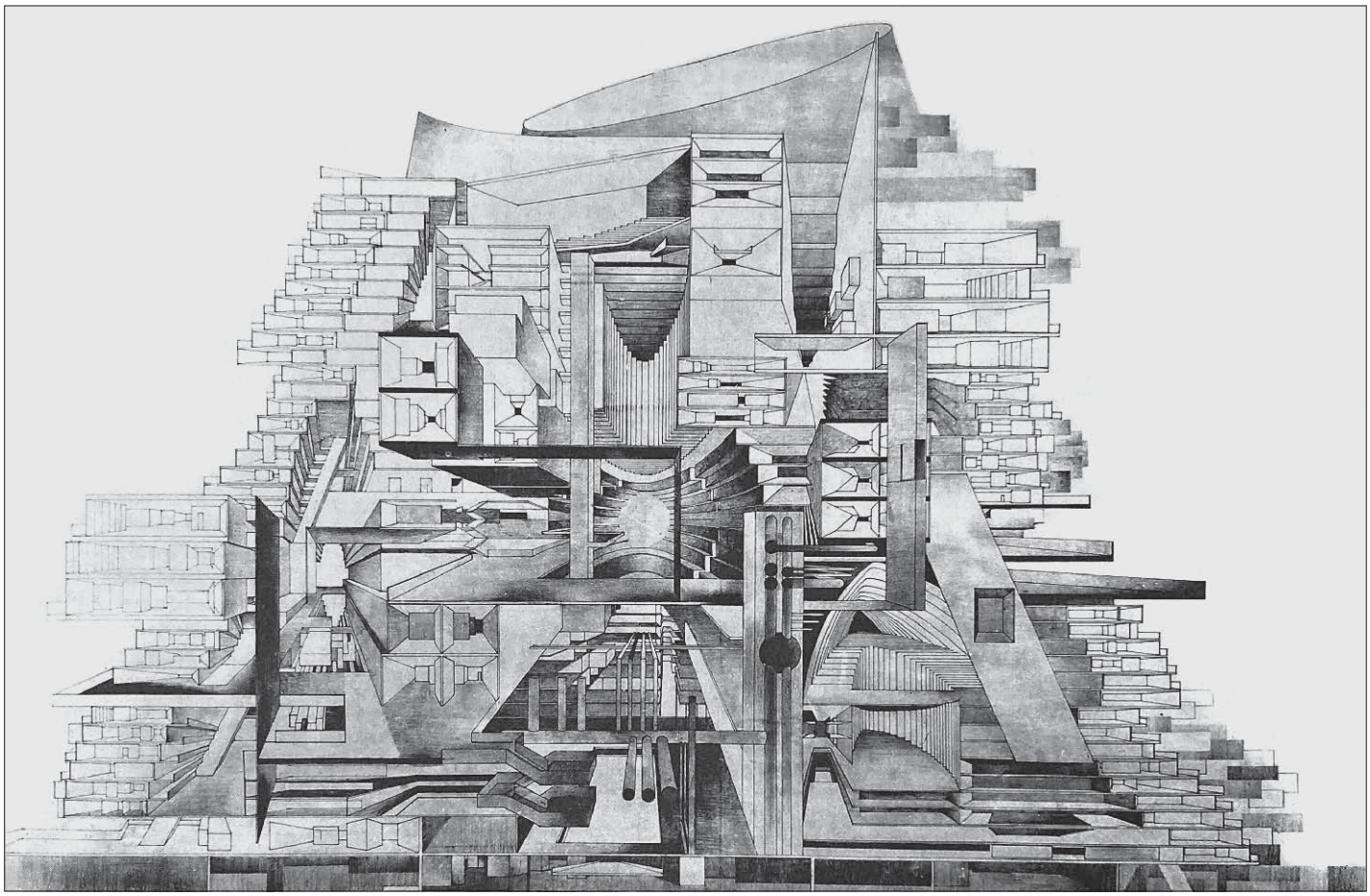


Fig. 4 Synthurbanism, Vjenceslav Richter, 1964

himself insisted on the opposite, and he only expressed his suspicion in the feasibility – and only temporary so – in the subsequent phase of Synthurbanism with rotating ziggurats in the Heliopolis project (Richter, 2016: 24).

The opposite of utopia is dystopia, so when interpreting his vision for the city of the future, "Ecumenopolis", Constantinos Doxiadis drew a distinction between the concept of utopia as a non-place and eutopia (or more precisely eftopia) as a good place, with dystopia on the other side of the spectrum, as a bad or dreadful place (Doxiadis, 1968: 32-33).

Besides the concept of utopian architecture, it is essential to mention the ideal city as a sort of an attempt to implement the utopian idea of an ideal society in a physical framework (Fig. 5; Mutnjaković, 2003: 232). The combination of utopia and the ideal city have resulted in models of cities that, even today, we look up to with awe (Rowe, Koetter, 2003: 14).

Radical projects

Radical implies indispensable and thorough changes (Anić et al., 2002: 1202), so even in architecture we come across terms such as: radical urban visions (Kulić, Mrduljaš, 2017: 120) for Vjenceslav Richter's project Synthurbanism, which utilizes means and proposals significantly different from customary urban planning practices. Architects who re-examine existing conventions and offer radical solutions assume a special place in the history of contemporary architecture, and exhibitions such as "Radical Architects, 1960-75" have been organized (Dellale, 1996: 54).

Lebbeus Woods wrote about how the term radical once referred to paradigm shifts and important changes in theory and practice that contributed to human progress but is today associated with various extremist (terrorist) movements that undermine the social order. Architecture, as one of the instruments that reinforces the social order, thus loses the possibility of proposing radical programs and modes of use, while radical forms are as always welcome (Woods, 2015: 33).

In architecture, the term radical is associated with the late 1960s and groups such as Archigram from London and Archizoom and Superstudio from Florence, as representatives of

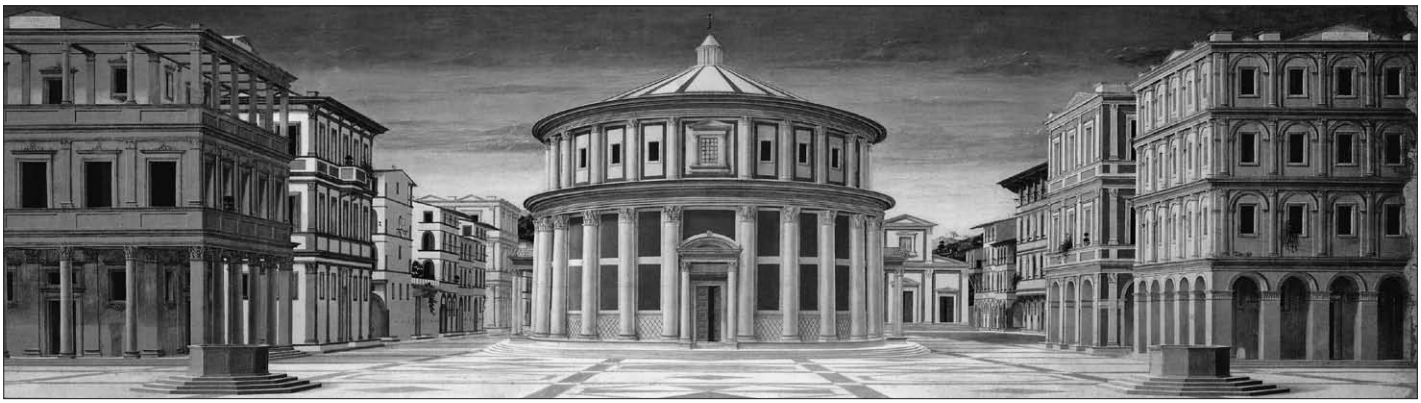


Fig. 5 Ideal city, Lucijan Vranjanin, 15th c.

Radical Design. The Radical Design Movement exhibited a desire similar to Speculative Design, representing a vision of a possible future as a means of criticism and provocation. They perhaps differed with regard to their motivation. Radical design wanted to break with the past, while speculative design demonstrates a more critical stance, present in its visions of projected futures (Smyth, Auger, Helgason, 2021: 24).

Speculative projects

What all of the thus far considered projects and the various designations that characterize them have in common is that they foresee a specific future and offer solutions in the form of projects in line with their postulates. However, predictions of the future have almost as a rule been proven inaccurate, particularly with regard to technology. Today, the term speculative is generally associated with design which uses visions of potential futures as tools to better understand the present and debate versions of the future that people want and those that people do not want (Dunne, Raby, 2013: 2). Even though the aforementioned architects, gathered in Archigram, Superstudio and Archizoom, operated for a relatively brief period, the radical architectural speculation by these teams is today becoming ever more relevant (Smyth et al., 2021: 24).

Visionary projects

Visionary projects are by definition classified in the speculative group because they imply a certain living notion of what should happen or be created. In the figurative sense, this is a conceived or foreseen objective that the individual or group intends to achieve in the future (*** 2021). If the definition is considered exclusively through the prism of the feasibility of implementation, then in architecture this would cover projects that could not be carried forward when they were conceived due to technological, political, economic or some other reasons, but were implemented as a whole or in part subsequently, when the necessary conditions were met. An older example that corresponds to such a notion of visionary architecture is the Ideal City (Functional City) in two levels by Leonardo da Vinci from 1488, in which canal transport for the populace and craftsmen would be divided from roads for the nobility, a sewage system would be introduced, etc. In other words, he quite ingeniously anticipated traffic segregation in the cities of the future (Radovic, 1969: 25). As under current conditions criteria for the feasibility of implementation are no longer dictated as much by technology, it is other factors, economic or social, that determine what is visionary or not (Drexler, 1963: 4).

In Croatian architecture, one of the oft-cited examples of a visionary project is the Outdoor and Indoor Swimming Facility on the site of Delta in Rijeka by Vladimir Turina, Ivan Seifert, Ninoslav Kučan and Zvonimir Radić from 1948 (Kovač et al., 2020: 330). Even though it was conceived as a theoretical project (Čerina et al., 1997: 71), it was elaborated in great detail, foreseeing what were at the time non-existent technologies that are today standard in construction. A lesser known example is the design for the Church of St. Peter in Split from 1974 by Andrija Mutnjaković which, according to the architect, came near implementation in 1980 for the needs of the Olympics in the then socialist Soviet Union, albeit no longer as a church, but rather a cultural hall (Fig. 1; Čerina, 2021).

Futurist projects, or projects of the future

Futurist projects are essentially speculative, but their focus is generally future based on technological development and possible social changes that run parallel to technological progress (*** 2021). Futurist projects (Fig. 6)

may be associated with futurology, which, among other things, aims at scientific prediction and research into the future of the human community based on the objective facts of the present day, in order to deliberately, consciously and purposively impact humanity's future (Keller, 1973: 19).

Here a distinction should be drawn between futurist projects turned to the future and the artistic movement called Futurism from the onset of the 20th century, in which architecture eschewed everything old while extolling the advancement of technology, transportation and speed and viewed cities as being in constant motion.

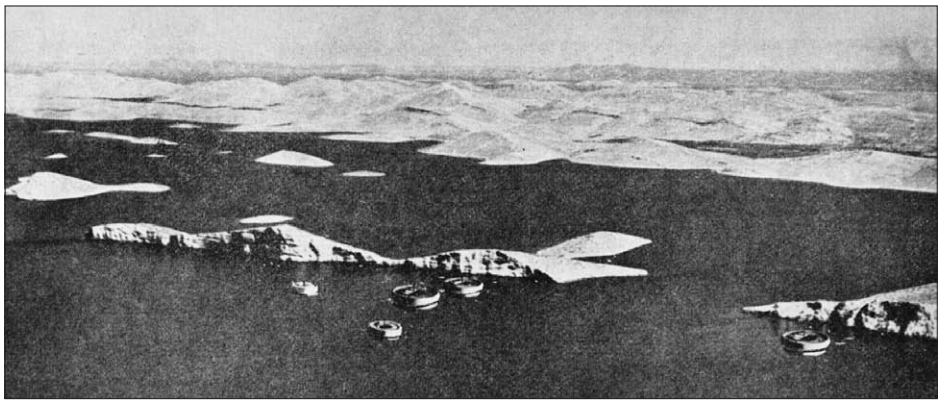


Fig. 6 Hydroid, Vojtjeh Delfin, 1966

Intentional architecture

The term intentional architecture is associated with the titles of two exhibitions held in Wrocław, Poland, "Terra-1" in 1975 and "Terra-2" in 1981, organized by Polish architect Stefan Müller with the sub-title: "International Exhibition of Intentional Architecture." Participants from the entire world were invited to the exhibition to contribute to its theme: "the relationship between art, science and technology as a social development factor of our era" (Duda, Rutkowski, 2011: 42). The term "intentional architecture", which has been attributed to Müller, contains within itself a utopian component and primarily implies pure architecture, liberated from all material limitations, reduced only to ideas and thoughts (Lisowski, 2011). Stefan Müller claimed that the material limitations that exist today may not be limitations in some near future (Duda, Rutkowski, 2011: 43).

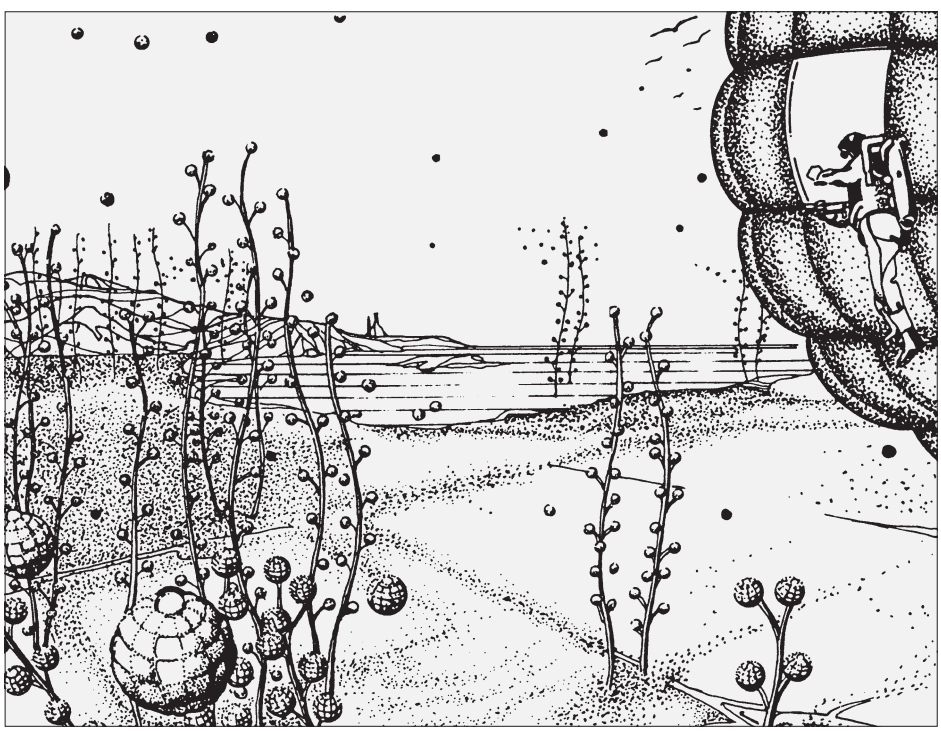
Andrija Mutnjaković also took part in both exhibitions by invitation with the project *Domobil*/Homobil at the first exhibition and the floating house project called *Kokonplan*/Cocoonplane at the secondone (Mutnjaković, 2018: 8; Fig. 7).

One may conclude that these are projects that do not necessarily have their point of departure in some common theory or orientation, rather they can be autonomous architectural ideas. However, even the term "intentional" is very broad and virtually encompasses every idea or project, because all projects are a result of the creator's thoughts and intentions.

Paper architecture

Paper architecture, like the terms analysed previously in the text, encompasses architecture that often cannot even be constructed, but which has always been the primary laboratory of architectural thought (Blažević, 2015). By the same token, the term paper architecture does not mean that the medium by which an architectural idea is presented must exclusively be paper. It implies all other forms of presentation of theoretical texts, engaged performances, campaigns, educational initiatives, film and video, etc. The expression paper architecture is used by many scholars, but perhaps the most precise definition was provided by Tahl Kaminer: "Paper architecture is the most explicit form of architectural autonomy, reducing architecture to its own medium – the drawing – and bypassing the building, the end-product of design which does not solely depend on the architect but also the investment, engineering, regulations and contractors. Actually, the very existence of paper architecture offers "evidence" that architecture is not situated in a building itself, but rather in an idea, in a project." (Kaminer, 2011: ch.1).

Fig. 7 Cocoonplane, Andrija Mutnjaković, 1981



Conclusion

There is no uniform term that would encompass all categories of projects included in this overview, and frequently several terms are used for the same projects, particularly if texts by different authors are considered. The meaning of terms and their relationship to the relevant projects often overlap, while their use depends on the specific aspects of the project itself, or the problem-oriented discourse instigated by the project. The authors of projects use different terms under different circumstances to describe their projects, or they accept terms that others use. Even though they use terms that underscore the fact that the project will likely never be implemented, in many cases the architects believe in the force and feasibility of their ideas, and that which stands in the way of implementation is technology, money, politics and social will, etc.

The terms used, however, do not fall into the same conceptual category and the heterogeneity of their origin contribute to their overlapping meanings. While some relate to the nature of the proposed intervention (experimental, speculative), the others enter the domain of the proposed content (utopian, ideal) or its specific characteristics (visionary, futuristic). Some of the terms are institutionalized through recognizable gallery practices by which they are strongly determined (radical, intentional).

What should be considered is that the observed attributes used by different authors could be aimed at directing the reader into the particular narrative of the text itself, hence set without a crucial critical stance toward the nature of the signified. Therefore, their uncritical acceptance could be misleading. Merely the application of such simplified attributions is insufficient for an in-depth study of experimental architecture, where it is necessary to deeply reexamine the relationship between the signified and the signifier, that is, the characteristics inherent to the projects and the terms used to describe them. Further on, while observing Croatian experimental architectural practices, it is necessary to consider the particularities of the context within which they are developed, and the causes of their distancing from or overlapping with world trends. Those facts could be taken as a direction for further research.

The term experimental project, although it cannot be simply superimposed upon architecture in the sense of its definition, encompasses the broadest spectrum of projects because it has no ideological, temporal or other determinant, but rather implies architectural research in the broadest sense of the word.

[Translated by Projectus grupa]

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Sources of illustrations

Fig. 1 Mutnjaković, personal archive
Fig. 2 Available at: https://www.spatialagency.net/database/haus-rucker-co (accessed: 8 September 2022.), adapted by authors
Fig. 3 Neidhardt, 1966: 4
Fig. 4 Archive of Vjenceslav Richter, Museum of Contemporary Art, Zagreb
Fig. 5 Mutnjaković, 2012: 158
Fig. 6 Delfin, 1967: 9
Fig. 7 Mutnjaković, 1981: 3

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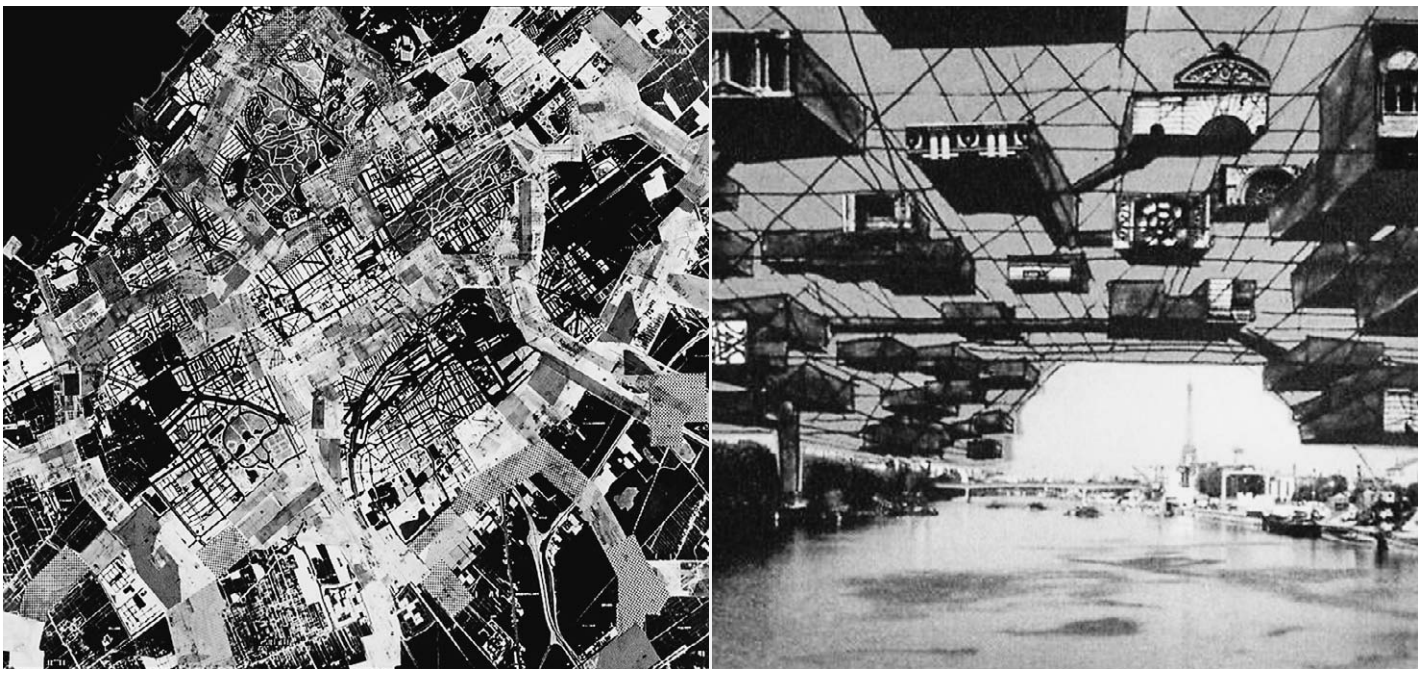

Fig. 1 left: Experimental architectural projects of the 60s – Constant, ground plan of New Babylon over the Hague, 1964;
right: Yona Friedman, collage on a postcard visualizing a Spatial City over Paris, 1960

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Temporary Urban Interventions in Public Space

PUBLIC SPACE
TEMPORARY URBANISM
TERRAIN VAGUE
URBAN APPROPRIATION

Insufficient research on the typology of temporary urban interventions, which has become a common tool for pointing out possible scenarios in the development of unused and neglected urban areas in recent 21st century projects, indicate the relevance of the article's topic. A literature review has allowed for a definition and analysis of the typology of temporary urban interventions in order to determine their basic characteristics, the relationship between the intervention and public space, and the establishing initiatives. The paper determines the formative period through an analysis of architectural and artistic events in 20th century and distinguishes three direct predecessors: events in public space, experimental architectural projects of the 60s, and art installations in public space in the second half of 20th century. A synthesis of collected data is an important prerequisite for understanding the role and impact of temporary urban interventions on future public space. Based on the obtained results, the research emphasizes the importance of the relationship between temporary urban interventions and public space for the creation of contemporary urban space in 21st century.

INTRODUCTION

The typology of temporary urban interventions inaugurates the concept of temporary engagement of public space throughout history and, accordingly, transformations in its expression and role. The relevance of the topic can be found in the insufficient research on the typology of temporary urban interventions, which has become a common tool for pointing out possible scenarios for the development of unused and neglected urban areas in recent 21st century projects. Also, the absence of a single definition of temporary urban interventions in public space and their confusion with other temporary occupations[1] presents a stimulus for further research.

A literature review has allowed for a definition and analysis of the typology of temporary urban interventions in order to determine their basic characteristics, the relationship between the intervention and public space, and the establishing approach. The paper determines the formative period through the analysis of architectural and artistic events in 20th century and distinguishes three direct predecessors: events in public space, experimental architectural projects of the 60s, and art installations in public space in the second half of 20th century. An analysis of recent contemporary trends in the last 20 years raises new questions about the role of temporary urban interventions in the modern city.

A synthesis of collected data is an important prerequisite for understanding the role and impact of temporary urban interventions on future public space. Based on the research results, the paper states the importance of a meaningful use of this typology in the public spaces of the contemporary city.

TERMINOLOGY IDENTIFICATION OF TEMPORARY URBAN INTERVENTIONS

TEMPORARY URBAN INTERVENTIONS – TERM ANALYSIS AND BASIC FEATURES

Temporary urban interventions are identified within the broader term of temporary urbanism, which implies short-term initiatives for a temporary transformation of marginalized and neglected urban spaces, both programmatically and spatially. In contemporary literature (Oswalt et al., 2013: 151; Löwstett, 2018: 20; Lehtovuori, Ruoppila, 2012: 34; Lehtovuori, Ruoppila, 2017: 54-55), the term temporary urbanism refers to various movements such as tactical urbanism, open-source urbanism, and everyday urbanism. The wide range of interpretations and the speculative nature of the term 'temporary' make it difficult to determine its definition, but many authors emphasize the key definition of temporary urbanism as a pre-planned and time-determined process of temporary use of space (Lehtovuori, Ruoppila, 2012: 30; Lehtovuori, Ruoppila, 2017: 49-50). Despite this, the concept of temporary use of space does not exclude improvisations in the form of spontaneous spatial and programmatic adaptation, or changes of predetermined duration (Oswalt et al., 2013: 52-56). Accordingly, the concept of temporary urbanism also includes informal and spontaneous daily occupations of space, as well as events of an impulsive nature and ambiguous value. Since these events are very difficult to record and observe within relevant research resources, this paper is exclusively focused on temporary urban interventions with clear criteria of spatial and programmatic articulation, duration, and purpose. The mentioned criteria are essential for the typological classification of temporary urban interventions, as stated by many authors (Oswalt et al.; Haydn, Temel).

The basic characteristic of temporary interventions is often simple, modular, prefabricated construction and a short period of presence (Hollander et al., 2009: 15; Hentilä, Lindborg, 2003: 3; Crowther, 2016: 69-72), but different interpretations are subject to variable patterns of duration and materialization. In addition to the term temporary intervention (Oswalt et al., 2013; Bishop, Williams, 2012), Pogačar (2014) uses the term

1 Eg. performance

2 Guerilla urbanism, Pop-up urbanism

urban activator, defining it as an accessible tool for brief space reorganization, as well as for examining the relevance and success of future long-term projects. Temporary urban interventions distinguish variation in scales and presence: from isolated point structures – pavilions and site-specific interventions to interventions that encompass a city block or even an entire neighbourhood (Boháćová, 2012; Robinson, 2013). Depending on the manner of deployment of a certain space, the dynamics of temporary interventions can be unique and repetitive, as well as migrating if a certain typology of the intervention appears in several different locations over time.

Concerning the type of placement in the surrounding context, we distinguish temporary interventions in the urban and those in the natural landscape. Installations of emphasized artistic significance and authorship, such as various land art and earthwork projects by artists are most typologically linked to the natural landscape (Scholte, 2022). In the urban environment, relationships are more complex and programmatic; therefore, we distinguish many types of temporary interventions such as festival events, temporary installations for trade and representation, and temporary interventions as an extension of the public space. This text shall focus on temporary interventions in the urban landscape, due to their more complex structure and the relationships they establish with the surrounding urban fabric.

According to the terminological and theoretical analysis of various authors, for the purpose of this research, a temporary urban intervention is defined as a spatially and programmatically determined object or a system of objects that changes the existing urban conditions for a short and predetermined period and is dismantled or displaced to a new location after the expiration of the specified time.

Top-down and bottom-up establishing approaches

Participation in temporary urban intervention projects can be divided into two groups concerning the establishing initiative (Oswalt et al.; Haydn, Temel). The range between sanctioned and non-sanctioned initiatives of temporary space occupation varies between top-down and bottom-up approaches.

The top-down approach represents an institutionalized and legally determined initiative for making and implementing decisions from an organized administrative or political position. As such, it is still one of the most represented methods of space management (Löwstett, 2018: 20-21), but it is often criticized for the lack of valuable dialogue and democracy in decision-making.

The bottom-up approach originates in the "Theory of Communicative Action" by the German philosopher and sociologist Jurgen Habermas (1981). His work points to the participation of the individual and the engagement of unconventional interest groups through the principle of participation in decision-making (Pogačar, 2014: 190-193), which results in many alternative fractions.[2]

Over time, these two approaches have alternated in an attempt to revitalize urban areas through temporary urban interventions. The combination of the two mentioned approaches, which implies mutual participation and a high degree of democracy, has proven to be the most effective model for public space appropriation.

Historical overview and formative period

The concept of temporary as an integral part of urban ritual throughout history

The concept of a temporary event follows the evolution of cities and dynamizes their role throughout history. Festivals, religious rituals, and demonstrations have been a part of urban life since the very beginning, and as such represent an introduction of the idea of the temporary into public space. Military and religious anniversaries, fairs, and ritualized commemorations of important events characteristic of the Middle Ages and Renaissance were accompanied by a temporary transformation of the cityscape through an architectural intervention and scenography (Sotelo, 2013: 14). The concept of the city as a stage for events has transformed the public into an audience, and the public space into a platform for temporary spectacle. A common characteristic of the mentioned historical tendencies until the beginning of the 19th century was the organizational initiative, which was almost always highly institutionalized by political or religious representatives of power (Sotelo, 2013: 16).

Continuing with the development of the concept of temporary urban interventions through history, contemporary discourse in the organization of temporary events can be observed through a set of 20th century events.

Formative period

Analysing events throughout 20th century and synthesizing the obtained results makes it possible to distinguish conceptual and typological precursors of temporary urban interventions in public spaces. This paper clas-

FIG. 2 ORGANISED EVENTS IN PUBLIC SPACES – EXPO WORLD EXHIBITION, BRUXELLES, 1958

sifies the tendencies that initiated the typology of temporary urban interventions into three groups:

1. Organised events in public spaces – The idea of temporary urban interventions follows the tradition of the great world design exhibitions and fairs[3] which presented the pavilions of world-famous architects under controlled conditions. The emphasis was on their spatial expression and dominant phenomenology in which the environment and architecture interfered.

The peak of the tradition of temporary events in the context of great world exhibitions occurred at the beginning of the twentieth century, when, thanks to rapid technological progress, it became easier to achieve the desired narrative and experiential sensation in space. Large urban venues within cities were prepared to host representative pavilions and spatial interventions of the world's leading countries. The festival spirit also occupied other areas of the city, where individual urban interventions appeared in the form of impressive visual and experiential effects of sound, water, and light. Festivals were a form of entertainment, but they also pointed to the power of design in creating new types of urban experiences (Bonnemaison, Macy, 2008: 215-216). The mentioned tendencies underline the possibility of understanding the city being transformed from an object into a participatory subject.

However, the rigid urbanism of modernism in the first half of the 20th century did not allow the development of urban spatial experience. The modernist city of the first half of the 20th century was based on the doctrine of functionalist urbanism, rational organization, and universalism (Kostrenčić, Jukić, 2020: 157). Public space was characterized by the logic of separation and passivity, which created a modernized version of the pastoral: a spatially and socially segmented world with a clear division of people, traffic, housing, rich and poor (Berman, 1983, cited in: Elliott, 2009: 9).

The accumulated mechanism of spatial standardization caused by globalization led to the creation of non-places[4], anonymous spaces without identity (De Clercq, 2001: 20). The revolt against such practices was stated in various literature of that time (Riesman, 1950; Jacobs, 1961; Lefebvre, 1968). Accumulated disappointment with such an ideology produced major changes in the second half 20th century forever changing the urban perception (Fig. 2).

2. Experimental architectural projects of the 60s – Accumulated criticism of society and the city led to the establishment of new tendencies in the 60s of 20th century, emphasizing the resumption of the relationship between man and the environment. Experimental architectural and artistic projects reflected the radical environment of the psychedelic sixties. It was a turning point in the liberation of the rigid rules of modernism and the aspiration to create a spatial experience. The city became a stage for events and experiments. Both in architecture and public space, the theory of the open work[5] as a participatory and never-completed design process was inaugurated, and architects such as Oskar Hansen and Aldo Van Eyck explored it through their projects. These particular tendencies are the direct predecessor of the concept of temporary use (Büttner, in: Oswalt et al., 2013: 139-147; Ferreri, 2014: 4).

Across the world, groups of enthusiasts and organized intellectuals, designers, and artists called for a paradigm shift. In England, new urban ideas rested on the Archigram group. Using collage methods of real and imaginary, associations taken from current pop culture, and intuitive technological utopias, Archigram created dynamic and progressive hi-tech projects that united the concept of change, movement, and temporality[6] (Swyngedouw, 2002: 155). At the same time, the Italian group Archizoom operated in the sphere of Counterdesign[7], creating critical and ironic utopian projects of a specific artistic expression with a combination of carica-

3 World Expo, Biennale

4 The term non-place was established by the French anthropologist Marc Auge in 1992 in his work Non-places: Introduction to an Anthropology of Supermodernity.

5 Opera aperta, Umberto Eco

6 Instant City, Blow Out Village, Living Pod

7 "Counterdesign" can be described as a desperate and nihilistic attempt to use one particular feature of architectural expression, with all its cultural values and connotations. It is desperate in that it relies on the weakest of all architectural means, the plan, since we have defined that, by nature, no built object could ever affect the socio-economic structure of a reactionary society. It is nihilistic

ture and absurdity of the existing spatial and social reality.[8] The concept of mobile architecture and capsules, as an alternate form of living, was also studied in projects by Haus-Rucker-Co, Buckminster Fuller, and Yona Friedman.

In France, a group of Parisian artists and Marxist intellectuals led by Guy Debord gathered in 1957 under the name Situationist International (SI). Continuing the Letristic narrative started a few years earlier, the Situationist International re-examined the status of the city in the context of large-scale modernist urban projects, emphasizing the importance of micro-interventions and temporary interventions within the changing urban environment. In the model of unitary urbanism, public space is identified as an autonomous surrounding of play, conflict, and spectacle (Swyngedouw, 2002: 159-160; Ellin, 1999: 310). Guy Debord and Constant Nieuwenhuys are the pioneers of today's theories of urban activism. While Debord's capital work The Society of the Spectacle (1967) deals with the symbolic and cultural aspects of the urban imaginary of the city and its global consequences, Constantin's New Babylon refers to the power of an individual when experiencing a continuously transforming urban utopia that accommodates the changing social flux in the form of a superstructure (Elliott, 2009: 24-25). In his Introduction to the Critique of Urban Geography (1955), Debord describes the intention to create an integrated urban environment without the boundary between public and private, work and leisure[9], advocating research into the impact of the environment on human emotions and behaviour[10] (Ellin, 1999: 310). These concepts contrast the logic of efficiency and instrumentalism of the capitalist system with the complexity of an individual's life in a modern city (Schrijver, 2011: 2).

Due to their experimental character, the presented events have forever changed the rigidly established relations of modernism and inaugurated the concept of temporary and ephemeral impulse that provokes the existing spatial and programmatic relations (Fig. 1).

3. Art installations in public space in the second half of 20th century – The paradigm shift of the 60s outlines the reorientation of contemporary artistic practices in the direction of artwork deconstruction and its transition from the art gallery to public streets and squares (Bonnemaison, Eisenbach, 2009). Art installation typology is inaugurated as a dynamic process of space engagement, in which physical environment influence on art installation creation is particularly emphasized. This heterogeneous art form primarily includes architecture, and artistic practices such as constructed situations, performance art, and happenings[11] (Zečević et al., 2015: 387).

Fig. 3 Art installations in public space in the second half of 20th century – left: Haus-Rucker-Co: Oase Nr. 7 (Oasis No. 7), Kassel, 1972; right: Christo and Jeanne-Claude, The Pont Neuf, Wrapped, 1975-1985

Such art installations appeared as temporary interventions in public spaces around the world, as part of organized urban initiatives such as Campo Urbano in Como in 1969, yearly exhibitions such as Documenta in Kassel, or as individual initiatives. This typology also includes many land-art projects by architects and artists who place their interventions within natural landscapes or urban scenery, such as Walter de Maria, Mary Miss, Gordon Matta Clark, Alice Aycock, and Christo and Jeanne Claude.

The aforementioned tendencies are part of the 'research process in art'[12], which refers to the legitimization of art in setting and solving certain problems rather than in creating an object of aesthetic reflection (Zečević et al., 2015: 388). In these projects, ephemeral works served as research tools, generators of meaning, vehicles to involve the community in the design of their public spaces, and a way to create a culture of long-term civic engagement. (Bonnemaison, Eisenbach, 2009: 170; Fig. 3).

Revolutionary enthusiasm and experimental projects of 20th century enabled the inauguration of new concepts of the possible temporary use and value of public space, and are a direct influence on today's events in public space. However, the mentioned tendencies were focused more on the internal concept

in that its only role is to translate the pessimistic forecast of the intentions of the holders of financial power into an architectural statement. (Tschumi, 2004)

8 No Stop City, Continuous Monument

9 Unitary urbanism

10 Psychogeography

11 Alan Kaprow coined the term happening to describe the events he organized as integration of all elements – people, space, particular materials and character of the environment, and time. In: Michael Huxley and Noel Witts (2002) *The Twentieth-Century Performance Reader*, 2nd edition, New York: Routledge, p. 264.

12 Pratica artistica come la ricerca, term by Carlo Argan

TABLE I COMPARISON OF THE FORMATIVE PERIOD OF TEMPORARY URBAN INTERVENTIONS AND CURRENT TENDENCIES

	FORMATIVE PERIOD			CURRENT TENDENCIES
TENDENCY	**ORGANISED EVENTS IN PUBLIC SPACES**	**EXPERIMENTAL ARCHITECTURAL PROJECTS**	**ART INSTALLATIONS IN PUBLIC SPACE**	**TEMPORARY URBAN INTERVENTIONS (result based on literature review)**
TIME PERIOD	19th century – Present	1960-1980	2nd half of 20th century – Present	Beginning of 21st century – Present
DURATION	Temporary : Defined	Temporary : Undefined	Temporary : Undefined	Temporary : Defined and Undefined
ESTABLISHING INITIATIVE	Top down	Bottom up	Bottom up and Top down	Bottom up and Top down
IDEA / PURPOSE	Performative, representative	Spatial, programmatic, experimental	Conceptual, aesthetic	Introduction, Redefinition, Intensification
CHARACTERISTICS OF THE LOCATION	Central public space, important and relevant locations	Central public space or nature; important and relevant locations	Central public space or nature; important and relevant locations	Currently underused areas, Areas losing significance, Urban central areas
RELATION WITH SPACE	Passive : Space as stage	Semi-active : Space as participant	Passive : Space as stage	Active : Space as subject and a generator
SPACE IMPACT	Instant : No long-term effect	Instant : No long-term effect	Instant : No long-term effect	Stand-in, Free-flow, Impulse, Consolidation, Co-existence, Parasite, Pioneer, Subversion, Displacement.

than on their influence and interrelation with the space in which they are placed. The public space served more as the scenery than as an active participant, which distinguishes these events from future temporary interventions on the brink of 21st century (Table I).

DISCUSSION OF THE IMPORTANCE OF TEMPORARY URBAN INTERVENTIONS AT THE TURN OF 21ST CENTURY

PUBLIC SPACE AT THE TURN OF THE NEW CENTURY – BETWEEN TERRAIN VAGUE AND JUNKSPACE

The beginning of the new century was characterized by the decay of revolutionary spirit, the rise of social standards, and the climax of capitalism supported by the phenomenon of abundant gentrification. One utopia was replaced by another; the spectacle ceased to be a ritual and turned into perpetuated everyday life – a simulacrum without hidden meanings. Dominic Pettman (2008), in his foreword to Baudrillard's Fatal Strategies, describes: *To live in the 1980s and 1990s was to be in a sociopolitical echo chamber, abandoned both by false promises of revolution and by the compensating hope for utopia.* Alienation, defined as the process by which a person becomes a passive consumer of the spectacle rather than an active participant, leads to general resignation and saturation with the stimuli of the everyday urban experience.

The autonomy of the intertwined political and economic structure dismantles and builds an urban metropolis driven solely by the logic of profit, and erases the boundary between private and public space for its benefit. Attempts to advocate public interest in such areas are mostly arbitrary and do not affect the solution of real problems.[13] Public space fragments of the modern city (including privatized 'public spaces') have become a series of drastically unrelated spectacles, leaving the impression of a theme park (Lokaitou-Sideris, Banerjee, in: Carmona, Tiesdell, 1998: 48). These spaces have become neglected urban entities known under the synonym *terrain vague*.[14] Such spaces are unwanted fragments of terrain, often with irregular and demanding proportions, access, and ownership relations: spaces between neighbourhoods, empty parking lots, peripheral parts of shopping centers, unused zones between roads and residential towers, and abandoned post-industrial zones of warehouses, factories, old ports and railway stations (Doron, 2008: 204). Simultaneously, further flourishing of the metropolis and accelerated production generate *junkspace*.[15]

These marginalized zones and intermediate spaces between hyperactive urban entities become significant urban heterotopias: places where the logic of capitalism is forgotten (or in the making). Such zones, between public and private, left to the collective (ir)responsibility paradoxically become autonomous zones of triumph, and appropriated spaces of resistance (De Certeau, Lefevbre) that serve as the stage for temporary occupations. Creative practices and strategic initiatives of designers, artists, architects, and other individuals find a way out through participation and activism (e.g. Salbke district library, Magdeburg, 2005; De Site, Ghent, 2007). Such tendencies lay the foundations for temporary use of space and further development of the concept of temporary space activation in the decades to come. Although pioneering in their meaning and expression,

13 Eg. works of art and sculptures in private 'public space' are unsuccessful and false attempts to achieve social and experiential pleasure

14 *Terrain vague* is a term established by Ignasi de Sola-Morales in the 90s of 20th century, who adopted it to refer to marginal islands and oversights in the landscape, "mentally exterior in the physical interior of the city, its negative image, as much as critique as a possible alternative."(Mariani, Barron, 2014: 4)

the problem of the aforementioned ideas of criticism and resistance from the end of the 20th century is in their glorification of the daily efforts of enthusiasts for the improvement of the urban environment, while the significant and necessary change of the ownership and administrative system remains untouched (De Clercq, 2001: 21).

The global financial crisis of 2008 left many areas and urban zones without any intended development strategies and projects, which forever changes the role of temporary use as an urban planning tool. While the temporary initiatives of the second half of the 20th century manifest social and political activism, the purpose of temporary urbanism in the 21st century is to create an all-inclusive public space (Oswalt et al., 2013: 13). Temporary urban interventions test the limits of flexibility, mobility, and dynamics within the contemporary urban planning discourse in various ways. Many examples prove this by denoting escape from the existing socio-spatial conditions[16], being a platform for experimental use[17], or an incubator of new concepts for the long-term use of space.[18]

Importance of the relationship between public space and temporary urban intervention

Looking at the events at the turn of 21st century, it is easy to conclude that awareness of the importance of public space as a valuable and irreplaceable resource remains a key issue engaging architects and urban planners. In this light, the difference between the temporary urban interventions in the 20th century and the new contemporary tendencies is the awareness of the important relationship between temporary intervention and public space. Public space is no longer just a backdrop for temporary use, but rather the materialization and role of a temporary intervention are adapted to it. Temporary intervention ceases to be merely an object and becomes a subject and stimulator of spatial change.

The increase in initiatives for temporary occupation of space in the last twenty years has resulted in an expansion of theoretical and scientific literature that deals with the relationship between public space and temporary intervention. The Urban Catalyst study, which started in 2001 as a systematically elaborated research paper on the phenomenon of spontaneous urban interventions in abandoned urban zones, culminated with the publication *Urban Catalyst – The power of temporary use* (2013). The conducted research divides the typology of temporary use into nine different categories, based on the intensity and impact of the temporary intervention on public space: Stand-in, Free-flow, Impulse, Consolidation, Co-existence, Parasite, Pioneer, Subversion, and Displacement.

Research by Lehtovuori and Ruoppila (2012) has shown that one of the main criteria for differentiating the role of temporary urban interventions related to the typology of urban spaces is the current status of public space. Depending on the current status of urban space, they differentiate the typologies of currently underused areas, areas losing their identity and significance over time, and central urban areas. The roles of temporary urban interventions vary and change by the indicated typologies of public space, from introduction to redefinition or intensification of space.

Significant theoretical and research contribution to this topic is further offered by Haydn and Temel (2006), as well as Bishop and Williams (2012). The mentioned studies observe temporary interventions through their morphological, spatial, and programmatic characteristics, and define different criteria for determining their typologies, focusing on the immediate relationship between public space and temporary intervention.

Conclusion

Although the typology of temporary urban intervention has been present for a long time, the balance between its positive impact on urban space and possible by-products is still ambiguous. To determine its potential within the framework of contemporary public space, it is crucial to establish its unique definition, define its relationship with public space, and simulate different establishing approaches. For a closer understanding of the main characteristics of this typology, it is essential to analyse its development through history and establish a formative period.

Based on the analysis of the formative period, this study finds the ambivalence of temporary urban interventions in public space to be a reflection of current social, political, and urban tendencies. It is impossible to understand this typology without a prior analysis of the interrelated space, considering the consolidation and the current status of the observed space. The establishing initiatives that lead to temporary urban interventions belong to a wide range of bottom-up and top-

15 A term coined by Rem Koolhaas in his 2002 essay. Junkspace is defined as a side effect of modernization, an unwanted residue of mass exploitation of space and its meaning in the form of accumulated and unnecessary infrastructure, fragmented space, unfinished development, and senseless multiplication through linear and uncritical human action.

16 Southwark Lido, EXYZT architects, 2008

17 Berlin-Mitte public Golf Center, 1995-2006

18 Salbke district library, Magdeburg, 2005

down approaches, with cooperation between the two mentioned methods proving to be the most successful solution. This paper defines the formative period of temporary urban interventions during 20th century and distinguishes three direct predecessors: events in public space, experimental architectural projects of the 60s, and art installations in public space in the second half of 20th century. In the analysis, the formation of the typology of temporary urban interventions is observed from a diverse perspectives emphasizing their phenomenological and artistic significance, but at the same time a strong architectural and urban impact.

The research finds the relationship between the location and the typology of the temporary urban intervention particularly relevant. As a result of events in public space at the turn of the 21st century, a change in the meaning and role of temporary urban interventions were noticed. According to the analysis of the existing literature, the shift from the temporary urban intervention being an object to becoming a subject of spatial change is crucial for the role of temporary urban interventions in public space, and it has not been sufficiently or adequately considered.

By comparing the characteristics of temporary urban interventions from the formative period, and the new tendencies at the turn of the 21st century listed in the attached table (Table I), a paradigm shift is visible primarily in the idea and purpose of contemporary temporary urban interventions, which are now focused on the introduction, redefinition and intensification of the space in which they are located (in contrast to the focus on their own phenomenological and conceptual characteristics in the formative period). The shift is also visible in the relationship between the intervention and the urban space, and in the attempt to have a far-reaching impact of the intervention on the future of the space.

As a result of the characteristics of phenomenological and conceptual nature, temporary urban interventions represent a valuable component of urban life. Future research will aim to determine the maximum potential of temporary interventions in the city's urban area by establishing typologies of both temporary interventions and the belonging urban spaces. The interrelationship between the obtained typologies will be crucial for defining future criteria for the valorization and integration of temporary urban interventions. In this way, unreliable practices of future occupation and gentrification of public spaces can be avoided.

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Sources of illustrations and table

Fig. 1 Photo collage by authors. Originals available at: https://static01.nyt.com/images/2016/09/07/arts/08iht-rartconstant-2/08iht-rartconstant-2-jumbo.jpg?quality=75&auto=webp and https://i.pinimg.com/564x/73/cb/01/73cb01bfccf372bof6679b84fe53dbfo.jpg [Accessed: 12 December 2022].

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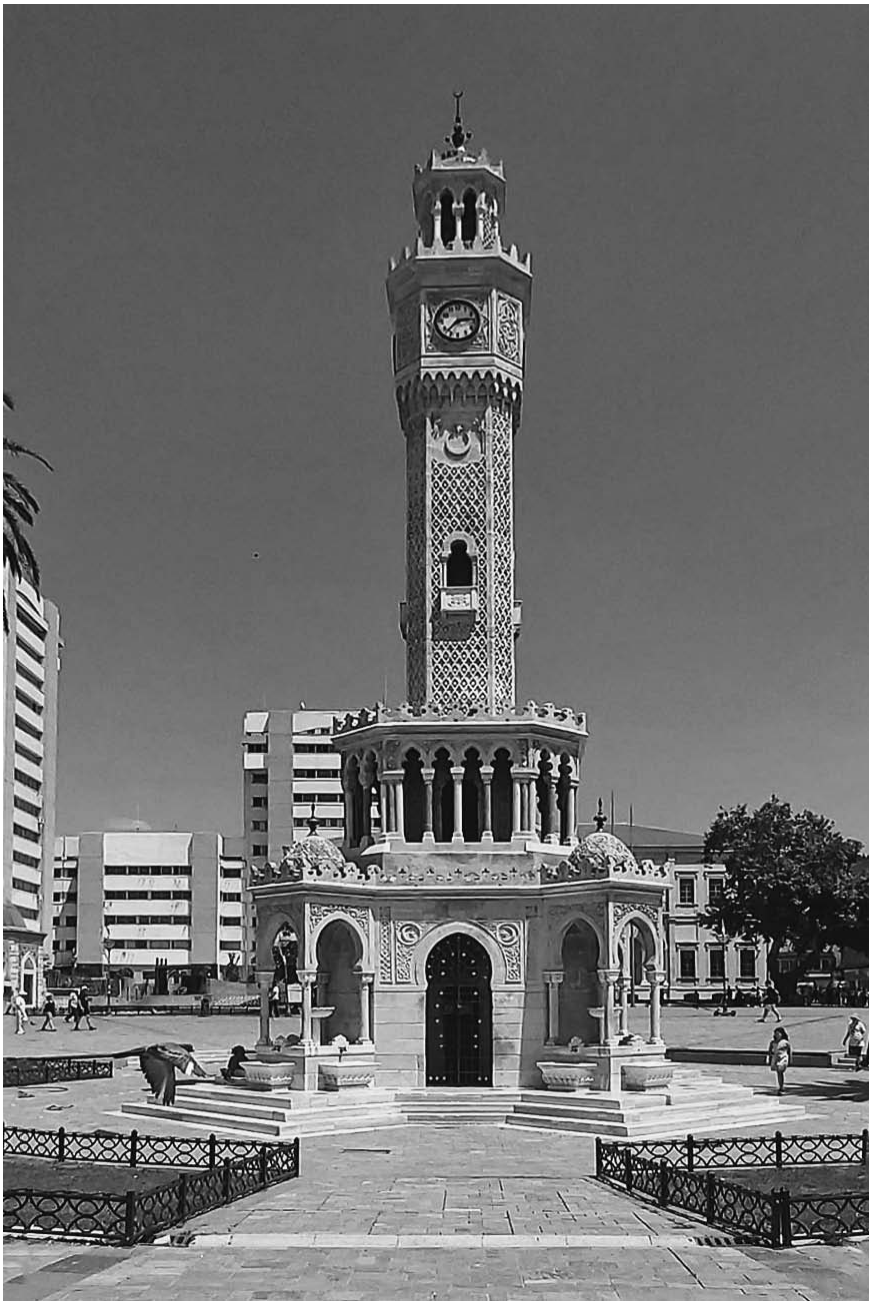

Fig. 1 Izmir Clock Tower

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Public Art and Percent for Art Strategy

Evaluation of Selected Western Cities and Possible Scenarios for the Case of Izmir-Turkey

CULTURAL POLICIES
CULTURE-LED URBAN REGENERATION
Izmir-Turkey
PERCENT FOR ART
PUBLIC ART

Public art plays a number of roles in the economic, social and cultural transformation of cities. The cultural policies of cities are significant for the interest in public art. The percent for art strategy as an important policy is one of the methods to promote public art in cities and finance artwork production. Many cities have been successfully implementing public art in their cultural policies. The cities of Chicago, Barcelona and Dublin can be mentioned as those which have different experiences in the implementation of this strategy. They can be taken as exemplars of cultural policies and public art strategies for the specific case of Izmir, Turkey.

This article intends to discuss public art as part of cultural policies in Izmir, demonstrating how public art can find more space in the urban environment. In line with this purpose, the main question focuses on how the percent for art scheme can be applied as a method that ensures the realization of public art practices for Izmir. The resultant findings obtained from proposed models show that an alternative financial resource can be provided via the percent for art strategy in Izmir city. In the end, the percent for art program is believed to offer a range of opportunities which should increase the presence of public art in the city.

INTRODUCTION

Public art is closely associated with culture-led regeneration, urban spaces aesthetics and quality of life improvement. For this reason, the existence of art in modern cities is increasingly considered a part of cultural policies while public art becomes an emphasized and "planned" feature of cities. Cities were subject to important changes in social, economic and spatial terms with the impact of rapid changes in political and economic paradigms at the end of the 20th century. Under these circumstances, the position of cities and the new steps they may take with regard to new competitive conditions gain a new perspective. In the big picture which can be called the global competition, cities obviously redefine their roles, and the new conceptual framework of culture in cities (cultural industry, creative cities, culture-led regeneration, cultural planning, etc.) demonstrates an obvious rise in the course of becoming one of the fundamental tools of urban competitiveness. In the very same frame of development, public art becomes a crucial part of cultural policies.

Cultural industries as the means to provide a new economic base in post-industrial cities have played a key role in urban problem-solving strategies since the 1980s. Urban regeneration can be commenced with different themes in mind, such as property-led, design-led, art and culture-led, or that organized around strategic marketing and mega events. Culture-led regeneration, as one of these themes, comes to the fore with its social and cultural economy dimension, as well as physical restoration. Culture-led regeneration approaches create employment while providing urban distinctiveness (Scott, 1997), encourage innovation and creativity (Mommaas, 2004) and enhance participation in artistic and cultural events through social unity and harmony (Griffiths, 2005). It is evident that public art has become a component of culture-led regeneration in cities with the increasing interest in the existence of works of art (Roberts & Marsh, 1995). It also aims to define identity in cities, except from its ornamental value (Miles, 2007), which enhances the meaning attached to public art.

The post-1980 period is also characterized as the "public art renaissance", whereby the increase in the participation of public and private sectors in art investments became evident in many cities around the world, and whereby there was more emphasis on art policies and the renovation of administrative structures regarding art matters. Artists also got increasingly integrated into urban design (Hall & Smith, 2005: 175). In this vein, public art appears as the main component of the cultural quarters designed in line with cultural policies and are seen as part of mega-events and a way of attracting the creative class to the cities. Cultural quarters are places where artistic and creative activities are produced and consumed because people visit them for entertainment and leisure activities. These areas, featuring a lively street life at different times of the day, offer a public space or series of spaces that attract people's attention, as places time can be spent in (Montgomery, 2004: 4). One of the clearest examples attesting to the role of art in development is the inclusion of arts in urban development strategies in order to attract highly skilled human capital to specific locations. In this context, art presents a magnet for creatives.

The percent for art strategy is one of the most common methods used to finance the production of artworks and to increase the presence of art in cities. By means of this strategy, a small amount (typically 1%) of the construction costs of large-budget structures by public or private investments is allocated for the construction and maintenance of public arts. Today, the percent for art program is carried out as an important implementation method of cultural policies in countries that adopt and implement this policy at different levels, ranging from central to local governments.

The purpose of this article is to analyse the administrative processes of public art practices, which progress with different strategies in different geographies. Among these, the percent for art strategy is a widely used

method globally. It can be said that different urban experiences contain alternatives that can be taken as an example through the percent for art processes, which is a method of realizing public art. Various cultural policies and public art strategies of Chicago, Barcelona and Dublin can be taken as a reference for Izmir-Turkey. The aim of the article is to discuss public art as part of cultural policies in Izmir and demonstrate how public art can take more place in the city. In accordance with this purpose, suggestions have been made in the article about how the percent for art can be applied as a method that ensures the realization of public art practices for Izmir-Turkey.

Percent for art strategy in Europe and the USA

Since the second half of the 20th century, new regulations have been implemented in Europe and the USA in order to encourage and even force the inclusion of art in construction projects (Hrastar, 2018: 81). Regulations regarding the inclusion of public art in the built environment first emerged in France in 1936 and were enacted as a law in 1951 (Gökçen, 2018: 219). This practice has been accepted in more than 80 cities in the USA and in European countries such as Great Britain, Belgium, the Netherlands, Norway, Germany, Austria, Switzerland, Italy, Finland, Ireland, etc. and is still in force in many of them (Hrastar, 2018: 81). While the share allocated for public art from construction costs in the USA varies between 0.25% and 1.25%, it generally amounts to approximately 1% (DCASE, 2012: 26). It is defined as 1% in Belgium, France, Netherlands, Norway and Sweden, and as 2% in Germany and Italy (Gökçen, 2018: 219).

The percent for art scheme differs from other public art practices such as donations, individual grants and the support of private companies. This strategy includes only permanent works and applications in public spaces; whereas other funding methods support temporary works, exhibitions, as well as public art produced in corporate office buildings and other private spaces. Percent for art can provide access to public art in economically disadvantaged areas and ensure the continuity of the production of public art. While this strategy as a legal provision in some countries consisted of a traditional artist participation model only to fill the empty spaces from the 1960s to the 1990s, it soon transformed into a continuous line of development (Hrastar, 2018: 81). Many countries and cities that apply the strategy are trying to improve the percent for art strategy. It appears that in many countries, which adopt and implement the percent for art program today, the method is carried out as an important component of urban cultural policies.

Different experiences in percent for art

Many cities around the world carry out public art works within the extent of cultural policies. The cities of Barcelona, Dublin and Chicago are among these cities and are examples that can be regarded as models for Izmir. Public art in these cities is realized in a planned manner via the strategic cultural plan, public art plan and other administrative regulations. The existence of the creative class in these cities further supports the strategies carried out. In each case, "culture-led regeneration" was used as a method to be applied in under-developed regions. Temple Bar in Dublin, El Raval and Barceloneta in Barcelona, as well as the Millennium Park District and Museum Campus in Chicago, are known as successful results of this regeneration.

The influence of mega-events is behind the public art works of Dublin and especially Barcelona and Chicago. While the city of Barcelona experienced a radical change with the Olympic Games (1992), public art took a noteworthy place in this transformation (Benach, 2004). Related to the effect of the Chicago World's Fair (1894), many works were made then and changed the face of the city (Conard, 2008). Dublin, on the other hand, has a different experience, as the city tried to position itself through another mega event, the European Capital of Culture candidacy. The culture strategy plan was originally developed for the European Cultural Capital of 2020. An overview of worldwide experiences reveal that the cities of Chicago, Barcelona and Dublin stand out as cities where the percent of the art strategy is implemented and they are known for their successful public art practices. These cities shall serve as an example for Izmir with the aid of their unique stories.

- **Chicago** – After the 1980s, many studies were carried out in Chicago to restructure the city with the support of culture-led strategies and policies. In addition to cultural policies at the local level, the city appears to owe its success to being a part of a larger urban region with ethnic diversity and immigration flows in every period, which further enhances its role as the point of attraction for the creative class.[1] The works of world-famous artists in the city has also accelerated the development of the city in this sense. The Chicago Picasso is an important symbol of the city's

1 Chicago is among the top 5 metropolitan areas that contribute to the creative class in the USA (Florida et al., 2015: 24).

FIG. 2 THE CLOUD GATE (BY ANISH KAPOOR)

FIG. 3 FLAMINGO SCULPTURE (BY ALEXANDER CALDER)

public art history as an example of this. After Picasso, many public art works were made in the city. Today, there are many works to support its identity as a "public art city". For example, the Cloud Gate, a sculpture known not only in Chicago but all over the world, is one of the symbols of the city today (Fig. 2).

In the United States, financial support for public art is largely provided by public institutions, in contrast to art organizations and museums which are heavily supported by the private sector. Approximately 81% of public art programs in the USA are supported by public institutions and state-sponsored programs are the main source of public art funding (Miller, 2012: 2). On the other hand, efforts have been ongoing to support public art by donations and private organizations for many years.[2] Percent for art strategy, a part of the legal framework in the USA, is obligatory in Chicago, as in many other regions (Pietsch, 2013). However, the percent for art in Chicago (1.33%) is higher than the national rate (DCASE, 2017: 24). The Culture and Special Events Department (DCASE) in the city administration also carries out the percent for art strategy in support of public art works throughout the city. Implementation strategies are included in the Chicago Cultural Plan 1986, Chicago Cultural Plan 2012, Chicago Public Art Plan 2017 and in administrative regulations. Most of the public art collection in the city of Chicago is the result of the percent for art policy (Srivastava, 2014).

The first work financed by the percent for art scheme was the Flamingo sculpture by Alexander Calder, one of the symbols of the city (Fig. 3). Since the adoption of the percent for art policy in Chicago, more than 500 works of art in over 150 public spaces have contributed significantly to the city's collection (DCASE, 2017: 18; Fig. 4).

These developments undoubtedly prove that the policies and strategies adopted in the case of Chicago paved the way for the rise of the city through cultural economy. In this regard, Chicago is renowned and exemplified as the city of public arts.

FIG. 4 THE RORA MOSAIC (BY GINNY SYKES) FINANCED BY THE PERCENT FOR ART SCHEME

• **Barcelona** – During the 1980s and 1990s, and especially thanks to the 1992 Olympic Games, there were numerous positive developments in urban design and urban management, many of which supported the emergence of the Barcelona Model (Garcia-Ramon & Albet, 2000; Marshall, 2000; Monclús, 2003). Barcelona has become one of the ref-

2 Many private initiatives have been established since 1872, when the Fairmount Park Art Association, was founded to support public art in the United States as the first private non-profit organization in Philadelphia (Miller, 2012: 2). In the following years, the construction of many sculptures was financed by individual donations in Chicago. As an example, the statue, which was made in 1884 in memory of the great fire in the city, was financed by the timber merchant Eli Bates (DCASE, 2017: 74). Another one, Benjamin Franklin Ferguson, donated $ 1 million after his death to be spent on the city's public art (Kutner, 1962: 217). Many sculptures, including the Nuclear Energy sculpture by Henry Moore, were made with this fund. (DCASE, 2017: 7).

Fig. 5 L'Estel Ferit sculpture (by Rebecca Horn)

Fig. 6 The Mistos sculpture (by Claes Oldenburg and Coosje van Bruggen)

erence cities in the European continent in terms of culture-led urban regeneration, creative industries and the development of the cultural economy. Barcelona's culture-led regeneration has guided the urban developments since the 1990s by means of a highly developed strategic vision and a set of spatial plans. For the first time in 1999, a city was awarded a gold medal by the Royal Institute of British Architects (RIBA) and it was Barcelona (Kutner et al. 2016: 30).

In Barcelona, which stands out with its success in urban design and cultural management, public art has been a part of the city's cultural policies since the Olympic Games. Public art played an important role in the transformation of public spaces following this mega event. Many new works were made especially in the coastal parts of the city. Rebecca Horn's L'Estel Ferit sculpture at Barceloneta, as one of the city's important cultural quarters, is such an example (Fig. 5). The Barcelona Head sculpture and the Mistos sculpture are among the many sculptures made for the 1992 Olympics (Fig. 6).

The cultural policies of the city are fostered by the Barcelona Cultural Institute, which was founded in 1996 as an autonomous institution. This institution coordinates the Cultural Strategy Plan, in which all actors, involved in the cultural and creative industries, are represented. The strategy plan identifies future needs of each area and proposes a common roadmap, in which the institute plays the key role. The institute establishes the link between the local government, nonprofit private institutions and cultural stakeholders. Barcelona also stands out with its cultural policies carried out in cooperation with the public and private sectors.

In Barcelona, art and cultural institutions are financed by individual grants, private and public cooperation and government support, as well as support from the European Union. While organizations and projects can be financed by a single source, sometimes comprehensive and continuous works can be financed by many different sources. The percent for art policy, which is one of the most common financing methods of public art, is applied all over Spain, and local governments have a great deal of autonomy in its implementation. Each project is evaluated separately. Therefore, there is no general procedure for applications (Public Art Online, n.d.).

The success of public art in Barcelona is directly related to cultural policies where public art has been an element of planned urban governance strategies since the Olympics. Multi-stakeholder strategies also have an impact on the financing of public art. Although there is no clear percent for art procedure, Barcelona is an important example for combining different methods of finance.

• **Dublin** – In the 1970s and 1980s, Dublin, like many other cities in Northern Europe, had various social and physical effects of economic restructuring whereby manufacturing industries abandoned the city centre because of deindustrialisation. The deterioration of social conditions in the city centre was accompanied by physical deterioration. In the 1990s, a successful economic regeneration policy encouraged the return to urban centres, resulting in a significant increase in population and the vitality of historical centres (Moore-Cherry & Vinci, 2012). Today, an important culture-led regeneration experience is revealed by the presence of restored historical sites such as Temple Bar, which is an important cultural quarter of Dublin (Fig. 7).

In Dublin, the participation of the local government in art projects is limited because local practices are shaped by central policies. Therefore, the reflections of cultural policies at the local level in Ireland have been put into practice through instruments such as the Arts Act, the Arts Council of Ireland and The Arts Plan (Dowler, 2004). Dublin's Cultural Strat-

FIG. 7 EXAMPLE OF PUBLIC ART MADE WITH PERCENT FOR ART IN TEMPLE BAR (BY FERGAL MCCARTHY)

FIG. 8 EXAMPLE OF PUBLIC ART MADE WITH THE PERCENT FOR ART SCHEME (BY ANDREAS KOPP)

TABLE I THE PERCENT FOR ART RATES IMPLEMENTED IN DUBLIN*

Project cost band	Percent for art rate	Maximum limit
€ 0 – € 5,000,000	1%	€ 50,000
€ 5,000,000 – € 20,000,000	1%	€ 125,000
€ 20,000,000 – € 50,000,000	1%	€ 350,000
€ 50,000,000 +	1%	€ 500,000

* The Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media, 2020

egy Plan was prepared in 2015 in collaboration with the Dublin City Council, arts and cultural organizations and Dublin's citizens. The percent for art, an important method for financing public art in Dublin, is included in the plans at the local and central government levels and a large number of works have been funded by this strategy (Fig. 8).

The strategy is implemented in Dublin in accordance with the framework determined by the central government. The rate is determined as 1% of construction costs, but it cannot exceed the maximum limits shown in Table I (Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media, 2020). For instance, when the cost of construction reaches € 49,000,000, the percent for art will be € 350,000 instead of € 490,000. However, when the determined amount is not sufficient, funds from other sources are also used. The cultural policies of the central administration have an important place in public art practices in Dublin.

PUBLIC ART IN IZMIR-TURKEY

Izmir, the third largest city in Turkey, is the cradle of many ancient civilizations such as the Romans, the Byzantines and the Ottomans with its 8000 years-old historical past. Beginning from the 17th century, with the effects of improving trade, it has been a city where different ethnic groups (Armenians, Greeks, Jews and Turks) lived together. Owing to its deep-rooted history, Izmir had the chance to develop cultural policies, especially in the two decades. By means of the Izmir Cultural Workshop held in 2009, cultural studies in the city made progress and the interest in public art increased. In the following years, after the Cultural Workshop of 2009, there have been some milestone developments related to cultural studies in the city. Among these is the Izmir Design Forum in 2011, the preparation of the Izmir Cultural Economy Compendium in 2012, as well as Sculpture and Mural Workshops which have been held since 2012 (Fig. 9).

Another important initiative is the Izmir History Project which was initiated in 2014. Guided by the Izmir History Project, the historical core of the city, including Kemeralti and its periphery, is planned as a cultural quarter in the city. In Izmir, public art is a part of different stages of multi-stakeholder cultural studies which includes the collaboration of universities, the local government and private organizations. However, the local government has a basic role in public art. For instance, the Sculpture and Mural Workshops organized by the local government are an important part of the latest public art works. The most well-known example in this respect is the Izmir Clock Tower, located at the Kemeralti district, which stands out as both the symbol and the oldest monument of the city (Fig. 1).

In terms of finance, public art in Izmir is funded by local governments. As in all public investments, investments in public art are to be made in accordance with the Public Procurement Law. The donations and grants are transferred to the public budget without directly supporting the public art and public investments in Turkey are made by a single method.[3] However, since there is no special procedure in Turkey for realizing public art, it is regarded as a construction investment. Through this method, an examination of the overall list of investments reveal that, between 2011 and 2020[4], only fourteen investments were made in Izmir in the categories of construction, design, maintenance and repair of public art. Additionally, workshops and competitions held by the local government support the production processes of public art. In Table II the data obtained from the

Fig. 9 Sculpture by Umit Turgay Durgun made at the Sculpture Workshop

Fig. 10 Examples of investments made in public art, Kulturpark Mural

above-mentioned fourteen works of art give information about the hosting administration, the date of production, the costs and the type of construction etc. Although listed under the category of construction investments, the list consists of sculptures, monuments and murals (Fig. 10). The cost of these fourteen works of art has been € 3,436,678.86 in total (Table II).

Model proposal for percent for art strategy for Izmir-Turkey

The percent for art strategy, applied in many countries and cities over the world, is not used in Turkey. This strategy, as an alternative to other methods of financing, evidently has the potential to positively affect the contribution of public art in the city. In case the due regulations are made in the legislation, it is possible to apply the percent for art as a part of cultural policies. The administrative processes related to public art in Ireland are determined by the central government and carried out by the local government, which can be regarded as similar to the Turkish case. Chicago and Dublin are examples that have successfully integrated the strategy into their cultural policies. On the other hand, in Barcelona, the strategy is not widely used in every case. However, although the percent for art in Barcelona is not a method applied frequently, it can be deemed as a model for the case of Izmir since there are many different means of financing used together.

In this article, two models are suggested for the implementation of the percent for art strategy in the city of Izmir. The first one is the method applied in Chicago, Barcelona and many other cities, concerning the allocation of a share between 1% and 3% from construction costs. The second method is to allocate a 1% share from the upper limits, as already applied in Dublin. Since the percent for art is taken from construction costs, the first step is to examine the public construction costs made by local governments in Izmir for the period of 2011-2020. Thus, the scenarios of the percent for art are also based on the data obtained from the same period of time. In Table III the data provides information about the number of construction investments and the total construction costs between 2011-2020. In total, € 456,915,681.70 as the construction costs (architectural and urban design investment) were made in Izmir over a decade (Table III).

The figures in Table III give the chance to calculate the percent for art ranging between 1-3% for the period of 2011-2020. This calcu-

Table II Public art investments in Izmir from 2011 to 2020

Local government	Process	Public art type	Year	Cost (€)
Municipality of Bayraklı	Repair, renovation, restoration	Monument	2013	€ 69,942.34
Municipality of Karabağlar	Construction	Sculpture	2016	€ 315,187.13
Izmir Metropolitan Municipality	Construction	Sculpture	2016	€ 65,871.16
Municipality of Karşıyaka	Repair, renovation, restoration	Monument	2017	€ 1,739,767.63
Izmir Metropolitan Municipality	Construction	Functional public art	2018	€ 42,948.67
Izmir Metropolitan Municipality	Repair, renovation, restoration	Landscape sculpture	2018	€ 52,923.12
Izmir Metropolitan Municipality	Repair, renovation, restoration	Monument	2018	€ 105,740.04
Izmir Metropolitan Municipality	Construction	Functional public art	2019	€ 41,465.91
Izmir Metropolitan Municipality	Design	Functional public art	2019	€ 35,245.32
Izmir Metropolitan Municipality	Construction	Functional public art	2019	€ 44,358.10
Municipality of Karabağlar	Construction	Sculpture	2019	€ 802,143.25
Izmir Metropolitan Municipality	Construction	Mural	2019	€ 30,005.46
Izmir Metropolitan Municipality	Repair, renovation, restoration	Sculpture	2020	€ 27,650.45
Izmir Metropolitan Municipality	Construction	Mural	2020	€ 63,430.23
			Total:	€ 3,436,678.86

3 Other financial methods in public are financially limited and, they are not accepted as the main method of finance.

4 There has been no record of public art investments made in Izmir after 2020, most probably due to the Covid-19 pandemic conditions, therefore, data after 2020 is not included in the table.

TABLE III CONSTRUCTION INVESTMENTS IN IZMIR*

Year	Number of construction investments	Total construction investment cost (€)
2011	17	€ 13,205,495.53
2012	20	€ 135,348,243.89
2013	29	€ 54,410,079.74
2014	8	€ 4,908,969.21
2015	18	€ 25,518,770.24
2016	32	€ 28,050,775.62
2017	32	€ 143,456,675.91
2018	23	€ 24,113,891.15
2019	11	€ 9,798,143.99
2020	14	€ 18,104,636.42
Total	204	€ 456,915,681.70

TABLE IV PERCENT FOR ART SCENARIO IN IZMIR**

Project cost band	Proposed percent for art rate	Proposed maximum limit
€ 0 – € 3,595,747	1%	€ 35,500
€ 3,595,747 – € 7,191,494	1%	€ 45,000
€ 7,191,494 +	1%	€ 70,000

** According to the threshold values, these ranges are as following. Percent for art maximum limits have been prepared by considering the rates determined in Dublin.

TABLE V NUMBER OF CONSTRUCTION INVESTMENTS IN IZMIR***

Year	Projects under € 3,595,747	€ 3,595,747 € 7,191,494	Over € 7,191,494
2011	17		
2012	17	2	1
2013	26	2	1
2014	8		
2015	17		1
2016	30	1	1
2017	29	2	1
2018	21	1	1
2019	11		
2020	12	1	1
Total	194	6	4

*** It is categorized according to percent for art scenario II.

* Between 2011 and 2020, a total of 12,726 works were made by local governments in Izmir. 3212 of these expenditures are related to construction investments. 204 of the construction investments (excluding investments such as infrastructure and renovation) are the construction of architectural structure and urban design projects. The table has been prepared after analyzing and examining the data on all these investments.

lation gives an idea about how much funding could have been allocated for the production of public art had the percent for art strategy been implemented in Turkey. According to this model, when the share is calculated at the rate of 1%, the resultant figure reached € 4.569.156,82 and when it is 3%, then it was € 13.707.470,45. However, the actual figures spent for the above-mentioned fourteen works of art have only been recorded as, € 3.436.678,86 in total. The first model shows that a great amount of investments could have been realized in contrast with the public art investment already made.

Another alternative to apply the strategy of percent for art in Turkey is based on the model used in Dublin. The second calculation method is therefore based on the application of upper limits as in the case of Dublin. In Dublin, the strategy with the upper limits applied amounts to a 1% share being allocated from construction costs. In contrast to other countries and cities that accept the strategy, the 1% share in Dublin is applied under specific conditions of upper limits determined. Over these certain limits, instead of the 1% share of construction cost, a fixed share can be applied depending on the amount. While determining the financial upper limits in Dublin, the construction figures were evaluated in four categories considering the budget. In the Turkish case, a similar classification is made based on the "threshold value", which is the financial amount determined by the central government every year in public construction works.

The threshold value in 2021 was announced as the amounts in three categories such as:

- less than € 3,595,747
- between € 3,595,747 – € 7,191,494
- over € 7,191,494

The data relating to the threshold value can be used by dividing the upper limits in Turkey into three categories. According to these data, the share figures from the second model is given in Table IV.

Based on the threshold figures calculated on the basis of 1%, Table IV gives the proposed limits for the three categories. According to these figues, there have been a total of 204 construction works made between 2011 and 2020 and the related categories are given in the list of Table V. During this period, 194 of the works are below € 3,595,747, whereas 7 of these works are between € 3,595,747 – € 7,191,494 and finally 4 of them above € 7,191,494. In the second model, based on the consideration of the upper limits, the percent for art appears to have reached € 2,351,304.25. This amount of € 2.351.304,25 is evidently less than the figure obtained from the first model, as well as the actual amount already spent for public art. However, the model can still be considered since it is an alternative way for other methods of financing public art.

The final step of evaluation involves a comparison of all models by different years (Table VI). Table VI contains the findings on all scenarios for the percent for art. In the table, the annual figures help to make a comparison between different years, and it also appears that the continuity of rising figures in construction costs in Izmir should promise sustainable funding, despite the changing figures by each year. All these findings have shown that the percent for art can possibly be adopted as a strategy and applied in Izmir, providing a sustainable method for financing public art in the city.

5 Limitations and future research: Among the limitations of the study is the inaccessibility of all data on public investments in Turkey. Data on public works of art made in Izmir with the main financing method has been obtained, but access to data on what proportion of the investment is public art and what proportion is construction investment is limited. The article can be a guide for future research and lead to similar studies in other cities in Turkey or all over the world.

Table VI Izmir-Turkey percent for art scenarios

Year	Scenario I. percent for art rate (1%)	Scenario I. percent for art rate (3%)	Scenario II. percent for art (upper limit 1%)
2011	€ 132,054.96	€ 396,164.87	€ 132,054.96
2012	€ 1,353,482.44	€ 4,060,447.32	€ 300,253.51
2013	€ 544,100.80	€ 1,632,302.39	€ 361,976.15
2014	€ 49,089.69	€ 147,269.08	€ 49,089.69
2015	€ 255,187.70	€ 765,563.11	€ 325,187.70
2016	€ 280,507.76	€ 841,523.27	€ 270,861.86
2017	€ 1,434,566.76	€ 4,303,700.28	€ 410,792.86
2018	€ 241,138.91	€ 723,416.73	€ 232,969.06
2019	€ 97,981.44	€ 293,944.32	€ 97,981.44
2020	€ 181,046.36	€ 543,139.09	€ 170,137,02
Total	€ 4,569,156.82	€ 13,707,470.45	€ 2,351,304.25

Conclusion

The percent for art program is implemented as a method for improving the built environment and making it more appealing, useful and accessible by incorporating works of art in public areas. What is essential here, as evident in different urban experiences, is the creation of continuous funding for public art. Additionally, this strategy appears to act as the crucial component of cultural economy.

As mentioned afore, it is clear that the percent for art strategy in public space has various positive effects on the urban environment and the citizens. For example, the strategy can ensure public art in economically disadvantaged or smaller areas. Different city experiences are not only full of examples of the advantages that can be achieved with this strategy but they also offer clues on how each city can create its own unique roadmap with different legal and administrative processes.

However, the percent for art schemes applied in many cities in the USA and Europe, is not implemented in Turkey. Therefore, it is possible to consider it a strategy that can be of guiding importance for related funding methods in Izmir-Turkey, by means of which it can be evaluated as a part of cultural policies and put into practice with new regulations to follow. In the article, two model proposals are given in terms of how the percent for art can be applied.

When the present process in the production of public art is examined, in the case of Izmir observations reveal that:

– Public art is financed through a single source.

– There is no separate and special budget for public art and works of art are therefore considered to be construction works only.

– Construction investments are continuously made, but there can be no such continuity on investments for public art.

– The selection of public art works is determined by financial criteria, and not by means of artistic considerations.

In future prospects, if percent for art strategy is applied for Izmir-Turkey;

– Funding can be a possible alternative in addition to existing methods.

– Public art can be evaluated separately from construction works.

– Since it is a fund reserved only for public art, the continuity of investments shall be ensured.

– Through percent for art, selection criteria for public art shall be reviewed.

– It can be an alternative fund for workshops and competitions.

– It can support the production of public art in economically disadvantaged or smaller areas.

The findings show that by the percent for art in Izmir, a continuous fund can be ensured in order to support the sustainable production of art works and the sustainability of public art appears to be ensured by means of supporting administrative regulations and cultural plans.

Since the Izmir Cultural Workshop held in 2009, there have been cultural development policies apparent in various steps taken with the Izmir Design Forum or the Izmir Cultural Economy Compendium, among many others, and they have contributed to the urban identity and urban development by all means. Within this context, public art should become a component of urban cultural studies together with the implementation of the strategy. The percent for art can be a solution for administrative constraints related to the production of public art in Turkey too.[5]

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Sources of figures and tables

Figs. 1, 9, 10	Photo archives of the authors, 2022, Izmir, Turkey
Fig. 2	DCASE, 2017: 22
Fig. 3	DCASE, 2017: 17
Fig. 4	Riseborough, 2022
Fig. 5	De Maffei, 2016
Fig. 6	Barcelona City Council, n.d.
Fig. 7	The Arts Council of Ireland, n.d.a.
Fig. 8	The Arts Council of Ireland, n.d.b.
Table I	Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media, 2020
Table II-VI	Authors, 2022

Authors biographies and contributions

Bengi Polat received her bachelor's degree in architecture from the Faculty of Architecture, Dokuz Eylul University and earned her master's degree in urban design from the City and Regional Planning Department, Dokuz Eylul University. She is currently a Ph.D. candidate at the same university. She is also engaged in practical architecture and urban design professionally. Her major research interests include urban design, cultural industries and public art.

Sebnem Gökçen completed her undergraduate studies in the Department of City and Regional in Dokuz Eylul University. She received her master's degree in 1996 and her Ph.D. in the theory and practice of urban design in 2002. She currently works as professor in the same University and is also head of the city planning division in the department. Her studies focus on culture-led regeneration, creative economy, public art and urban design theories.

Both authors have contributed equally to the preparation of this article.

Book reviews

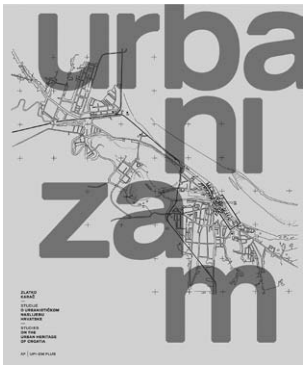
Summaries of doctoral dissertations

Dragan Damjanović

Urbanism
Studies on the Urban Heritage of Croatia

Urbanizam
Studije o urbanističkom naslijeđu Hrvatske

Zlatko Karač



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After a series of representative editions published in the last five years, on Islamic architecture and art and the architecture of synagogues in Croatia, as well as on the Chapel of Our Lady of the Oak Tree in Vukovar, in which he summarized his decades-long research on the key segments of Croatian architectural heritage from the Middle Ages to the present day, in June of this year, Prof. Zlatko Karač collected and published a part of his numerous studies on the urban heritage of Croatia. The book of representative size and hardcover, published by the Faculty of Architecture in Zagreb and the publishing house UPI-2M Plus, was reviewed by academician Mladen Obad Šćitaroci and Prof. Zlatko Jurić.

The texts published within the *Studies* are divided into two large chapters – the first is composed of peer-reviewed articles, studies, debates and essays, and summaries, while the second consists of various presentations (reviews, criticisms and book reviews, introductions and headlines, presentations of exhibitions, memories and diverse other texts). Within each of these large units, the texts are arranged according to the chronological-thematic principle.

The texts published in this book first of all testify to the changes in the interests of Zlatko Karač from the time of his studies at the Faculty of Architecture of the University of Zagreb, when the first articles were written, until today. It is noticeable that in the early stages of his career, during the 1980s and 1990s, he mostly focused on topics from the early episodes of the history of urban planning in Croatia – he researched the famous prehistoric site Vučedol, the urban development of ancient Osijek/Mursa and Vis/Issa, ancient and medieval heritage of Ilok, traces of Byzantine urbanism in Croatia, medieval fortresses of Đakovo and Zagreb, medieval planned cities in Croatia, urban planning and communal provisions in the statute of Mošćenica and other similar topics. It is equally evident that the first decades of his research activities were strongly marked by topics on the area where he spent his childhood. In addition to the already highlighted topics that touch the wider area of eastern and central Slavonia and Srijem, Zlatko Karač, at the same time investigated the oldest layers of the heritage of his native Vukovar, medieval and Ottoman. Later, he turned to more contemporary topics from the heritage of Vukovar, especially after the suffering of this city in the war of 1991. From the beginning of the new millenium, after having worked on the large exhibition project of the Museum of Arts and Crafts Historicism in Croatia, studies from the urban (and architectural) heritage of Croatia in the 18th, 19th and 20th centuries have been dominating his research.

In that period, texts dedicated to the urban development of settlements and planned and newly founded industrial cities in Croatia in the 19th and 20th centuries, the urban environment of Croatian synagogues and numerous other texts were created. These texts included a number of topics in the Croatian history of architecture, first of all *Bataville, i.e.* today's Borovo Naselje near Vukovar, a key example of a newly founded industrial city whose project was created in the offices of the Bata's company in Zlín, in Czechoslovakia in the 1930s, as well as Ubli on Lastovo, an outstanding example of an industrial settlement established as part of the projects of interwar fascist Italy aimed at improving economically backward areas. The article about Ubli is a testament to the scale of Zlatko Karač's perspective – the text opens with an analysis of the oldest layers of the settlement's history, prehistoric, ancient and medieval, before talking about the creation of the current fishing village between 1933 and 1936. When analyzing the settlement, he pays attention to the general urban plan of the place and individual buildings in it, comparing it with other planned industrial cities built by the Kingdom of Italy in the areas that would be a part of Croatia after the Second World War, i.e. Yugoslavia, Raša and Podlabin.

Working on reconstruction projects in Vukovar during and after the Homeland War, Karač has begun his work on the creation of reconstruction models, i.e. conservation and related studies that would remain an important segment of his scientific and professional activity to this day, so it is understandable that he included a part of these studies in the book on urbanism. From this group of texts, one article stands out. It is his work on the restoration of the historic urban nucleus of Zagreb after the 2020 earthquake. This article will undoubtedly be a key text for any future research of this topic, especially in terms of analyzing the problems faced by architects and art historians when defining the first steps in reconstruction. The group of *conservation* texts published in the book also includes a work on the heritage of Stupnik villages, and a work on the rural heritage of Istria. Finally, the book also contains biographies of key professors from the Zagreb Faculty of Architecture from the second half of the 20th and the beginning of the 21st century, Bruno Milić and academician Branko Kincl, which provide detailed descriptions and analyses of their work.

Regardless of the period or topics they deal with, all of Karač's texts are characterised by exceptional meticulousness. In the footnotes, references are made to countless units not only from professional literature (domestic and foreign), but also from the daily and popular press, and therefore they can serve as a starting point for further research. All texts are characterized by a systematic analysis of the subject of interest, which goes from general to individual, attempts at authorial attribution (if necessary), and chronological definition of the work. Valorization issues are often included in the works too. The function of buildings and typology are his starting point in the structuring of the text, which is followed by contextualization with historical events and other similar works on the territory of Croatia and the wider area to which Croatia, politically or culturally, belonged.

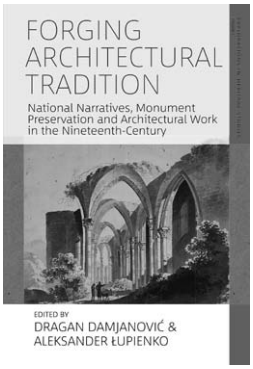
It can, therefore, be concluded that this book provides the pinnacle of the many decades of Zlatko Karač's work at the Department of Urban Planning, Spatial Planning and Landscape Architecture of the Zagreb Faculty of Architecture. It is a piece of work which shall undoubtedly represent indispensable literature for anyone interested in the history of urbanism in Croatia.

Marin Duić

Forging Architectural Tradition

National Narratives, Monument Preservation and Architectural Work in the Nineteenth Century

Edited by:
Dragan Damjanović, Aleksander Łupienko



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Architectural heritage has often been an essential element of nation-building. Nation-states were established in the long 19th century, during which a change occurred in how contemporary people looked at architectural structures from a distant past. The book *Forging Architectural Tradition : National Narratives, Monument Preservation and Architectural Work in the Nineteenth Century* edited by Dragan Damjanovic and Aleksander Łupienko, explores the processes of creating modern national identities and myths around architectural structures.

The book is not so much about the form and style of the monuments themselves as it is about their perception and the frequent changes of meaning imposed on them based on social factors. The research undertaken by authors is not focused on nationalism as such but explores an aspect of nation-building mostly related to space shaping and connection with historical structures. The book fills in gaps in nation-building studies by tracing some of its cultural aspects. It combines the analysis of nation formation with architectural history and heritage studies to emphasize that places and monuments are not culturally neutral. This work is not a review of the whole process, but it rather examines thirteen case studies focused on the 19th (and partly early 20th) century, a period in which nation-building processes led to heritage nationalization or the nationalist manipulation of heritage. The research refers to the eastern and central parts of the European continent – that is, to areas most often characterized as multi-ethnic, multi-cultural, and multi-religious and therefore, particularly suitable for the analysis of the afore mentioned processes.

Thematically divided into three parts, it opens with an introduction by Aleksander Łupienko and closes with an afterword by Dragan Damjanovic. The first part *(Architectural Conservation and National Narratives)* in five studies focuses primarily on the mutual influence between national narratives and the preservation of monuments. Bérénice Gaussuin examines Viollet-le-Duc's attempt to reconstruct the country's architectural monuments as well as French national identity; Kristina Jõekalda investigates the afterlife of nineteenth-century gothicizing renovation of Estonian churches; Aleksander Łupienko writes about Polish discourse; Anda-Lucia Spânu explores the context of the creation of a national style in Romanian architecture; and Georgios Karatzas researches the articulation of medieval revival in the architecture of the 19th century Athens.

The second part *(Styles for the Nation and State)* discusses attempts to create national architecture and national styles in four texts. Douglas Klahr writes about the new public architecture and monuments on the example of the monument to Kaiser Wilhelm I in Berlin; Paolo Cornaglia explains how interconnected the national and royal (dynastic) systems of meaning are on the examples of Turin, Budapest, and Bucharest; Gábor György Papp shows the process of searching for a national style that would show national uniqueness on the example of Hungary; and Dragan Damjanović emphasizes the tradition of vernacular wooden architecture and medieval stonework in the national architecture of Austro-Hungarian Croatia.

The third part *(Appropriation of Heritage(s))* discusses the appropriation of heritage in favor of national ideologies, also in four texts. Gulchachak Nugmanova talks about Russia in the 19th century; Andrea Kocsis shows how Hungarian nation-building used medieval archaeological heritage in the nineteenth century; Monika Ewa Adamska focuses on the context of Silesia's architectural heritage during Prussian rule over the region; and Anatole Upart researches the example of a church in Rome that went through the process of Ukrainian nationalization.

Drawing from their stylistic analyses, all authors contextualize stylistic characteristics within the historical political, social, and economic setting of the time and connect them to national narratives. In the texts, we notice that almost all the analyzed European nations had more than one national style during the 19th century. What was considered national architectural heritage changed and adapted due to the changing nature of nationalist movements. The studies show that in areas of low urbanization, the search for a national style often turned to vernacular architecture. Simultaneously, in more urbanized areas, where researchers had started with the creation of national narratives earlier, sacred and public buildings of the medieval and early modern periods were taken as models. In areas with several religious groups, the national style served to create a difference from other religious groups. The nationalization of the architectural heritage logically led to the system of monument protection. However, as we learn in some of the studies, the nationalization of the heritage did not always accompany its preservation. The re-narration of heritage became possible on a broader scale with the development of the bureaucratic state.

The book *Forging Architectural Tradition* is an excellent contribution for anyone interested in the creation of national narratives around architectural buildings. It is suitable for architects, art historians, historians, sociologists, cultural researchers, and the general cultural public, as well as anyone interested in the national narratives of "small" nations.

The topics explored in the book should not be viewed as a part of the distant past but as still current as the historical processes described in the book can help us deal with problems related to the politicization of heritage that is still evident today. Narratives related to national monuments continue to develop daily, whether they concern the general protection and restoration of heritage or the political exploitation of an individual monument. It happened in the past, it is happening today, and it will undoubtedly happen in the future. Whatever building does not get crushed by the wheel of time, shall necessarily be re-invented and re-narrated.

Tonči Čerina

Kinetic Architecture Creations

Kinetičke arhitektonske kreacije

Andrija Mutnjaković

The Croatian Academy of Sciences and Arts
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"Kinetičke arhitektonske kreacije / Kinetic Architecture Creations" by Andrija Mutnjaković is a reduced reprint of the architectural map *Kinetic Architecture 1964-1990,* with an addition of the author's original texts in Croatian. The aim of publishing the map was to adequately present the architectural thought of academician Mutnjaković as a key representative of the powerful and innovative imagination of Croatian architecture in the second half of the 20th century. The map was printed in 50 numbered and signed copies and sent to various relevant addresses in Croatia and abroad, with an ambition to be included in research on kinetic architecture.

The promotion of the book took place at the opening of the exhibition "Andrija Mutnjaković: Kinetic Architecture 1964-1990" in April 2022 in the lobby of the National and University Library (author of the exhibition Borka Bobovec). In addition to the map, four models of projects are on display at the exhibition, a model by Aleksandar Srnec / Kinetic Art, old maps and acknowledgements.

The book contains four selected projects of kinetic architecture by A. Mutnjaković: family houses Homobil / Domobil in Hollywood and in Ornitottero, Reggio Emilia, Kineticdome – St. Peter's Cathedral in Split, and the pavilion in Venice Flower-House / House Flower.

Research on kinetic architecture begins in the introductory part of the book with an inspired prolegomenon by academician Velimir Neidhardt, reminding the reader of the historical continuity of thought and examples questioning the use of machines in architecture, but making a clear distinction between examples that are only partially dynamic and are basically still static, and Mutnjaković's truly dynamic ideas in which all parts of the house are movable, able to create meaningful spatial compositions, achieving complete unity in mutual communication with man.

Next is the author's foreward, which is also key to understanding kinetic architecture, because we must first abandon our own prejudices about the use of machines in architecture. With a meticulous series of conclusions, Mutnjaković reminds us how long machines have been an integral part of our lives and we are completely accustomed to it, except in architecture. By incorporating essential properties of the machine into architecture, the house of today should communicate with men directly and be an extension of man's desires and wills. This kind of thinking originated almost sixty years ago, but it is still contemporary, unrealized, untested.

The introductory chapter concludes with a review of the map edition by academician Branko Kincl. He emphasizes that these projects include only one part of Mutnjaković's tireless research approach to architecture. Its relevance in the field of kinetic architecture on a global scale was confirmed by his 1995 inclusion of the book *Kinetička arhitektura / Kinetic Architecture* in the Oxford Lexicon Dictionary of Architecture, Oxford 2016, under Kinetic architecture.

The presentation of each of these four projects begins with a text in which the author lucidly and precisely communicates the basic settings and thoughts about the project. It is followed by a presentation of the project richly illustrated with sketches, drawings and visualizations that alternate with gentle and suggestive photographs of models. The blueprints were made analytically convincing and further enhanced by depictions of endless permutations of surfaces, floor plans and cross-sections as a series of frozen frames suggesting movement, and no less important 1964, anticipating a future in which architectural projects will be shown in videos, animations and gifs.

In Domobil, where the house-machine becomes one with the user, the house becomes a direct projection of the person who lives in it, his wishes and moods. Although the house-machine meets all the functional and physiological requirements of a house, its primary goal, according to the author, is *to achieve the joy of life*. The man-made machine, which enables a direct man-house connection, is elaborated in the essential features that function at the time when the project was created as it is today. Although with the development of technology such proposed machines can be even simpler and more practical, the kinetic architecture of the house-machine has not yet been realized.

Similar settings are built into the 1988 Ornitottero project in Reggio Emilia, where the author explores a modest variant that adapts to a given program and the realities of the stage of technology development at that particular time.

St. Peter's Cathedral in Split from 1970 is a project that, creates a dynamic spiritual space that connects the earth and the sky with the man in the centre thanks to the possibilities of kinetic architecture. It is a project that is so logical and powerful in appearance that we can only wonder how come it was never built.

In Flower for Venice, the moving elements of the pavilion become an interpretation of the lace of Venetian floral gothic style, creating a new ambience that seems to have always been in that place, belonging to it.

Re-published projects and texts in English with the addition of a Croatian translation can be particularly interesting as a guide for young or future architects who are just beginning to see their own path and place in the architectural world. A step forward in architecture is always risk, true research and experiment, but without it, architecture remains a mere service. The author notes at the beginning of the book that all four presented projects are competitive works, which confirms the truth that architectural competitions are an inherent platform for architects to question new concepts, thoughts and ideas. Another area of freedom that needs to be preserved and improved.

Freed from the imperatives of physical realization, experimental and research projects give the opportunity to dive deeper and look wider at different social phenomena and respond to them with architectural language: drawings, models, education, actions and words. Because the idea does not depend on the realization, the idea exists independently and is pivotal in every phase and/or part of the project. With the publication of this book on kinetic architecture, Mutnjaković is proving this truth to us as tirelessly and passionately today as at the time when he first took his graduation exam.

Marijana Sironić

Zagreb Lower Town – Urbanistic Traits of the Eastern Part 1905-2017

Urbanistička obilježja istočnog dijela Donjega grada u Zagrebu 1905.-2017.

Marijana Sironić (Šibenik, 1966) graduated from the Faculty of Architecture, University of Zagreb. She is the assistant to the Head of the City Institute for Cultural and Natural Heritage Conservation in Zagreb.

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The dissertation has 654 pages, 11 chapters with 49 secondary and additionally 74 tertiary subchapters, 133 illustrations, 27 tables, 597 footnotes, 148 bibliographic units and 186 catalogue units.

The thesis investigates urban traits of the eastern part of Zagreb's Lower Town up to the limits of its planned expansion to the east, as established in Lenuci's regulatory basis from 1905. What is particular about the researched area is the therein applied method of natural planning, which, respectful of natural and existing spatial traits, shapes modified block structures, establishes new spatial relations and introduces new typological templates and shapes into the already applied block matrix of Zagreb's Lower Town.

During the 20th century, several different (historical) building interventions were identified within the built, but never completed historical urban tissue, either in form of individual block interventions or larger-scale urban metamorphosis. Urban heritage research of the eastern part of Zagreb's Lower Town came about as a consequence of the recognition of its value, primarily on the perceptual and environmental level, as well as by a lack of appropriate planning and implementation tools that would serve to preserve and build on its value.

Among an array of heritage research and interpretation approaches, herein selected and applied, is the contemporary method of *heritage urbanism* [HERU] that puts an emphasis on the urban approach and integrated view of heritage together with its surrounding environment, and considers heritage revitalisation and advancement in spatial, urban and landscape context. In this context, three important indicators stand out: determinants (of identity, influence and value), criteria (for heritage evaluation, improvement and revitalisation) and models that are important for heritage regeneration and enhancement.

The aim of the research was to establish *urban traits* of the eastern part of Zagreb Lower Town for which, in the context of *heritage urbanism* [HERU] approach, *identity determinants* of the researched area could be derived from. That was to answer the following research questions: 1) what are the determinants of identity, influence and value of the eastern Lower Town urban heritage, based on which the criteria for the evaluation of enhancement interventions and heritage regeneration are established, and 2) how to apply those criteria in the design of contemporary regeneration interventions and urban heritage enhancement in the eastern part of Zagreb's Lower Town.

Comprehensive research of 67 urban blocks, which was based on collected and processed archival material classified into six catalogue attachments, yielded scientifically measurable determinants of the spatial phenomenon of the eastern part of Zagreb's Lower Town.

Research results incorporate the following: a) urban traits of each individual block from different viewpoints: culture-historical, urban-architectural, functional, social and economic, as determined through the application of *expanded urban analysis* method that was designed during doctoral research; application of 73 criteria yielded 12 urban traits that distinguish 13 different block types for 5 traits overall, b) historical planning approaches in the urban planning of the eastern part of Lower Town from 1905 to 2017, with a genealogical account of construction of the researched area, and c) recorded and classified construction interventions in each block and in the researched area in its entirety in order to establish models and criteria for the evaluation of historical construction interventions.

Types of historical construction interventions in the built tissue of the block, as recognised and established in the research, are classified according to the following: a) impact they produce on the physical traits of the block (replacement, amendment and modification of the built tissue of the block), b) coverage boundaries and area affected by intervention, c) contribution they give to enhancement, revitalisation and regeneration of historic buildings, namely, built tissue of the block, and d) affiliation to a developmental stage. Additionally, the research also recognises construction interventions that play a necessary role in the modification of the city's social space, those that contribute to the promotion and conservation of heritage and those that remain unrealised.

Based on research results, the following were determined: a) *identity determinants* of the eastern part of Zagreb's Lower Town – *universal identity determinants* on the level of research area coverage and *specific identity determinants* based on typological traits of the block or the kind of historical construction interventions that occurred in the block, b) *criteria for the evaluation* of potentially significant contemporary regeneration interventions and heritage enhancement based on the evaluation of historical construction interventions and established identity determinants, c) a multidisciplinary approach and starting points for the design of *models for contemporary regeneration interventions and heritage enhancement* graded in relation to the type, spatial impact and extent of intervention.

Based on three important indicators (*identity determinants, criteria for evaluation* and *models for contemporary interventions*), a gold-standard *heritage urbanism* [HERU] research approach for planning contemporary regeneration interventions and heritage enhancement is fully applied in the doctoral research.

The conducted research corroborates the initially established hypotheses. The eastern part of the historical Lower Town area stems from Lenuci's 1905 regulatory plan, which applied block urban matrix, adjusting it to existing space primarily with an aim to connect the Lower Town central area to Maksimir Park, and thus generated a good quality urban metamorphosis of the unbuilt city space in the east, established new spatial relations and introduced new typological templates/forms. The applied template of sequential planning considers spatial defaults and firstly shapes *empty*, unbuilt spaces with streets and squares (as imagined in the 1905 regulatory plan), and then *fuller* block spaces, following and during a longer period of time (but always in accordance with the spatial plan). The stability of *empty* / unbuilt space in the urban tissue of the eastern Lower Town is not only its general identity determinant, but also the key to its sustainability. The research has shown that the model of urban block has played a generative role in the conception (as well as survival) of the city centre, whilst the urban matrix has been the main carrier and determinant of the value of its urbanity.

Nevena Mašanović

Rural Settlements in Continental Montenegro
Criteria for Preservation and Protection of their Spatial Values

Ruralna naselja kontinentalne Crne Gore
Kriteriji očuvanja i zaštite njihovih prostornih vrijednosti

Nevena Mašanović was born in 1987 in Podgorica, Montenegro. She enrolled in basic studies in 2006 at the Faculty of Architecture in Podgorica. She completed her specialist studies in 2010. She has been employed at the Faculty of Architecture of the University of Montenegro in Podgorica since 2014, and her field of interest is focused on physical and urban planning issues of rural settlements and their future development.

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The dissertation has 343 pages, 51 tables, 16 images and 13 cartograms, 87 notes, 127 bibliographic units, sources (61 literature units, 44 laws and decisions, 10 spatial planning documents, 12 internet sources).

The doctoral thesis is dedicated to the research of rural settlements of continental Montenegro, considering that they represent foundations of the economic development of the country. Continental Montenegro has four municipalities of the greatest state importance, which is the reason for choosing this region and its rural settlements for conducting research. The research points to the natural distinctiveness of these spaces and their insufficient and uncontrolled utilization.

The research is divided into four main steps. The first step is the analysis of previous research on the topic of rural settlements, with the conclusion that the rural areas of Montenegro are insufficiently covered by legislative and spatial planning documents, as the main impetus for this research. The second step was to recognize the identity factors of rural settlements in Montenegro, as well as the development potential of the settlements. Based on these findings, the criteria for preserving and protecting the spatial values of rural settlements are analyzed in detail, which also represents the third step in the research process. Determining the model for the revitalization and improvement of the spatial values of rural settlements represents the fourth step in the research.

Special attention in this research was given to the analysis of 96 selected rural settlements through a catalogue form that confirmed their spatial values. On the basis of these findings, settlements were singled out, which in the further research process served as the basis for establishing criteria and models for their preservation and protection, as well as the improvement of the lives of their inhabitants.

The results of the conducted research include: systematization of scientific and professional research in the country and the surrounding area on the subject of settlements, demarcation of settlements and their appearance in space, recognition of elements of the natural and cultural environment as a tool for evaluating the preservation and protection of rural settlements, as well as creating criteria for the preservation and protection of spatial values of rural settlements and models for their further development.

In this research, the spatial analysis method, the comparative analysis method (comparative method) and statistical methods were applied. The method of spatial analysis was based on a detailed review and analysis of available studies, strategies, planning documentation, scientific and professional works, legislation and other available literature and research conducted on the topic of rural settlements. At the same time, field tours of the researched area were carried out in order to get to know the reality of rural settlements in Montenegro. The method of comparative analysis was used when considering/determining similarities and differences in the legal regulations of Montenegro, Croatia and Serbia, which observe settlements, the division of settlements and natural and cultural assets within them. Through the analysis of statistical data, available statistical materials were collected on the division and name of settlements and the movement of the number of inhabitants over certain time periods.

The application of the aforementioned research methods contributed to a better overview and understanding of the current state of rural settlements and made it possible to determine proposals for necessary changes, both in legislative documents related to the issue of rural settlements, and in changing expert steps in the creation and adoption of spatial planning documents for these areas and their further implementation. Tabular, cartographic and graphic attachments and photo documentation additionally contributed to an easier overview and monitoring of the complete research process.

The mentioned results of the conducted research provided a double contribution, review scientific contribution and original scientific contribution. In the first part of the dissertation, a critical review of previous research on the topic of rural settlements in Montenegro was given, after which a comparative analysis and systematization of the results obtained in those pieces of research was carried out. An analysis and evaluation of valid legal documents in Montenegro and abroad, dealing with settlements and their division, was also carried out. The research was additionally extended onto the analysis of spatial planning documentation for the observed area, all with the aim of examining the possibility of establishing new criteria for a settlement to be declared rural, as well as proposing new criteria for selecting rural settlements for continued research. The identity features of the natural and cultural heritage of rural settlements were observed, as an indispensable potential for their future development. An extensive analysis of the characteristics of 96 selected rural settlements was presented through a uniquely created catalogue form, which certainly represents a valuable basis for further research on this topic. The presented analysis and the obtained conclusions presented in the catalogue forms served as a starting point for determining new criteria and guidelines for the preservation and protection of the spatial values of rural settlements. The proposed and used catalogue form, which was applied to 96 selected rural settlements, can be considered original scientific contribution, so different in all established characteristics and criteria. The structuring of this catalogue form, which has led to the original results, certainly represents a certain original contribution because this kind of methodological procedure carried out through a unique catalogue has not been recognized in the scientific literature until now. The original scientific contribution was achieved through the review, analysis and critical review of previous research on the topic of rural settlements and the determination of key terms for the continuation of the research. The analysis and critical review of legal and spatial planning documentation for the area of four municipalities of continental Montenegro represents another scientific contribution that can be further used in scientific research on a similar topic in any other area of Montenegro and beyond. The newly proposed criteria and guidelines for the preservation and protection of rural settlements present a special contribution as they enable their further spatial and economic development.

SANJA SAVIĆ

SETTLEMENTS BY THE ADRIATIC COAST OF MONTENEGRO

PLANNING AND OTHER CRITERIA FOR THEIR DEVELOPMENT AND IMPROVEMENT BETWEEN 1945 AND 2006

NASELJA NA JADRANSKOJ OBALI CRNE GORE

PLANSKI I DRUGI KRITERIJI NJIHOVA RAZVOJA I UNAPRJEĐENJA OD 1945. DO 2006.

SANJA SAVIĆ was born in 1987 in Cetinje, Montenegro. She enrolled at the Faculty of Architecture in Podgorica in 2006. She has been employed at the Faculty of Architecture of the University of Montenegro in Podgorica since 2013.

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The dissertation has 514 pages, two groups of catalogue forms are found in Annex I and Annex II on 242 pages, 54 pictorial representations, and 101 images as a part of 67 catalogue forms in Appendix I and 72 cartograms in Appendix II, 41 tables, 21 cartograms and 10 graphs, and 229 notes, 187 literature units.

From 1945 to 2006, settlements on the Adriatic coast of Montenegro underwent major transformations, which changed their historical image as well as the image of the immediate landscape. These transformations resulted from the political, economic, and sociological changes that had occurred in the observed period. Due to the above, extensive changes in the urban structure and the appearance of individual settlements can be noticed. Comparing the researched and known criteria of settlement development (landscape, cultural-historical, legislative, spatial-urban, and economic), an attempt will be made to determine general and/or individual criteria of development and improvement of these settlements with the aim to establish clear general and individual guidelines for their future spatial and economic development. The conducted research covers the time scope of two periods: from 1945 to 1992, and from 1992 to 2006, making use of available archive material (topographic maps, plans and designs of settlements or parts of settlements in various scales), modern spatial planning documentation, statistical data, as well as the analysis of scientific research undertaken in the field so far.

During this research, a large number of spatial planning documents of various levels (from state to local) were reviewed. They were found in numerous state and private archives. Much of the used spatial planning documentation has not been published so far at all. After finding and recording the place where it is stored, a very detailed analysis of all available written and cartographic parts of a particular physical-planning documentation was conducted. The way of conducting the grouping of the found physical-planning documentation, their analysis and evaluation enabled the creation of certain conclusions necessary for the research. The results of this analysis and evaluation are presented in catalogue form in line with the needs of this research. However, this way of creating and designing a catalogue form can certainly be used in the analysis of physical-planning documentation for the purposes of other research, and with necessary minor changes. This type of catalogue form has not been used in any previous research, so its design can be considered scientific contribution in the field of research of existing spatial planning documentation.

The analysis of the built-up area is presented in the catalogue patterns of coastal settlements. The state of the built-up area certainly represents a unique way of presenting the changes in shape and size and thus scientific contribution in the field of research into the origin and formation of settlements throughout history, regardless of the fact that this research was done only for the period from 1945 to 2006. In this way, it is unequivocally confirmed that there was a built-up area which underwent change in a certain period and that there exists the greatest indicator of change in the area of coastal settlements. It is precisely these findings that proved to be very important in the process of recognizing directions, and later monitoring, the planned development of settlements in the area.

After reviewing and classifying the physical-planning documentation in a systemic manner, a slightly different procedure for evaluating physical-planning documentation grew from the research and involved analysing the existence, recognition and evaluation of identity features within the scope of the Plan, as well as determining the planning criteria for their further preservation and protection. The conditionality of the criteria for the development of settlements through previously evaluated identity attributes is shown in the table. After checking the existence of records for each settlement, the existence of planning guidelines for further development of the settlement was looked into in each plan, regardless of its level, but through the process of preserving and protecting the existing identity features.

The analysis of the identity attributes of an individual settlement, as well as the recognized planning criteria set out in the physical-planning documentation, revealed some vagueness or even non-existence of some very important criteria, and consequently planning guidelines that may be of great importance for coastal settlement development. The existing planning coefficients could be read mathematically as an equation with identified necessary features to establish guidelines for a planned development of coastal settlements. The newly proposed planning criterion (term) is certainly the capacity and coefficient of the beach/coast, which is directly related to the identity (natural and demographic) characteristics. Based on such newly established planning criteria, new planning guidelines for the development of coastal settlements can be determined.

At the very beginning of this research, three hypotheses related to the overall research of coastal settlements in Montenegro were set: The first one is that the development of any coastal settlement in Montenegro is a result of certain historical, natural, economic and political (even defensive) factors while the second is that the changes that occurred in the coastal settlements of Montenegro in the period 1945-2006, mostly occurred between 1992 and 2006, and that there were certain drivers for this. The third hypothesis is that the (planned) criteria for the development and improvement of coastal settlements and their possible shortcomings can be determined, suggesting the improvement of existing as well as the introduction of new criteria, on the basis of which a more appropriate development of coastal settlements would be achieved. The hypotheses (on the conditions of the development of coastal settlements of Montenegro, with the greatest changes occurring from 1992-2006 thanks to certain drivers, and the existence of planning criteria and the possibility of upgrading them and adding some new ones) have been confirmed through the research.

Increasing the spatial changes in the built-up area of the coastal settlements of Montenegro call for the preservation of their identity attributes, as well as for changes in the methodological approach in the development of spatial planning documents. Determining the criteria for the improvement of coastal settlements, which are based on the recognition of the identity attributes of the subject area, is a condition for their further planned development.

Boris Iharoš

The Model of Preparation and Evaluation of Sustainable Urban Development Projects

Model pripreme i vrjednovanja projekata održivoga urbanoga razvoja

Boris Iharoš (1971, Sisak) has a degree in architecture, Master of Science degree in interdisciplinary field of technical and social sciences and Ph.D. in architecture and urban planning. He works in the field of sustainable urban development and participates in the preparation of projects supporting territorial development and intended for international financing.

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The dissertation has 270 pages, 8 chapters, 53 illustrations, 95 tables, 16 charts, 21 footnotes and 141 bibliographic units.

The doctoral thesis and the research conducted in it consider the issue of preparation and evaluation of sustainable urban development [SUD] projects in the architectural and urban domain. The research framework represents financing through European funds. In general, and in relation to EU policies, sustainable urban development projects seek to achieve territorial cohesion, cooperation and partnership between cities and encourage balanced development. The results of the research indicate the emphasized importance of quality preparation of SUD projects in order to achieve these goals. The research is a continuation of previous theoretical knowledge and thus indicates the need for further research on the topic whose broader context is interdisciplinary.

The conducted research included analyses of 28 SUD projects at the level of formed urban areas of the Republic of Croatia, analyses of 16 SUD projects at the city level and analyses of the existing method of project preparation. Based on the conducted analyses three main research segments were identified and greatest problems observed as follows: (1) Identification of sustainable urban development projects, (2) The process of creating a conceptual solution, and (3) Preparation and evaluation of sustainable urban development projects. The analyses carried out according to the established evaluation criteria led to the results on the basis of which a link was established between the problems of project preparation at the level of urban areas and at the level of the city. Through this research, it was recognized that the problems of the existing method of preparation and part of the project quality problems relate exclusively to the organizational aspects of project preparation, and that the key to solving them is, therefore, precisely in the management of the project in an interdisciplinary manner. Also, it was noticed that problems can be solved by addressing them in a quality manner in the early phase of preparation. In this regard, from the architectural-urban aspect, the conceptual solution was recognized as the earliest design phase in which it is possible to implement multiple sustainable development measures that ensures the quality and sustainability of the project, with the importance of interdisciplinary preparation of project documentation. Related to the preparation process of conceptual solution, research on SUD projects has shown that city authorities do not pay enough attention to Terms of Reference [ToR] that form the basis for designing process. ToR represent a basic document that contains unified instructions for designers. It should be created by an interdisciplinary project team in cooperation with representatives of the city. In addition to architectural and urban planning indicators, the ToR should also contain requirements for achieving project quality according to the general selection criteria for EU financing and guidelines related to circular economy and green infrastructure envisaged in the strategic documents of the Republic of Croatia. The research has shown that the importance of ToR was not recognized, which indicates a lack of understanding of the basic processes and activities of the preparatory phase, the purpose of which is to ensure the quality of projects. As a response to the observed problems, and with the aim of creating sustainable SUD projects of quality, this paper has created a new conceptual solution process that is based on an interdisciplinary approach and includes architectural-urbanistic and economic elements.

As the main result of this research a unique model for preparation and evaluation of SUD projects was established and offers solutions for previously identified problems. The model is harmonized with European and national policies, supports polycentric development and enables the selection of SUD projects according to the real needs of cities, emphasizing the preparation of quality project documentation as a prerequisite for EU funding. The research established a model that, in addition to scientific contribution, has a practical application by providing support to cities – initiators of public projects in the field of SUD, and architects, urban planners, engineers and other experts in preparing quality and sustainable projects. The model is aligned with the Project Cycle Management [PCM] methodology which is according to European Commission a main tool for the implementation of all programmes and projects financed by EU funds. With this research, the main phases of PCM are fully accepted, with the fact that the preparation of projects takes place within two phases – identification and formulation. The proposed model of preparation finds its origin in these phases and builds on the processes that are necessary for the preparation of projects from the perspective of the architectural and urban planning profession, taking into account the social and economic aspects that are an inseparable part of project preparation. The model is designed and unified with five key processes: (1) project selection, (2) planning, (3) technical development, (4) public invitation, and (5) selection procedure and also indicates the preparation segments (key processes) in which it is possible to solve the identified problems with adequate project management skills, which implies an interdisciplinary project team in charge of complex and multi-layered problems that arise during project preparation. The basic assumption of this model is that the successful preparation of SUD projects depends on the members of the interdisciplinary project team who possess professional knowledge, competencies and mandatory previous experience in the preparation of EU projects.

The model with such assumptions becomes a valuable tool for the preparation of quality and sustainable projects, the implementation of which contributes to the development of Croatian cities and urban areas and improves access to various public content that is a prerequisite for achieving a better quality of life for the citizens of the Republic of Croatia.

The scientific contributions of this research are manifested through: (1) Establishing the SUD project identification system, (2) New procedure for creating conceptual solutions, (3) Defining a set of harmonized criteria, (4) Establishing an evaluation system, and (5) Establishing a unique model for the preparation and evaluation of SUD projects.

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