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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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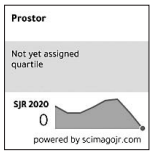

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Fig. 1 Adolf Loos, photo: Viktor Kovačić, Vienna, 1905 (upper left); Hugo Ehrlich (upper right); Villa Karma, photo: Martin Gerlach jun., 1930 (down).

Dina Vulin Ileković[1], Boris Ileković[2]

[1] University of Zagreb, Faculty of Architecture, Fra Andrije Kačića Miošića 26, 10000 Zagreb, Croatia
https://orcid.org/0009-0004-4414-0889

[2] University of Zagreb, Faculty of Architecture, School of Design, Frankopanska 12, 10000 Zagreb, Croatia
https://orcid.org/0009-0005-5464-0753

dvulin@arhitekt.hr
bilekovic@arhitekt.hr

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Hugo Ehrlich and Villa Karma

Adolf Loos
Hugo Ehrlich
Villa Karma

Villa Karma's authorship is as a rule ascribed to Adolf Loos. According to most accounts, the villa was formed by taking an existing structure and extending it upwards and sideways, in the period between 1903 and 1906. However, as a matter of fact, at that time the construction of the new parts and the transformation of the existing building had only just begun. The period in which the Zagreb architect Hugo Ehrlich was involved in the design and building of Karma stretched from 1908 to 1912; it was then that the villa took on its final external appearance. At the same time the grounds were landscaped, and the interior spaces were defined according to Ehrlich's designs. The hall and the library are an exception, for Ehrlich produced them in line with Loos's approach and in part with materials already sourced. An examination of the documentation kept in three countries has shown that the claim that Ehrlich was just the contractor for the building of designs previously defined by Loos is untenable. The original style can be correlated with a series of formal motifs in the works of Hugo Ehrlich or Viktor Kovačić at the time they were working together, which was contemporaneous with the period in which Karma was undergoing its finalisation. The most telling confirmation of Ehrlich's work consists of several hundred drawings from Ehrlich's personal papers.

Introduction

Beautiful buildings are preserved, renovated and revitalised... Such buildings are regarded as part of the architectural history and the richness of the city; they are protected and defended against speculation. Beauty gives a building important, big, reliable value.

(Vittorio Magnago Lampugnani in: Magnago Lampugnani, 2016: 74)

It is not a matter of indifference whether some architectural work is beautiful or not, notwithstanding all the complexity of the use and definition of the concept of architectural beauty. Works that are beautiful *enjoy a sort of immunity in the city and in history* (Magnago Lampugnani, 2016: 74). And it is not all the same who the architect is, for the work is indivisible from the author. Although all architects and architectural theorists would probably agree that authorship should not *per se* affect the perception of the beauty or architectural quality of some building, it will without doubt to a great extent influence its value and how much it is featured in critical essays and in publications in general. Authorship and authenticity are fundamental to the determination of the value of an artwork. Without getting into the issue of whether architecture is an art, we shall agree that the value of some building will depend to a great extent on the reputation and prestige of the architect. Villa Karma is a creation that belongs in the elite shortlist of the best-known pieces of architecture of the 20th century. Since it is one of the key structures of its time, the issue of authorship is sensitive indeed, for it contributes to the value of the work and, conversely, the value of the work contributes to the valorisation of the architect's oeuvre.

The villa is sited in Clarens, now a district of the municipality of Montreux on Lake Geneva. It is primarily and almost exclusively associated with Adolf Loos[1] (Fig. 1). It was his first real building[2], which was preceded by work only on the execution of interiors. In historical surveys it is mostly dated to the years 1903 to 1906, although the construction was then not even nearly finished. This is also to ignore completely the importance of the period in which Hugo Ehrlich[3] was at work (Fig. 1), from 1908 to 1912. If Ehrlich is mentioned in the context of the building of the villa, his role is interpreted as a mere contractor for the works according to designs that Loos had already completed. To answer the question what was done according to the ideas and drawings of Loos and what according to those of Ehrlich, one needs to consult the archival records located in Switzerland, Austria and Croatia.

The purpose of the research was to investigate the available documentation that unequivocally proves the extent of Hugo Ehrlich's share in the authorship of Villa Karma and consequently to confirm his own description of the contribution. This paper establishes the impact of his project on the final design of the villa and places Ehrlich's contribution in the context of his architectural projects created during the same period of time.

Loos and Ehrlich

Loos, one of the best-known architects of the 20th century, needs no introduction, for he is omnipresent in the writings of the discipline, not only because of his architectural produc-

1 Adolf Loos (1870-1933)

2 In the 1910 text *Mein erstes Haus*, Loos writes about his first building, meaning the Goldman and Salatsch building on Michaelerplatz known as the Looshaus. But at the beginning of this piece of writing he mentions his previous work that he calls the porter's lodge – *portierhäuschen* – thinking of Karma. (Loos, 1910 in: Loos, 1962: 293).

3 Hugo Ehrlich (1879-1936) graduated from the Technical High School in Vienna as a student of Karl König. He started his architectural practice in the studio of Humbert Walcher. In 1909 he went back to Zagreb where he worked and lived for the rest of his life.

4 Loos and Ehrlich took part separately in the invitational international design competition for the Esplanade Hotel. Together with Kovačić they agreed to cooperate in the event that any of them were entrusted with the construction (Bjažić Klarin, 2020: 137).

5 Viktor Kovačić (1874-1924) was one of the most important Croatian architects of the 20th century, and has been dubbed the father of Croatian modern architecture. He trained in Vienna at the Academy of Fine Arts, where he was a student of Otto Wagner; he went back to Zagreb in 1899. Often mentioned is his friendship with Loos.

6 *They studied the commissions together, and one of the partners, depending on the circumstances and in agreement with the other, would take on the elaboration of details, supervising the job and finishing each individual order.* (Galović, 2015: 60)

tions but, even more, perhaps, because of his polemical texts. His views and stances, positively or negatively taken on board, did not go unnoticed even in the time of their origin, and later on attracted a great amount of interest from critics and theorists of architecture. They have been analysed down to the smallest detail countless times. Loos endeavoured to get through to the general public, and did manage to create the kind of buzz that was very important for his activity. He wrote productively on a wide range of topics.

When it came to his designs, Loos was not dogmatic. On one level he is a modernist, on another he is recognized as a traditionalist with principles that did not produce a unified language (Andrews, 2010: 440). He was primarily an architect of the intimate, smaller scale with some 56 apartment interiors executed during his lifetime. Except apartment interiors, dominant among his productions are shops and cafes interiors as well as those of dwelling places, on the whole villas, in which he affirmed the *Raumplan* principle. The Michaelerplatz building is the only large-scale built work in his oeuvre, although he did produce a number of designs for buildings with public facilities, among others a competition design for the Esplanade Hotel[4] in Zagreb in 1922.

As distinct from Loos, who in the broadest of senses was a public personality, Ehrlich had a restrained and introverted nature and as a rule did not make his views and opinions public. (Domljan, 1979: 226). While both talented and broadly educated, he was practical and realistic. The oeuvre of Hugo Ehrlich, although extensive, considerable and properly evaluated in the context of Croatian architecture, is neither known to the global public nor mentioned in international architectural surveys. His operations were on different scales and had different purposes: interiors, town plans and buildings with public purposes. Particular importance attaches to the period in which he worked together with Viktor Kovačić[5], which began in February 1910. This period gave rise to designs and built works giving evidence of the style of Ehrlich either on his own or in company with Kovačić[6] in the context of the completion of Karma. The business partnership of Ehrlich and Kovačić was unofficially terminated when Ehrlich went off for military service in 1914, but formally after the war. He put forward his own architectural and planning designs for the new complex of the Technical Faculty, with its very contemporary idiom, and blamed local conditions for his deferral of the implementation of modernist principles.[7] Ehrlich was appointed professor at the Technical Faculty in Zagreb in 1925.

During the 1920s, almost all the most talented architects of the younger generation got together in Ehrlich's independent studio.[8] With their own productions, in the 1930s, they were fully to affirm modern architecture in Croatia.[9]

It is hard to cast any doubt on Adolf Loos's share of the authorship precisely because of his international eminence.[10] A more considerable role of an unknown architect could seemingly diminish the potential value of the structure. Thanks to the professional authority of a number of writers who have not devoted sufficient attention to the issue of the authorship of Villa Karma, but whose claims have been accepted unconditionally, the role of Hugo Ehrlich has been neglected. Compounding this, biographers and researchers will frequently identify, consciously or unconsciously, with an author by protecting his interests. And finally, it is not unimportant that the documentation from the Hugo Ehrlich Papers is on the whole not known to international professional circles.[11] Most of this documentation has been deposited in the Fine Arts Archives of Croatian Academy of Sciences and Arts, some of it in the Croatian Academy of Sciences and Arts Architecture Museum. It was donated by Hugo Ehrlich's niece, Marta Ehrlich Tompa. The Croatian Academy of Sciences and Arts Fine Arts Archives have 420 inventory sheets or drawings for the project *completion of the remodelling and extension of the Villa Karma* (Martinčić, 2007; 35).

Loos is well known to have been an architect who was not fond of drawing.[12] He held that

7 At the time he wrote the letter to Henri-Robert Von der Mühll, Ehrlich was clearly already engaged in designing the new complex of buildings of the Technical Faculty (Ehrlich, April 16, 1928, in: Von der Mühll, 1928), for which in the years to come he made two versions, neither of which, unfortunately, was built.

8 Alfred Albini, Branko Bon, Juraj Denzler, Drago Galić, Mladen Kauzlarić, Veljko Kauzlarić, Juraj Meniga, Josip Pičman, Vladimir Potočnjak.

9 Aleksander Laslo thoroughly researched the influence of Loos on Croatian architects e.g. Zlatko Neumann, Bela Auer, Ernest Weissmann, Bogdan Teodorović and Vladimir Potočnjak (Laslo, 1984: 120-133; Laslo, 1987: 97-112; Laslo, 1991: 52-80).

10 It is not unusual for the most famous member of the design team to be mentioned in architectural reviews, while the others are left out. In this case, it is not about teamwork, but about the successive and independent engagement of two authors on the same building design.

11 Additional Ehrlich documentation related to the building of Karma was mentioned as part of the Vernikos-Eugenides Fonds in Montreux (Gubler, 1985: 302). About 180 drawings comprised part of the Tihomil Stahuljak bequest owned by the collector Josip Jura Gašparac. The ledgers of the Ehrlich and Kovačić office, kept from 1910 to 1918 can also be used to track the activities related to the Karma commission.

what an architect drew was an attempt to be understood by the master builder who was carrying out the works (Loos, 1924, in: Loos, 1962: 392). He always paid attention to the materials available[13] (Ehrlich, 1933: 174-175). The work of Loos on Karma is notable for the lack of graphic documentation, while in the Hugo Ehrlich Papers there are several hundred drawings. Ehrlich and Kovačić had remarkable visual sensibilities and their designs are accompanied by numerous perspective drawings.

Both Adolf Loos and Hugo Ehrlich considered Villa Karma to be their work. At the end of the 1920s they wanted to agree on photographing the built situation with the then owner, Regier, which he wanted to facilitate for both architects (Von der Mühll, April 17, 1928).

Villa Karma: The Client and the Architects

The path from idea and architectural design to a completely constructed building is sometimes intricate, and is hardly ever simple. Villa Karma is one of the many-layered and intriguing examples that can illustrate this vividly.

It is not very unusual for a client to engage several architects on the same project. Dissatisfied with collaboration with the first one, the client will seek a second or even a third. A family house is an issue to which the client will as a rule dedicate themselves in the expectation of the materialisation of their own vision of ideal living. But when there is once a clear break between architect and client, both of them turn in different directions, the designer to a new assignment and the client to a different architect, hoping for a better outcome of the new collaborative venture. Irrespective of the documentation that gives the lie to this possibility, any assumption that after the break with the client, Theodor Beer, Loos might have gone on with his work "in the shadow", advising Ehrlich as he designed, is completely unrealistic.

The house of Dr Theodor Beer was supposed to be harmonised with his sensibility and with the physical and psychic needs of the doctor and of his wife Laura. Apart from that, it inevitably reflected his social and material standing. Theodor Beer[14] was not a client that architects might wish for, and plenty is known about his personality. Having an authoritative bent and a hasty temper, he supervised every detail, at the same time putting forward his critical remarks. It was hard to satisfy him and he often required modifications and the production of new, variant approaches. He gave detailed instructions about the design of the individual rooms and the use of materials and colours; he defined the brief down to the slightest details, leaving not very much scope for the, so-called, creative freedom of the actual architect (Behalova, 1974: 32-39). He had turned his attention to Loos when he already had a design of the local architect Henri Lavanchy and after he had already contracted for the making of the interior appointments with the firm of F.O. Schmidt of Vienna, an order that he later cancelled. Right at the beginning of their collaboration, Beer mentioned that only time would tell whether Loos's work was going to satisfy him (Behalova, 1974: 32-39), and his personal problems to a major extent affected the development of the project and the unfolding of the works. According to Loos, they had not been personally acquainted before the commission for Karma (Schwartz, 2012: 454), although they moved in the same Viennese intellectual circles, proponents of the ideas of Viennese Modernism, and cultivated close relations with influential contemporaries like Ernst Mach, Sigmund Freud, Arthur Schnitzler, Karl Kraus, Peter Altenberg, Arnold Schönberg and Bertha Eckstein-Diener.

Ehrlich was taken on as architect after the better-known Maks Fabiani[15], who had already made his name. Clearly, he did not want to, or simply could not, accommodate himself to the demanding client. In the given circumstances, Ehrlich's youth plus his enthusiasm and drive at the beginnings of his career were an advantage. The number of his different approaches and detailed drawings show the necessary patience and flexibility. It is significant that it is his unbuilt designs that

12 *I have no need whatsoever to draw my designs. Good architecture, how something is to be built can be written. One can write the Parthenon.* (Adolf Loos, 1924 in: Risselada and Colomina, 1993: 175)

13 While building the Goldman and Salatsch edifice on the Michaelerplatz, Loos asked the authorities not to insist on detailed drawings, for he still did not know what material was going to be available to him and he deferred the solution of the cladding of the façade until a given and available stone block should be found (Schwartz, 2011: 447).

14 Theodor Beer (1866 – September 27, 1919) was a physiologist and the founder of behaviourist psychology with a wide range of other interests among which one might list photography, philosophy, Buddhism and sport. His liking for Buddhism must have contributed to the selection of the name Karma and the yin-yang symbol that is placed on both leaves of the main entry door. In 1903 he became a professor at Vienna University. But by 1904 his reputation as a scientist and his academic career had already been compromised by criminal charges and a later trial. On advice of counsel, he left for England, and then for America, where he stayed for more than a year. At the end of the trial he managed to avoid a prison sentence by paying a fine. Neither an appeal nor a pardon at the request of Franz Joseph I were of avail. Beer withdrew to Switzer-

comprise the most attractive part of his archive related to Karma (Ehrlich January 20, 1928 in: Von der Mühll, 1928).

Theodor Beer during the whole course of the construction supervised the design approaches and influenced designer decisions. His sketch for an entry portico with four Doric columns was found in one of the letters to Loos (Rukschcio and Schachel, 1982: 93). The sketch does not suit the built state, but Ehrlich solution for the entry portico nevertheless has four Doric columns.

Villa Karma 1903-1906

The works on the villa will be presented in the time frames of two periods, the first marked by the work by Henri Lavanchy and Adolf Loos (1903-1906), and the second, related to the involvement of Hugo Ehrlich (1908-1912). Spatial interventions carried out after the period of Hugo Ehrlich's work refer primarily to the furnishing of the rooms on the second floor and are not the subject of this article.

The nucleus of Villa Karma consisted of a building originating in the end of the 18th century and renovated a century later. The building lay on the site of the demolished complex of a former Benedictine monastery that in the 16th century was meant for the care of lepers, hence the placename *à la Maladaire* (Gubler, 1985: 215). From the eastern, approach side, the building had a ground and a first floor with a mansard roof, but from the western, lake-facing side it had two stories and a mansard, related to the elevation differences on the site. The simply formed building[16] with its rectangular ground plan, dimensions about 11.8×14.5 meters with a hipped roof was located on a plot with a direct lake frontage. The position and the views onto the surrounding countryside were exceptionally picturesque. The internal space of the main floor consisted of four unequal rectangular rooms and a central communication. The division of space was followed by two load-bearing walls, longitudinal and transversal. In the later intervention, the internal loadbearing walls were retained, without a doubt because of the structural logic.

Theodor Beer called the building Villa Karma, and had already, in 1903, commissioned designs for the transformation of the original building from the local architect Henri Lavanchy.[17] The volume handling of the extension can be ascribed to the new owner. Theodor Beer did not only describe in detail the functions and dimensions of the space but also expressed his view of the volume – the

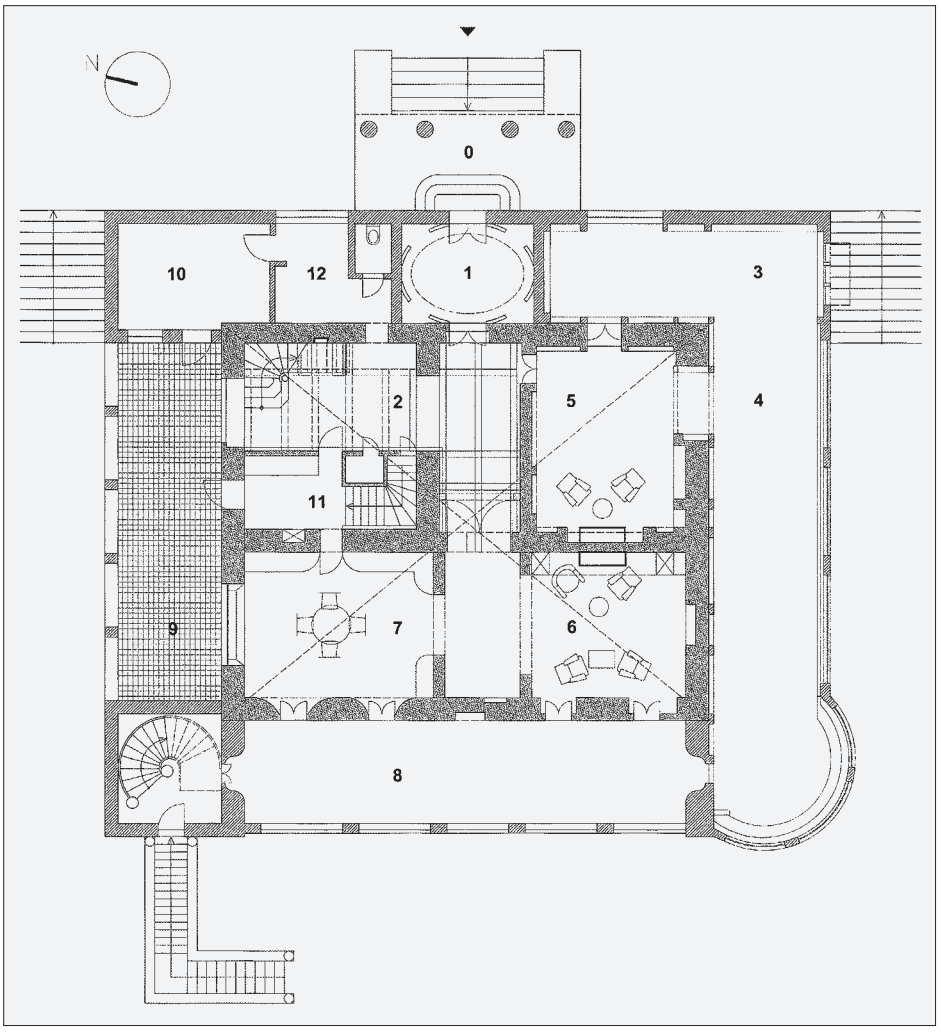


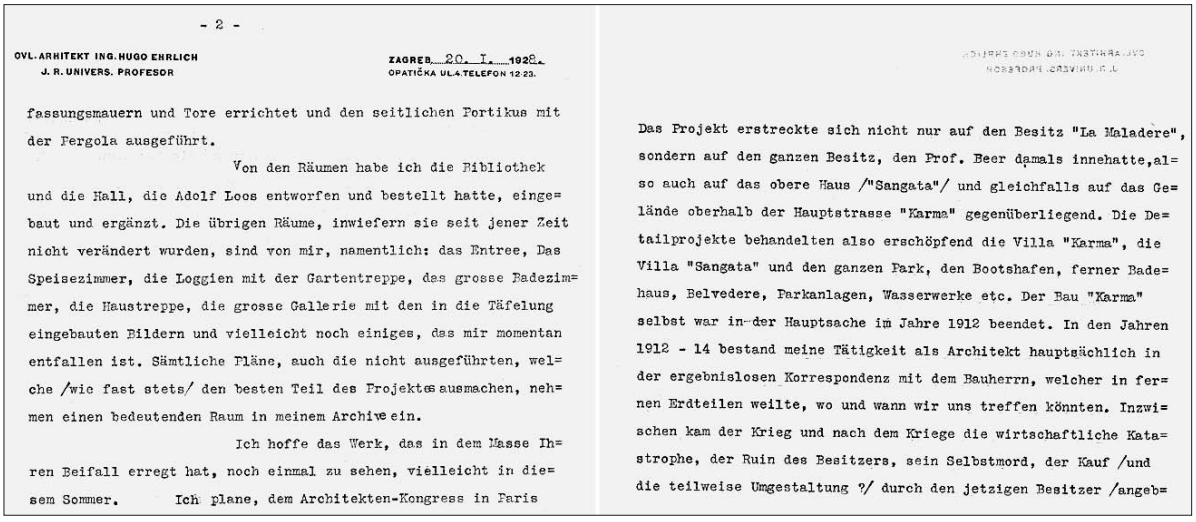
Fig. 2 Villa Karma, Floor plan of the entrance floor, author's drawing. 0 Entrance porch, 1 Vestibule, 2 Hall 3 Study, 4 Library, 5 Gentlemen's room, 6 Smoking room, 7 Dining room, 8 Veranda, 9 Terrace, 10 Servant's quarters, 11 Stair to kitchen in basement 12 Cloakroom.

land and in 1916 was called up. He committed suicide in Lucerne in 1919 after going bankrupt, on the very same day that Karma was auctioned off. (Schwartz, 2012: 437-442; Rukschcio, 1973: 33)

15 Maks Fabiani (1865-1962) graduated at the Technical High School in Vienna, where for a short time he worked on Otto Wagner's designs. He was an assistant to Karl König at the Technical High School, and he must then have met Hugo Ehrlich. In the Maks Fabiani Institute Archives, Štanjel, Slovenia, there are no records related to Villa Karma. It is interesting that in 1899, Fabiani, who was already established, provided the then little-known Loos with a commission for the interior design of the Café Museum in Vienna (Rukschcio, 1973: 35).

16 The drawings and perspective sketch of the existing building are in the Ehrlich Papers.

17 Henri Lavanchy (1836-1914) was born in Vevey. He did most of his work in his native city and in the surrounding towns of the Vaud canton. He studied architecture in Zurich at the recently founded Polytechnic. On graduating, he spent a year more studying in Munich at the Academy of Fine Arts, and then in 1860 returned to Vevey. He ran a firm *Lavanchy & Fils* whose stamps can be seen on the drawings made while Loos was working on the project. (Fl., 1914: 207-208)



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fassungsmauern und Tore errichtet und den seitlichen Portikus mit der Pergola ausgeführt.

Von den Räumen habe ich die Bibliothek und die Hall, die Adolf Loos entworfen und bestellt hatte, eingebaut und ergänzt. Die übrigen Räume, inwiefern sie seit jener Zeit nicht verändert wurden, sind von mir, namentlich: das Entree, Das Speisezimmer, die Loggien mit der Gartentreppe, das grosse Badezimmer, die Haustreppe, die grosse Gallerie mit den in die Täfelung eingebauten Bildern und vielleicht noch einiges, das mir momentan entfallen ist. Sämtliche Pläne, auch die nicht ausgeführten, welche /wie fast stets/ den besten Teil des Projektes ausmachen, nehmen einen bedeutenden Raum in meinem Archive ein.

Ich hoffe das Werk, das in dem Masse Ihren Beifall erregt hat, noch einmal zu sehen, vielleicht in diesem Sommer. Ich plane, dem Architekten-Kongress in Paris

Das Projekt erstreckte sich nicht nur auf den Besitz "La Maladère", sondern auf den ganzen Besitz, den Prof. Beer damals innehatte, also auch auf das obere Haus /"Sangata"/ und gleichfalls auf das Gelände oberhalb der Hauptstrasse "Karma" gegenüberliegend. Die Detailprojekte behandelten also erschöpfend die Villa "Karma", die Villa "Sangata" und den ganzen Park, den Bootshafen, ferner Badehaus, Belvedere, Parkanlagen, Wasserwerke etc. Der Bau "Karma" selbst war in der Hauptsache im Jahre 1912 beendet. In den Jahren 1912 - 14 bestand meine Tätigkeit als Architekt hauptsächlich in der ergebnislosen Korrespondenz mit dem Bauherrn, welcher in fernen Erdteilen weilte, wo und wann wir uns treffen könnten. Inzwischen kam der Krieg und nach dem Kriege die wirtschaftliche Katastrophe, der Ruin des Besitzers, sein Selbstmord, der Kauf /und die teilweise Umgestaltung ?/ durch den jetzigen Besitzer /angeb=

FIG. 3 LETTER FROM HUGO EHRLICH TO HENRI-ROBERT VON DER MÜHLL, JANUARY 20, 1928.

one-floor upward extension and the expansion by which new development surrounded the existing structure. Basically, he defined the principle of wrapping the existing structure around with a new volume and the building on of new storey with a flat roof. He had very precise demands concerning function, among which there was a dome or moveable roof to be used as an observatory, a laboratory and a gymnasium, not to be located in the basement but conceived as a bright and airy space linked with the master bathroom.

Henri Lavanchy was a pupil of Gottfried Semper (Fl., 1914: 207-208) and produced the first design that envisaged the extension and enlargement of the house with galleries, at first on two sides, and later on three, with a width of about three and a half meters. The apertures that in the new approach were caught inside the building were mostly formed in such a way as to be used as connections between rooms. The three facades of the existing building were incorporated into the interior of what was to become the villa.

The shape of the principal façade onto the lake had a historicist character, with a pronounced plastic richness used to articulate the vertical and horizontal elements of the façade. In a classical spirit, it was divided into three horizontal zones. Such a concept was radically changed as soon as Loos became involved in the project.

The alteration to and simplification of the façade clearly came in after February 10, 1904, when Beer and Loos had signed a contract for the *Innendekoration* and for minor interventions outside the actual house (Behalova, 1970: 12). During the Loos period, Lavanchy continued making construction drawings. Although Loos was originally put in charge of the interior design (*Inneneinrichtung*), he did design variants of the facades, and probably to some small extent intervened in the floor plans that Lavanchy had set up in association with Beer. So, Lavanchy was basically charged with the preparation and elaboration of the construction drawings[18] while Loos was primarily involved with interior design. Furthermore, he occasionally made some preliminary sketches for Lavanchy by way of guidelines or subsequently made some corrections of Lavanchy's construction drawings. In general, Loos's role was of an aesthetic character. Thanks to the correspondence between Beer and Loos that can still be consulted, it is possible to track Loos's tasks as architectural designer. A clearer image of the dynamics of the works is provided by the payments of Loos's fees, although specific drawings are on the whole not in existence (Behalova, 1974: 56-89). Villa Karma does not have the characteristic Loosian *Raumplan* elements. The client required a single floor level without any delevelling.

18 Since Loos never obtained his professional qualifications, the documentation for permits had to be signed and prepared by other, authorised, architects. Ernst Epstein, for example, signed the plans for the Michaeler platz building.

19 The trial was held on October 25 and 26, 1905, but the charges had by early 1904 already brought about a halt in the works and the absence of the client. Loos testified on behalf of Beer and at his request attempted to mould public opinion by engaging his friends. Later it turned out that he had taken part in the concealment of evidence and that he had borne false witness (Schwartz, 2012: 440).

20 Laura Beer (1883-1906) took her own life on March 23, 1906, in Clarens.

21 Henri-Robert Von der Mühll (1898-1980), a champion of the international avant-garde, was the co-founder of *Congrès internationaux d'architecture moderne* (CIAM) and thanks to him Ehrlich was invited to the first conference in 1928 in La Sarraz Palace. In letters sent to Von der Mühll he confirmed his coming with enthusiasm; in the end, however, he did not take part in this meeting of 28 European architects.

Loos's work on the villa was interrupted at the very outset because of the indictment and trial[19] of Theodor Beer. Not quite a month after the signing of the contract, on March 6, 1904, Laura Beer wrote to Loos that the work on Karma had to be stopped, and on May 6, 1904 declared that Karma would perhaps not be able to be finished (Laura Beer, 1904 in: Schwartz, 2012: 453). In the same light, in July of the same year, Beer wrote to Loos from San Francisco that the building should be built with the cheapest materials for it to be able to be used, let or sold (Behalova, 1974: 39; Rukschcio, 1973: 34). Who would live in it Beer did not know any more; he simply emphasised the need to give up on anything that was not necessary for the basic function. He was thinking of wood panelling, marble, brass, built-in furniture, and multiple times stressed the need for simplification to the nth degree in order to achieve a usable, hygienic and practical space, furnished with the existing furniture. At the end he wrote that his dogs were to be sold, because they ate too much. (Behalova, 1974: 41)

On a reduced scale the work was taken up again in June 1905. At the end of the year Beer was dissatisfied with Loos's work and required greater assiduity from him in the interest of the architect's own good name (Behalova, 1974: 43). For the sake of furnishing Karma, Loos left for London in early 1906, but the situation was strained. Beer forbade him any purchases. After the death of Laura Beer[20] in March 1906 there was another hold up and the client and architect finally parted ways; their collaboration had lasted a bit more than two years with many interruptions. Beer and Lavanchy wanted the drawings Loos had had from them back so as to be able to carry on the renovation without him.

At the moment of the break with Loos, the main body of the building was defined in outline and in part built, but not completed, while parts of the interior were designed, but not built. The work was extremely discontinuous and design solutions were created partially and with numerous variant solutions according to the requests of the client. From the available sources it can be inferred that at the beginning of 1909 Karma was still uninhabited (Behalova, 1974: 47).

Fig. 4 Adolf Loos, Villa Karma, sketches, around 1904 (up); Hugo Ehrlich: Villa Karma, drawing, 1908 (middle); Hugo Ehrlich, Villa Karma, southeast view (down left) and northwest view (down right), drawings, 1908.

Villa Karma 1908-1912

Ehrlich took over Karma as an abandoned and dilapidated building site in 1908, probably at the recommendation of Humbert Walcher, in whose studio he had started his professional career (Domljan, 1979: 29). In the same year, he was introduced to Loos by Viktor Kovačić (Ehrlich, 1933: 174). The most dynamic tempo period of his work came between 1909 and 1912. Still in existence are hundreds of drawings, documents of the time in which Ehrlich produced an *extremely large number of detailed designs* (Ehrlich January 20, 1928, in: Von der Mühll, 1928). Swiss architect Henri-Robert Von der Mühll[21] tried to specify the authorship of Karma. For help, he turned to his older colleague Alphonse Laverriére, who named Josef Hoffmann from Vienna or Hugo Ehrlich from Zagreb as possible authors (Laverriére December 30, 1927, in: Von der Mühll, 1927). Thanks to this information, Von der Mühll contacted both of them and the role of Hugo Ehrlich has been to a great extent explicated. At last he had the

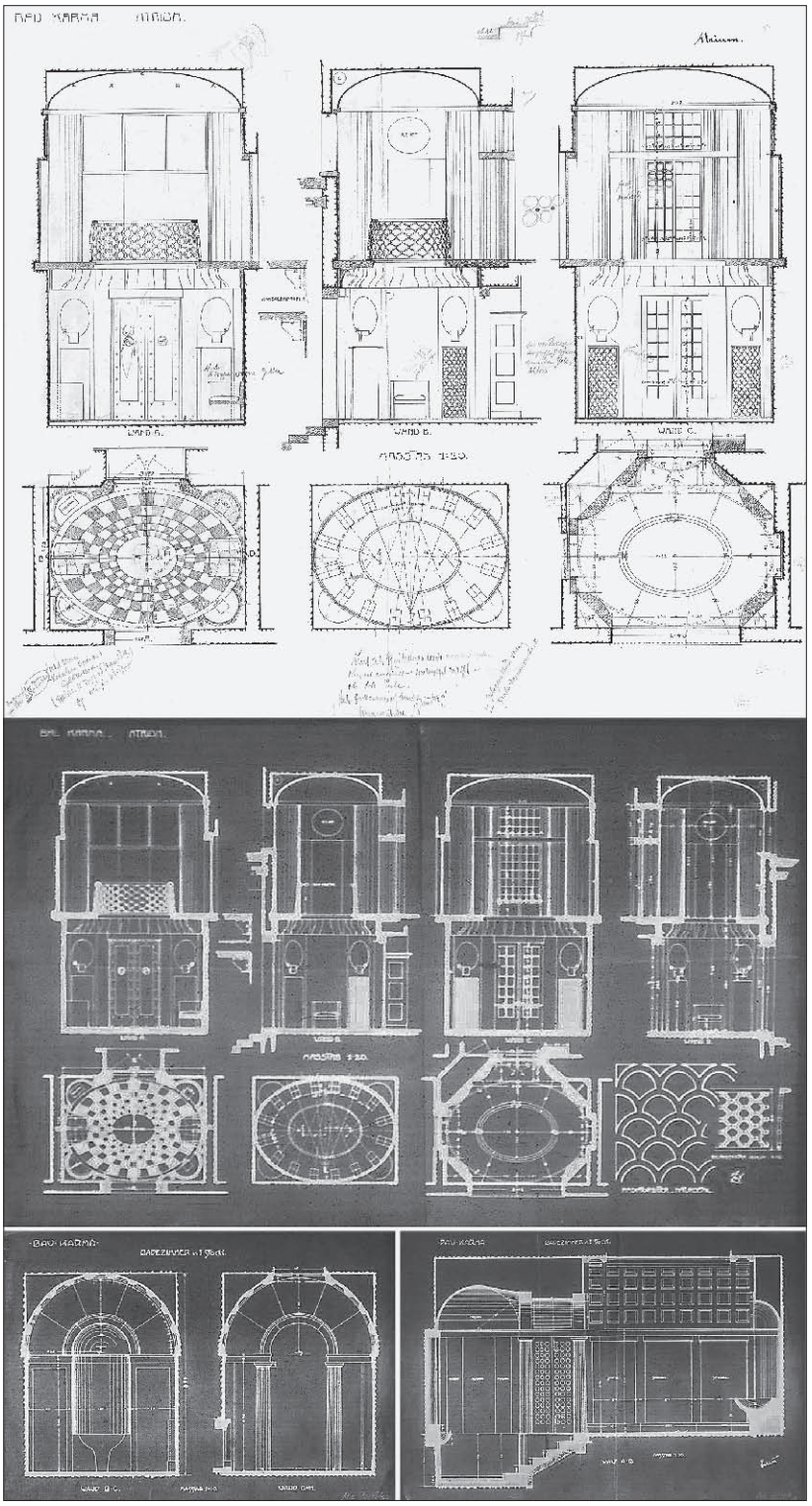

Fig. 5 Hugo Ehrlich, Villa Karma, Vestibule (*Atrium*), drawing (up) and heliographic copy with Ehrlich's initials (middle), around 1909; Hugo Ehrlich, Villa Karma, Master bathroom, drawing with Ehrlich's signature, around 1909 (down).

The gallery railing and the metal niche guards were not done according to this variant approach. It can also be seen that the drawing does not include a central lightwell in the form of a pyramidal glazed volume.

chance to describe his work and come out of the shadow of Adolf Loos (Fig. 3). Ehrlich sent an identical letter with a detailed explanation of his work to Von der Mühll and to Loos at the same time, which tells that he wrote what he considered to be the truth.

In his monograph published in Vienna in 1932 we find: *Ehrlich built the exterior of the building using Loos's upward and lateral extensions in terms of his own drawings and his own supervision. Also coming from Ehrlich was the landscaping of the grounds, the boundary walls and the preponderant part of the interior decoration*. But later this first-hand testimony was forgotten. The topic of the authorship of the second phase of the construction of Karma was affirmed by Jacques Gubler (Gubler and Barbey, 1969: 215-216; Gubler, 1985: 214-229) and Vera Behalova (Behalova, 1974). It was Behalova who studied the documentation related to the period of the work of Hugo Ehrlich in most detail. This documentation takes up the major part of the graphic appendices of her dissertation. Žarko Domljan in his monograph also cited several guidelines, referring to possible sources (Domljan, 1979).

What did Ehrlich exactly do regarding the exterior of the building? In his own words he *constructed a flat roof, partly walled up Loos' terraces, partly glazed and fitted it with bars, fixed the pergolas, closed the window openings, installed sanitary facilities, designed the garden, built the porticoes and façades, put up the enclosing walls and gates and erected the side portico with a pergola* (Ehrlich, January 20, 1928, in: Von der Mühll, 1928).

Loos's radical formal austerity and striving for reduction were the occasion for the halting of the works, with the explanation that this was *an attempt at the assassination of the beauty of Geneva's lake* (Loos, 1910 in: Loos, 1962: 293-294). With his intervention, Ehrlich toned down this impression by bringing in the motifs of a pergola, greenery, arches, porticoes and sculptural elements – mascarons used as wa-

22 The hall is the space entered from the oval vestibule. In Ehrlich's drawings the vestibule is called the atrium. One of Loos's sketches for the hall is kept in the Viktor Kovačić Papers in the plan collection of the Ministry of Culture and Media of the Republic of Croatia.

23 At the time of the beginning of the works on Karma, Wilhelm Beer (1832-1905), Theodor's father, was owner of Sangata and the land on which it was built.

24 *The project encompassed the „La Maladere" estate as well as the entire estate Prof. Beer was working on, that is, also the upper house („Sangata") and the building plot beyond the main road opposite „Karma". The detailed designs provided in-depth data on the villa „Karma" and the villa „Sangata", the entire park, the boathouse, bathhouse, Belvedere, parks, waterworks etc.* (Ehrlich, January 20, 1928, in: Von der Mühll, 1928).

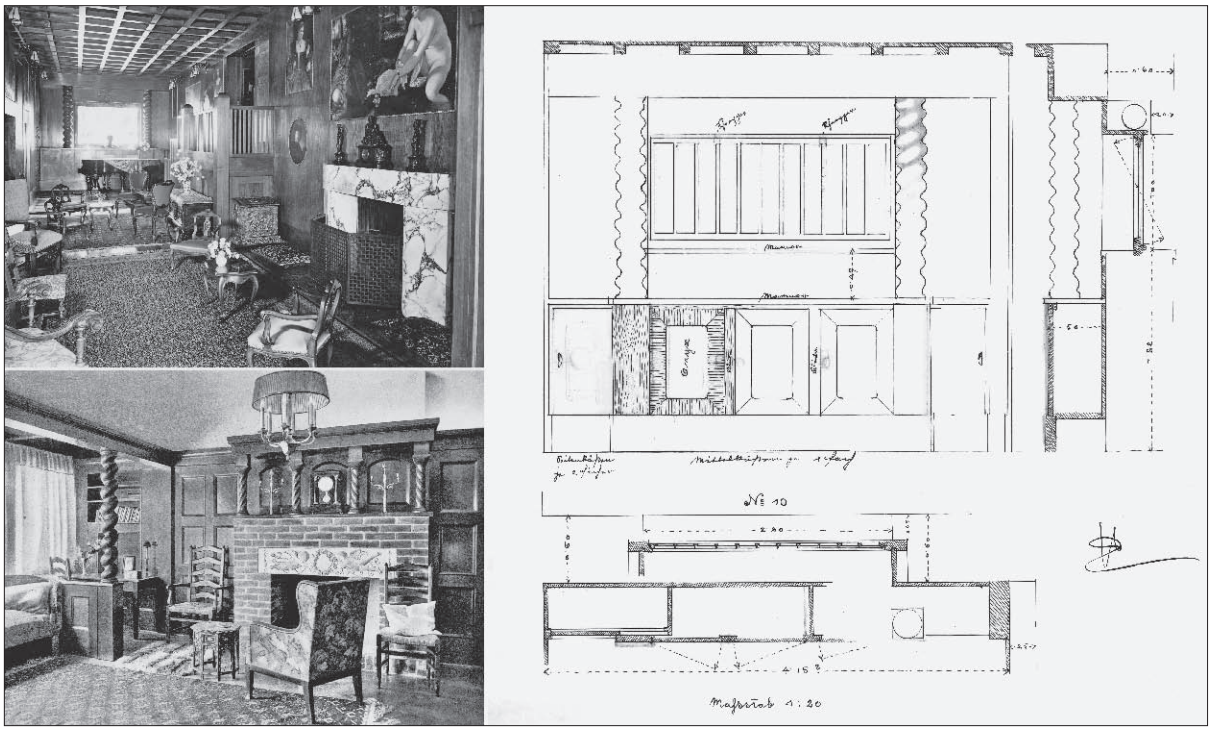

Fig. 6 Hugo Ehrlich, Villa Karma, Music room (upper left); Ehrlich & Kovačić, Villa Vrbanić, Den, 1910-1911 (down left); Hugo Ehrlich, Villa Karma, Music room, drawing, detail, around 1909 (right).
Large or small twisted columns are frequent motifs in Ehrlich and Kovačić interiors and are also present in the Villa Karma.

ter spouts. All this combined with his architectural and horticultural treatment of the plot gave it a certain picturesqueness that bore the mark of its maker (Fig. 4).

What did Ehrlich exactly do regarding the interior of the building? In his own words he *integrated and extended the library and the hall designed and ordered by Adolf Loos.* He himself designed the rest of the rooms, *in particular: the hallway, dining room, the loggias with the garden stairs, the big bathroom, the staircase, the large gallery with pictures built into the panelling*. Furthermore, he had designed a *few more things* which he was unable to *recall at the moment.* (Ehrlich, January 20, 1928, in: Von der Mühll, 1928).

Loos's ideas and the material already supplied went into the interior of the hall[22] (*Vorraum*) with the exposed wooden beams on the ceiling and the characteristic niche for sitting as well as the interior of the library, in which there was the main writing table, also made according to a Loos design. All the other rooms that in a design sense characterised the interior of Karma were done from Ehrlich's designs and in the period of his work – the vestibule, dining room, stairs, smoking room, gentlemen's room, the master bedroom and the music room with paintings from the rich collection of Wilhelm Beer built into the wooden wall panelling. An exception is the furnishing in the spaces on the second floor, which were designed when Karma changed hands.

In parallel with his work on Karma, Ehrlich was engaged on the remodelling of Villa Sangata[23] with a detailed landscaping of the grounds that according to the drawings was to have been linked by an underpass with the grounds of Karma. Villa Sangata was sited on an estate much larger than the parcel occupied by Karma; between the two ran a road.[24]

Ehrlich's work on the villa is indicated not only by the extant drawings but also, very tellingly, by the designs and details characteristic of the period of the joint work of Ehrlich and Kovačić in parallel with the works on the Villa Karma. Kovačić's signature can actually be found on the drawing for the Karma bathing pavilion (Domljan, 1974: 30). During the same period, Hugo Ehrlich was associated in design terms with Viktor Kovačić, and both were working on designs for Zagreb villas, apartment buildings and redevelopment plans for Zagreb squares and promenades. Some of the architectural approaches and details done for Zagreb projects indicate the authorial contributions of Ehrlich, and perhaps even of Kovačić, to the design of Villa Karma. The following can be picked out (among others): Villa Vrbanić; the Ehrlich rental apartment building in Kumičićeva 2; the Lustig-Perok rental apartment building at Kumičićeva 10; the mausoleum of the Marquis de Piennes in Vrbovec. Town planning proposals for Jezuitski trg, Strossmayerovo šetalište and Vrazovo šeta-

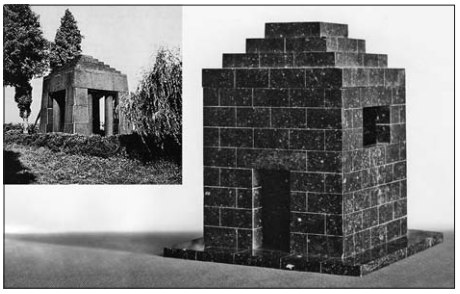

Fig. 7 Ehrlich & Kovačić, Mausoleum of the Marquis de Piennes, Vrbovec, 1910-1912 (upper left); Adolf Loos, Max Dvořák Mausoleum, model, 1921 (right).

The shape of Loos's design for a mausoleum of 1921 is clearly similar to the mausoleum of the Marquis de Piennes built ten years earlier to a design of the Ehrlich & Kovačić Studio. The simple shape of black Swedish granite has a roof in the form of a stepped pyramid. On three sides there are pairs of fluted columns, while the interior space is vaulted over with a calotte featuring a gold mosaic. A golden mosaic is placed on the soffit of the gallery with its oval floor plan in the vestibule of Karma. The soft, segmented transition between the oval rim of the central void and the vertical peripheral walls of the ground floor give the impression of a zenithally lit vaulted space.

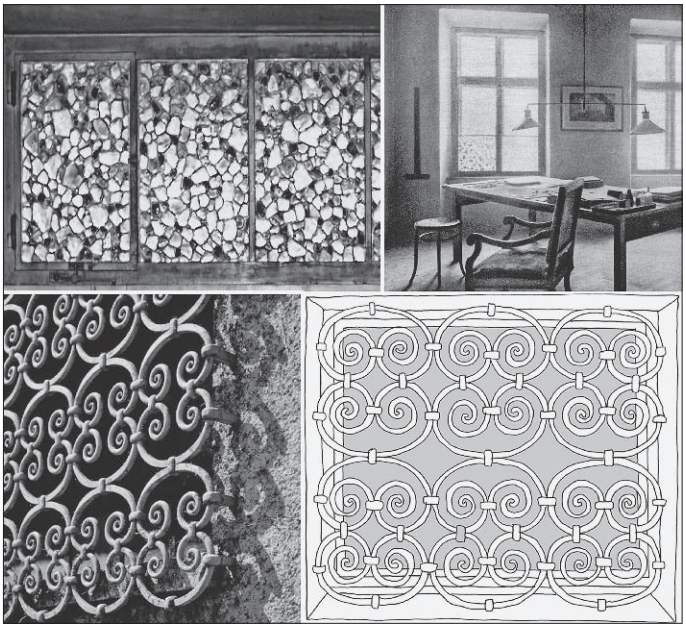

Fig. 8 Villa Karma, Dining room, stained glass, photo: Jacques Gubler, 1967 (upper left); the Ehrlich & Kovačić studio, subsequently the studio of Viktor Kovačić, Radićeva 32 (upper right); Villa Karma, Wrought iron grating on a Karma window, photo: Jacques Gubler, 1966 (down left); Ehrlich & Kovačić, Villa Vrbanić, Wrought iron grating on the windows, author's drawing (down right).
The pattern of the stained glass in the dining room, vestibule and the staircase of Villa Karma corresponds completely to that incorporated in the window of the Ehrlich & Kovačić studio. There is an identical piece of stained glass in the den of the Villa Vrbanić. The wrought-iron gratings on the windows of the entrance facade of Villa Karma have the characteristic spiral pattern that Viktor Kovačić had used in 1903-1904 on the door of the Villa Auer. They also appear contemporaneously with the works on Karma in the windows of the entry porch of the Villa Vrbanić.

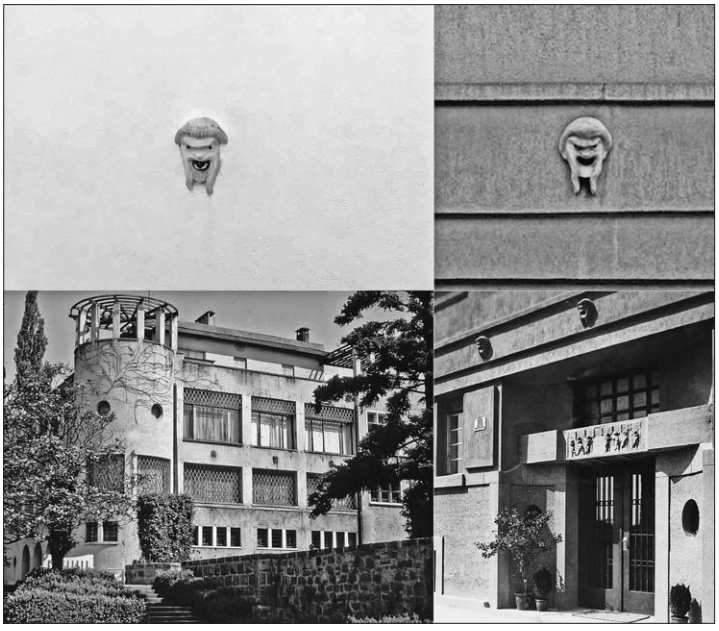

Fig. 9 Villa Karma, Facade, mascaron (upper left), 2021; Ehrlich & Kovačić, Lustig-Perok apartment building, Facade, mascaron (upper right); Villa Karma, Southwest view, photo: Jacques Gubler, 1966 (down left); Ehrlich & Kovačić, Lustig-Perok apartment building, Facade, detail (down right).
Among the variously shaped mascarons used as water spouts on the facades of the Villa Karma there are some models that are identical to the mascarons on the facades of the Lustig-Perok Building (1910-1911). Mascarons of different shapes are to be found on the facade of the Ehrlich Apartment Building (1910) designed by the Ehrlich & Kovačić Studio.

liste can be correlated with the architectural and horticultural designs for the grounds of Karma and Sangata. Although not all the Zagreb designs were built in their entireties, the carefully considered and adroit handling of tasks of various scales can be spotted, simple means being used to achieve ambiances in which elements of architecture, sculpture and landscape created attractive spatial units.

Zagreb's villas and interiors are on a more modest scale and correspond to the local conditions of the time; they cannot be directly compared with the approaches possible and applied at Karma. Nevertheless, there are links. The twisted columns of the music room of Karma are identical to the column in the den of Villa Vrbanić (Fig. 6); the fluted columns of the porticoes and the bathroom have associations with the mausoleum of the Marquis de Piennes (Fig. 7); the gold mosaic in the vestibule is used in the interior of the same mausoleum roofed with a calotte; the stained glass in the vestibule, dining room and staircase in Karma have the same pattern as in the Villa Vrbanić and the studio of Ehrlich and Kovačić; the pattern of the wrought iron grating on the Karma windows is the same as that on the windows of Villa Vrbanić (Fig. 8); the same mascarons are to be found on the facade of Karma and on that of the Lustig-Perok apartment building (Fig. 9); the climbers at the bottom of the walls and the greenery that cascades over the edges of the terraces is suggestive of Ehrlich's greening of the walls of Zagreb promenades.

Apart from the obvious similarity of stylistic details, mistakes can be found in places on the unsigned drawings that suggest croatophony[25] (Fig. 10).

Conclusion

Drawings and other documentation that would enable easier tracking of the emergence of Villa Karma cannot be found as part of the same archival unit. Accordingly, the

25 For example, *mozaik* and *bronce* instead of Mosaik and Bronze, which would be correct German.

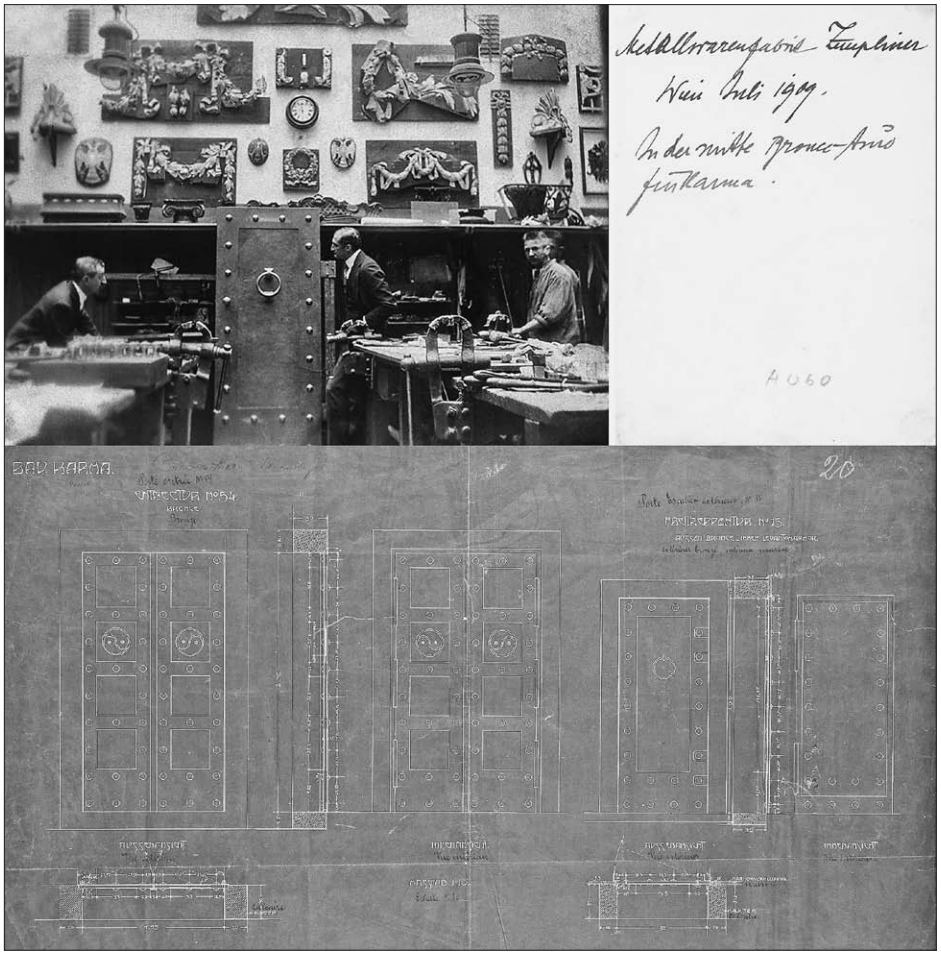

Fig. 10 Hugo Ehrlich in the Alfred Zempliner workshop in Vienna with bronze door for Villa Karma, 1909 (upper left); the back of the same photo (upper right); Hugo Ehrlich, Villa Karma, bronze doors, drawing, around 1909 (down).
On the back of a photo taken in the metal workshop there is a note in Ehrlich's hand giving information as to the time the bronze door was made. The same language usage mistake as on the unsigned drawing can be found – *Bronce-türe* instead of *Bronze-türe*. This error reveals someone whose native language is Croatian. Door drawing no. 15 (stair door) and door drawing no. 54 (main entry door) were clearly made by Hugo Ehrlich, who oversaw the making of it in the Zempliner workshop in summer 1909. The drawing was offered for sale at auction by Dorotheum, without any details of the provenance or the author of the drawing. As finally produced, the entry door was simplified, the moulding by which each leaf was divided into 4 square panels being abandoned. The actually made version of entry door is in the drawing of the variant of the vestibule.

dispersion of archival materials could be one of the causes of the improper attribution of authorship. The other might be the failure to recognise the importance of the working period during which the Croatian architect Hugo Ehrlich was involved, meaning the period from 1908 to 1912. However, the most probable reason is that it is very easy for the name of a world-famous architect simply to overshadow the work of a colleague whose significance is recognized exclusively within his national domain.

Thanks to the architect Henri-Robert Von der Mühll we are today able to read how Ehrlich himself described his involvement. Von der Mühll was well aware that Villa Karma was not exclusively Loos's work and tried to find out who continued the construction after him. The Ehrlich Papers, mainly deposited in the Fine Arts Archives of Croatian Academy of Sciences and Arts in Zagreb, fully confirm Ehrlich's authorship and his own description presented in the letters to Von der Mühll. Furthermore, it can be asserted with certainty that his authorship absolutely dominates the interior, that it is evident on the exterior of the building and exclusive regarding the landscaping of the grounds, the boundary walls and all the other design interventions outside the building.

The conclusion arises that in the reviews related to Villa Karma in general, necessarily and inevitably both authors should be specified as equal. In reviews of the interior design of specific spaces, excluding the hall, the library and the rooms on the second floor, Ehrlich should be mentioned as the only author. Most important parts of his interior design are: the vestibule, dining room, stairs, smoking room, gentlemen's room, the master bedroom and the music room. Therefore, Hugo Ehrlich clearly did not merely handle final completion of the Villa Karma as is usually claimed. As author, he is at least as important as Loos. The role of Henri Lavanchy should not be forgotten either and has yet to be fully researched, however, that topic is beyond the scope of this paper.

[Translated by Graham McMaster]

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Illustration sources

Fig. 1 Zagreb City Museum (upper left); Digital Collection and Catalogue. Croatian Academy of Sciences and Arts (CASA) (upper right); Albertina, Austria – Public Domain, via Europeana. Available at: https://www.europeana.eu/hr/item/15508/ALA3156 [Accessed: 15 January 2024] (down).

Fig. 2 Author's drawing

Fig. 3 Archives of Modern Construction – EPFL, fund Von der Mühll, Henri – Robert.

Fig. 4 Albertina, Austria – Public Domain, via Europeana. Available at: https://www.europeana.eu/item/15508/ALA779 [Accessed: 15 January 2024] (up); Architectural Press Archive / RIBA Collections (middle); Archives of Modern Construction – EPFL, fund Von der Mühll, Henri-Robert (down).

Fig. 5 Croatian Museum of Architecture. Croatian Academy of Sciences and Arts (CASA): Personal archival collection of Hugo Ehrlich (up); Fine Arts Archives, Croatian Academy of Sciences and Arts (CASA) (middle and down).

Fig. 6 © Albertina, Vienna (upper left); Šen, 1927: Tab. XVII (down left); Croatian Museum of Architecture. Croatian Academy of Sciences and Arts (CASA): Personal archival collection of Hugo Ehrlich (right).

Fig. 7 Domljan, 1979: 98 (upper left); Albertina, Austria – Public Domain, via Europeana. Available at: https://www.europeana.eu/hr/item/15508/ALA2184 [Accessed: 15 January 2024] (right).

Fig. 8 Private archive of Jacques Gubler (upper left and down left); Šen, 1927: Tab. XIX (upper right); Author's drawing (down right).

Fig. 9 Private archive of Jacques Gubler (upper left and down left); Author's photo (upper right); Architecture Collection. Museum of Arts and Crafts, Zagreb (down right).

Fig. 10 Digital Collection and Catalogue. Croatian Academy of Sciences and Arts (CASA) (upper left and right); Jugendstil and 20th century Arts and Crafts – Online catalogue, via Dorotheum. Available at: https://www.dorotheum.com/en/l/8561434/ [Accessed: 15 August 2023] (down).

Authors' biographies and contributions

Dina Vulin Ileković, Ph.D., is a Croatian architect and professor at the Department of Architectural Design at the Faculty of Architecture University of Zagreb.

Boris Ileković is a Croatian architect and associate professor at the School of Design at the Faculty of Architecture University of Zagreb.

Their area of interest is the phenomena of visual expression that comprise the elements of what constitutes architecture and design.

Conceptualization: D.V.I. and B.I.; methodology: D.V.I. and B.I.; software: D.V.I. and B.I.; validation: D.V.I. and B.I.; formal analysis: D.V.I. and B.I.; investigation: D.V.I. and B.I.; resources: D.V.I. and B.I.; data curation: D.V.I. and B.I.; writing – original draft preparation: D.V.I. and B.I.; writing – review and editing: D.V.I. and B.I.; visualization: D.V.I. and B.I.; supervision: D.V.I. and B.I.; project administration: D.V.I. and B.I. Both authors have read and agreed to the published version of the manuscript.

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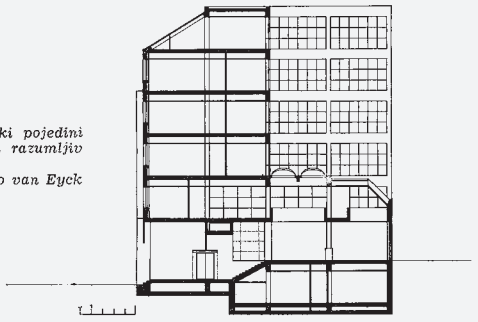
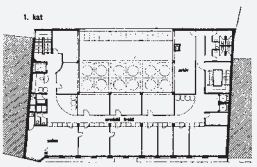
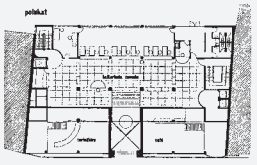
Parabola o ugrađenoj kući
(Osiguravajući zavod, Preradovićeva 1—3, SAŠA LASLO diplomski rad u klasi prof. Dragomanovića, travanj 1976)

»Želim samo naglasiti činjenicu da svaki pojedini slučaj JEST specijalni slučaj, i može biti razumljiv jedino u vlastitim okvirima.«

Aldo van Eyck







Komentirajući projekt s distance, opisujući pristup, pobrojat ću neke poticaje koji možda nisu čitljivi s nacrta.

Koncept glasi »poštujem«, a znači istovremeno kontekst i hommage à.

Pod kontekstom podrazumijevam:

... Kad je prošlost prikupljena u sadašnjosti i kad se nakupina iskustva udomi u svijesti, sadašnjost stječe vremensku dubinu, gubi svoju poput britve oštru trenutnost...
Prošlost, sadašnjost i budućnost moraju u svijesti djelovati kao kontinuum. Ako to nisu, artefakti koje tvorimo bit će bez vremenske dubine i asocijativne perspektive... (1)

... Kad se osoba identificira s mjestom, kaže se da se nalazi (boravi) prebiva...
Biti »kod kuće« znači osjećati se potpuno povezanim s kvalitetama tog mjesta...
Svako mjesto je nešto u sebi jedinstveno...
Mjesto zna »što bi htjelo biti«...(2)

Pod hommage à podrazumijevam:

... Svaka kultura uspostavlja sasvim poseban slučaj. Sposobnost/mogućnost da se cijene različiti kulturni uzori, u okvirima u kojima znače a ne u okvirima onoga kome pripadaju, najveća je nagrada što treba da se dobije školovanjem/odgojem... (3)

Kuća bi, nadalje, htjela istražiti/naznačiti neke dvojne fenomene, na različitim strukturalnim razinama, i ne u sekvenci. Uključeni su korelati javno-privatno, monumentalno-ordinarno, (analogni) grad-(analogna) kuća (od Tree is a leaf... do Rossijevog panela).

Kuća bi htjela naznačiti dualitet projekt/potencijalna realizacija-kolaž/imaginacija, pa neke elemente treba epigrafski očitati (a u vezi s hommage à): (4)

- »zagrebačka kuća« — Palača gradskih poduzeća Jurja Denzlera
- šalter-hala beogradske Union banke Huga Ehrlicha
- fasade Zakladnog bloka, Ulrichove zgrade na Preradovićevu trgu, Denzlerove Pravoslavne općine
- veliki hal Sprengel muzeja Leona Kriera
- Nagasumi filijala Fukuoka banke Arate Isozakija
- Parlament Donje Austrije u Beču Ivana Crnkovića i Nevena Mikca

I napokon, zahvaljujući Venturiju, svaku kuću treba promatrati kao interakciju unutrašnjih i vanjskih snaga, i zid ponovo postaje mjesto gdje se događa arhitektura.

(1) Aldo van Eyck, The interior of Time, Kaleidoscope of the Mind, 1962
(2) Christian Norberg-Schulz, Genius loci
(3) Aldo van Eyck, op.cit.
(4) cfr. ikonologiju A. Grumbacha za Sprengel muzej Leona Kriera

Zagreb, svibanj 1977

Saša Laslo

FIG. 1 ALEKSANDER LASLO, BUILDING OF THE INSURANCE INSTITUTE IN ZAGREB, PRERADOVIĆEVA 1-3, GRADUATION THESIS, 1976

Tamara Bjažić Klarin

Institute of Art History (Institut za povijest umjetnosti), Ulica grada Vukovara 68, 10000 Zagreb, Croatia
https://orcid.org/0000-0003-2900-397X
tbjazic@ipu.hr

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Review of Aleksander Laslo's Research on Late Nineteenth and Early Twentieth-Century Architecture in Zagreb

On the Occasion of the Tenth Anniversary of the Architect's Death

Architecture Guides
Art Nouveau
Interwar Architecture
Laslo, Aleksander
Modernism
Zagreb

Architect Aleksander Saša Laslo (Celje, 1950 – Zagreb, 2014) was one of the leading historians of Croatian nineteenth and twentieth-century architecture, with a research scope centered on the city of Zagreb. Its aim was to investigate the processes of modernisation, tracing the evolution from high historicism and eclecticism through Art Nouveau to proto-functionalism and *New Building* (Ger. *Neues Bauen*, Cro. *novo građenje*) – viewed through building spatial-organisation, construction, and then inevitably form. Laslo's interest, of course, extended beyond the mere physical structure of the building to wider social, economic, and cultural context, and dynamic knowledge exchange with Central Europe during that time, within which Laslo positioned the architecture of Zagreb. Methodologically, since the very beginning in the early 1980s, Laslo relied on exhaustive research, cataloguing, and contemporary research of Central European architecture. To mark the tenth anniversary of the death of this prominent researcher of Zagreb's architectural heritage, this paper provides the first review of Laslo's work, highlighting its comprehensiveness, integrity, and scientific method.

INTRODUCTION

Architect Aleksander Laslo (Celje, 1950 – Zagreb, 2014) was one of the leading historians of Croatian nineteenth and twentieth-century architecture. Despite being a permanent employee of architectural firms Industroprojekt, INA-Projekt, and Plan since 1976, and later, from 1995, of the City Institute for the Conservation of Cultural Heritage and the Office for Strategic Planning and Development of the City of Zagreb, over almost four decades, Laslo published around ninety professional and academic texts and two guidebooks. Almost all of them are dedicated to the architecture and architects of Zagreb. The research that began as a hobby in the early 1980s has gradually evolved into a lifelong project. However, it was methodologically structured and theoretically oriented from the very beginning, possessing all the elements of a never defended doctoral thesis.[1] To mark the tenth anniversary of the death of this prominent researcher of Zagreb's architectural heritage, this paper provides the first comprehensive review of Laslo's work, highlighting its completeness, integrity, and scientific method.

RESEARCH BEGINNINGS

The 1970s and 1980s marked a crucial phase in Laslo's career, shaping him both as an architect and a scholar, coinciding with a period of notable dynamic in the architectural landscape of Zagreb. On the path to Postmodernism in the 1980s, the field of architectural research of historicism, Art Nouveau, and the interwar period was expanded during the 1970s, drawing on the groundbreaking contributions of Lelja Dobronić on Zagreb's nineteenth century urban planning and its builders, as well as Radovan Ivančević's research on interwar architecture (Dobronić, 1961, 1962, 1965, 1971; Ivančević, 1968a-f). At the end of 1976, two significant events took place at the Zagreb City Museum – a scientific conference and an exhibition on Hermann Bollé[2], along with an exhibition titled *Modern Architecture of Zagreb between the Two Wars* accompanied by a thematic issue of the journal *Arhitektura* (Premerl, 1976; N.N., 1976). Željka Čorak and Ivo Maroević were researching the interwar architecture of members of the Association of Artists Zemlja (Cro. *Udruženje umjetnika Zemlja*), and pioneers of *New Building* such as Drago Ibler and Ivan Zemljak.[3] The gap in understanding the architecture of Zagreb between Bollé's historicism and interwar internationalism, the work of architects who "rejected the mannerist use of academicism" (Živković, 1977: 15), was filled as early as 1977 by the Museum of Arts and Crafts (MUO) with the exhibition *Secession in Croatia*.[4] The architectural heritage of Zagreb was presented as a separate section of exhibition showcasing the main architects and builders of the Lower Town: "Lubynski, Hönigsberg and Deutsch, Fišer, Bastl, Vancaš, Sunko, Holjac, Pilar, Benedik and Baranyai, Bornstein and others" (Živković, 1977: 16). The journal *Arhitektura* heralds the shifts in professional focus during the 1970s with a series of thematic issues that explore the conservation and revitalisation of historical city areas and buildings.

Aleksander Laslo graduates against the backdrop of these events in 1976 from the Faculty of Architecture in Zagreb (Fig. 2) with a design for the Insurance Institute office building at Preradovićeva Street 1-3, an interpolation into the existing urban city block at the heart of Zagreb (Fig. 1). The project draws inspiration from interwar Zagreb precedents – such as the building of the Zagreb Stock Exchange by Viktor Kovačić, the School of Public Health by Juraj Denzler and Mladen Kauzlarić, and Denzler's City Electricity, Gas and Water Administration building. The credo of Laslo's work is encapsulated in a quote by the Dutch architect Aldo van Eyck: "I just want to emphasise the fact that each individual case IS a special case, and can only be understood within its own framework." (Laslo, 1977). The research of the framework, or the understanding of the individual within the broader context, is not only the starting point of Laslo's graduation thesis but also of his entire academic work.

Laslo belonged to the community of architects gathered at the Faculty of Architecture and the Croatian Architects' Association.[5] During the years 1980 to 1988, he served as an assistant under Mladen Vodička and Neven Šegvić, professor of *Yugoslav Architecture* and *Modern Architecture* (Štulhofer and Tadej, 2000; Fig. 3). In 1985, together with the young editorial team of *Arhitektura*, of which Laslo was a member, Šegvić worked on a retrospective of four decades of Croatian architecture from 1945 to 1985, presented in Zagreb and Ljubljana, and later compiled into a thematic issue of the journal (Uchytil and Barišić, 2000; Šegvić, 1986). The Croatian Architects' Association annually and triennially produced several exhibitions, awarded professional prizes, and published journals – *Arhitektura* and *Čovjek i prostor* (ČIP) – which had been Laslo's most significant publishing platforms since 1982.[6] His writing style is very concise, focused, and the text is extremely logically structured. Every word was carefully chosen and weighed. The discourse would vary from chronicle-like, reminiscent of Gjuro Szabo, to meticulous about citing sources (Laslo, 1998a). Laslo reported on exhibitions, wrote reviews of seminal books such as *Modern Architecture: A Critical History* by Kenneth Frampton, and domestic architectural production (Laslo, 1983b,d,e, 1983/1984b, 1986a). At the same time he presented the first results of research conducted with colleague Neven Mikac – a series of three texts titled "Zagreb Studies" (Laslo and Mikac, 1982a-d), in which he outlined the scope of future research, its methodology, and ultimate goal – the ongoing revitalisation of Zagreb's urbanity.

Laslo's fundamental theoretical premise was the continuity of modernisation processes, the evolution from high historicism through Art Nouveau to proto-functionalism and *New Building* – viewed through building's spatial-organisation, construction, and then inevitably form, thereby surpassing then-established approach of art historians. Laslo's interest, of course, extended beyond the mere physical structure of the building to encompass the social, economic, and cultural atmosphere of Zagreb, which became a propulsive centre of dynamic knowledge exchange with Central Europe, of which it is an integral part. The Art Nouveau movement in Zagreb was almost simultaneous with that of Vienna, and proto-functionalism emerges in the early twentieth century with Kovačić, a Vienna-trained student of Otto Wagner and acquaintance of Adolf Loos. At that time, foreign practices served as a basis for the development of *adaptive architecture,* authentic architectural and urban planning practices anchored *between avant-gardism and pragmatism*.[7] At the turn of the 1920s to the 1930s, thanks to the newly established Polytechnic with a Department of Architecture, Zagreb had a burgeoning professional scene and tried to adopt the most advanced designe, technological, and urban planning practices through international designe competitions. Transitioning from being a place of import from the architectural centres of the Austro-Hungarian Empire, it would ascend to a position of their dissemination in the territory of the new state, the Kingdom of Serbs, Croats and Slovenes, later Yugoslavia. The late 1930s were also a period in which Croatian architectural production achieved full recognition in the Kingdom, reaching its peak in socialist Yugoslavia in the 1950s.

The cornerstone of the thesis lied in *data mining*, conducting meticulous research of Zagreb's architectural stock and the body of work of key protagonists – architects and builders from the late 1890s to the early 1940s. Additionally, delving into the architectural landscape of Central Europe was crucial, as it served as a foundational prerequisite for appreciating the accomplishments of Croatian architects. Methodologically, Laslo relied on the in-depth research of archival materials, publications, fieldwork, and interviews with contemporaries. He systematically archived and catalogued the collected data by addresses and authors/architects. This was a time when archival funds were mostly unorganised, and the establishment of specialised architectural collections and museums was still pending. As an independent researcher with a full-time job, Laslo had limited time for his hobby – meticulous research work. He needed his own specialised library equipped with domestic professional periodicals, contemporary literature from the field of his research interest, as well as rare original publications, because – as he himself stated, "an entire alternative Zagreb can only be understood indirectly – through newspaper reports on architectural competitions, exhibition catalogues, and the like (...)" (Laslo, 1989a: 10). Laslo was a passionate collector of personal documents, photographs, postcards, telephone directories, and brochures through contacts with protagonists, their descendants, and colleagues, as well as through regular visits to antiquarian bookshops.

Architecture Guides of Zagreb

In 1982, Laslo and Mikac published the first results of archival and field research, the beginning of cataloguing the Lower Town's architectural inventory from the nineteenth and twentieth centuries, as an appendix to the first of the three mentioned texts titled "Za-

Fig. 2 Aleksander Laslo on a student trip in the 1970s

Fig. 3 Jelena (?), Dražen Juračić, Mladen Vodička, Jadranka Alić, Damir Kvočić, and Aleksander Laslo, from left to right, in the 1980s

1 In 1983, Laslo enrolled in a postgraduate program at the Faculty of Architecture in Belgrade. Under Ranko Radović's mentorship, he wrote seminar papers *Urbani modernizam i kulturni ideal* and/or *Novi urbani program: izgradnja Zagreba 1880.-1914.* (Archive of Aleksander Laslo, Institute of Art History, Zagreb, hereinafter AAL-IPU).

2 The conference papers were published in *Život umjetnosti* no. 26/27 (1978) edited by Željka Čorak.

3 Žarko Domljan published a monograph on H. Ehrlich in 1979 (Čorak, 1971, 1975; Maroević, 1969, 1974; Domljan, 1979).

4 According to Marina Bagarić, Laslo mentioned that he visited the exhibition several times and sketched the exhibiton panels.

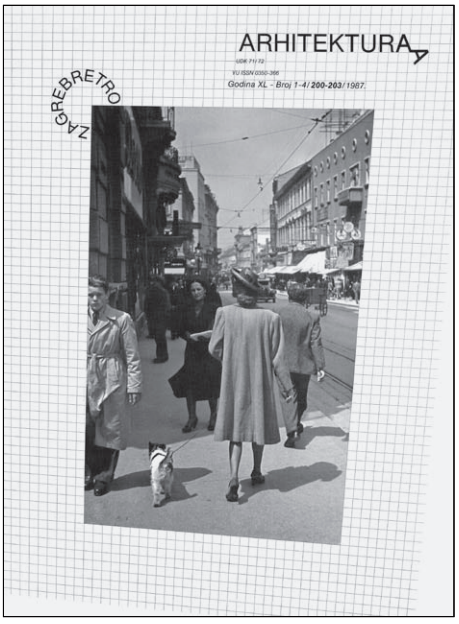
5 Laslo designed industrial facilities and residential buildings.

6 ČIP was edited by Tomislav Premerl and Branko Silađin, and *Arhitektura* by Slavko Dakić and Marijan Hržić.

7 Same thesis was elaborated in the *Project Zagreb* (Blau and Rupnik, 2007).

FIG. 4 ZLATKO REBERNJAK, ALEKSANDER LASLO, ANTE MARINOVIĆ UZELAC, MARIJAN HRŽIĆ, AND VLADIMIR BEDENKO, FROM LEFT TO RIGHT, AT THE PROMOTION OF THE THEMATIC ISSUE OF THE JOURNAL *ARHITEKTURA* DEDICATED TO CIAM, CROATIAN ARCHITECTS' ASSOCIATION IN ZAGREB, 1986

FIG. 5 THEMATIC ISSUE OF THE JOURNAL *ARHITEKTURA* "ZAGREB RETRO", EDITED BY ALEKSANDER LASLO, 1987



greb: 1850-1914: Faces of Modernity": "The dormant urban culture cannot be revived by a direct repetition of fragments AD ABSURDUM, much less by designing what has already been designed. For urban culture elements to become operational at all, they must first be deciphered from Zagreb's ARCHITECTURE PARLANTE, and in that spirit, also the GUIDE TO THE LOWER TOWN ARCHITECTURE OF THE 19TH AND 20TH CENTURIES in this issue." (Laslo, 1982).

After mapping the building substance of the Lower Town, enabling its first comprehensive understanding, Laslo focused on the analysis of architectural types: public buildings, individual housing, and industrial facilities presented in the form of smaller thematic guides (Laslo, 1983a,c, 1983/1984c). Laslo's aim was to continually revise all guides as the research was extensive and surpasses the capacity of individual work. Aware of his own research capacity, he invited readers/walkers to share data and any potential corrections (Laslo, 1987a: 97). In light of the fact that the guides represent "architecture literature that did not exist in our local context" (Laslo, 1983/1984c: 120), Laslo studied the available architecture guides of Vienna, Prague, Budapest, and other cities, their structure, content of individual units/displays, format and design, with a clear vision to publish precisely such a publication – an architecture guide of Zagreb – which he will ultimately accomplish.

The housing stock, consisting of two dominant types – family houses and rental apartment buildings, was to be explored by Laslo through the works of two architects, leading representatives of the Croatian Art Nouveau Modernism – Aladár Baranyai and Rudolf Lubynski. Baranyai served as the focal point for the study on the topic of individual housing, the ideal family home, inspired by the Gesamtkunstwerk Viennese models. Analyzing Lubynski's work, as well as comparative examples of his contemporaries and the genesis of incorporated rental residential buildings in a broader European context, Laslo established a thesis on the development of the "Zagreb [apartment] floor plan", which originated in the last quarter of the 19th century and underwent further refinement until the onset of World War II. These texts, published in the thematic issues of the journal *Arhitektura* on individual housing and the International Congress of Modern Architecture (CIAM), represented a hybrid of sorts (Fig. 4).[8] They were an amalgam of monographs, guides/catalogues of constructed buildings, and problem-oriented text in which achievements were analysed through the reception of imported architectural practices but also their co-modification into authentic, proprietary ones. Laslo's enduring focus became precisely the exchange of knowledge, architectural styles, and theoretical discourse, and its roles in constituting the modernism of the Zagreb School of Architecture during the period from 1900 to 1940, and, of course, its main actors: Viktor Kovačić, Vjekoslav Bastl, Zlatko Neumann, Ernest Weissmann, Croatian students and collaborators of Otto Wagner, Adolf Loos, and Le Corbusier in Vienna and Paris.

A comprehensive architecture guide from the 1930s and an overview of works from the most important interwar competition – for the General Regulation Plan of Zagreb held in 1930/1931, were also part of the series (Laslo, 1984a). The exhaustive presentation of residential and public architecture from the 1930s, with 188 catalogue entries, served as the impetus for Laslo's ambitious and significant publishing project. Laslo edited a thematic issue of journal *Arhitektura* – "Zagreb Retro," which has been inadequately valued to date (Fig. 5).[9] The scope of the "Zagreb School of Architecture" was provided by selected constructed buildings, excerpts from "fundamental texts," and a review of the work of institutions and architects of the Association of Artists Zemlja.[10] The selected buildings were presented through photographs captured mostly by Tošo Dabac from that period and a selection of "exceptions", buildings that deviate from the usual perception of the International Style and testify to a high level of innovation and craftwork (Kośćević, 1987b). A separate topic was "Yugoslavs at the Bauhaus"; of the five, three were directly connected to Zagreb, indicating the presence of domestic artists and architects in the most important European educational, artistic, and architectural experiment of the first half of the twentieth century.[11]

In "Zagreb Retro," Laslo also presented a "preliminary report," the first results of research on the life and work of Neumann and Weissmann directly referencing the recently published book *Raumplan versus Plan Libre: Adolf Loos and Le Corbusier, 1919-1930* (Laslo, 1987d; Risselada, 1987). Notably, Weissmann engagement in Paris should be credited to Neumann, Loos's personal assistant. Upon Loos's recommendation Weissmann later went on to work for Le Corbusier from 1927 to 1930. Through Neumann's and Weissmann's designes and constructed buildings, Laslo explored the application of *Raumplan*, Loos's method of compressing all house spaces into minimal volume, and Le Corbusier's *free plan* based on the construction of columns and floor slabs, as well as flexible partition and façade walls. Both systems function to optimise living space and construction. The new approach to studying

architecture required a detailed analysis of floor plans, sections, and axonometric views, which Laslo had diligently redrawn and created, elevating the preparation of scientific and professional papers to a new level.

Exhibiting Zagreb in Vienna and Zagreb-based Exhibition Projects

Laslo's research into connections between Zagreb and Central European based architects, was further prompted and guided by Vladimir Šlapeta and Ákos Moravánszky. His peers, then young architects and architecture historians dedicated to researching the architecture of the same period in Czechoslovakia and Hungary, visited the Zagreb Architects' Association (DAZ) in 1986. The occasion for Šlapeta's lecture on the "architects of Czech modernism" was Kamil Roškot's exhibition held in Ljubljana, Belgrade, and Zagreb. Moravánszky's lecture on *Architecture in Hungary at the Turn of the Century* reinforced for Laslo the significance of positioning Zagreb's architecture within the broader historical and cultural context of the Austro-Hungarian Empire: "Certainly, the lecturer's introductory thesis was most instructive, stating that the study of one's own architecture is incomplete without an understanding of contemporary developments, at least in the nearest vicinity. Indeed, it is high time for Zagreb's architecture, especially the architecture around 1900, to be systematically evaluated within the context of contemporary Central European architecture, to which it truly belongs. (...) The examples from Prague, Budapest, and finally Ljubljana should serve as a lesson."[12] (László, 1986).

Laslo himself reported on both lectures in ČIP, using the opportunity to announce further collaboration – the hosting of another exhibition by Šlapeta, *Adolf Loos and Czech Architecture*, in Zagreb.[13] The interest of Czech and Hungarian colleagues in the architecture of Zagreb, as well as its limited recognition beyond the country's borders, was likely a *spiritus movens* for the bilingual Croatian-English edition of *Arhitektura* – "Zagreb Retro". Laslo recognised a unique opportunity to introduce the "Zagreb School of Architecture" to the international audience, thus contributing to current research on Central European architecture.

"Zagreb Retro" is Laslo's reference point for entering the circle of researchers of Central European architecture and urban planning of the nineteenth and twentieth centuries, as well as the first participation in an international project – the retrospective exhibition *Adolf Loos* at the Albertina in Vienna in 1989 and 1990. Curated by Burkhardt Rukschcio, the exhibition provided a review of Loos's entire body of work in architecture, theory, journalism, and education (Rukschcio, 1989). Laslo's section "Loos's School in Croatia" explored all of Loos's connections with Zagreb – contacts and influences on Kovačić, Neumann and Weissmann, Hugo Ehrlich, Bela Auer, as well as Loos's competition entry for the Esplanade Hotel in Zagreb (Laslo, 1989b). The text about Loos is Laslo's first text in which he brought forth the genesis of architectural modernism in Zagreb before the World War II, tracing it through the work of its two key promoters – Kovačić and Neumann. Its starting point were the thematic issue of the Ljubljana journal *Arhitektura* published in 1933 on the occasion of Loos's death and Neumann's obituary by Boro Pavlović in the issue of Zagreb journal *Arhitektura* from 1969 (Pavlović, 1969). Loos's contemporaries in Croatia, Ehrlich, Ljubo Babić, Weissmann, and, of course, Neumann, were aware as early as in 1933 of his undeniable influence and importance for Croatian architecture. The Slovenian-English version of Laslo's text was also published in the *Arhitektov bilten* in 1991[14], which he then supplemented in the text "Architecture of Modern Bourgeois Zagreb" in *Život umjetnosti* (ŽU) in 1995, encompassing all the significant aspects and themes of interwar architecture. As he himself notes, "Croatian modern architecture has opened (...), most of the important issues on planning, spatial-organisation, construction, and form, which will be addressed by the architecture of the International Style." (Laslo, 1995.a: 63)

The text in *Život umjetnosti* (ŽU) also laid the groundwork for the review of Zagreb Art Nouveau and interwar architecture, synthesised and presented to international audiences as part of Laslo's second major international exhibition project – *Shaping the Great City: Modern Architecture in Central Europe 1890-1937*. The exhibition was staged in Prague, Montreal, Los Angeles, and Vienna in 1999 and 2000 (Blau and Platzer, 1999). Zagreb was featured alongside Vienna, Budapest, Prague, Krakow, Lviv, Ljubljana, Brno, and Timișoara as one of the cities examined. Working on the exhibition with original drawings, and photographs brought Laslo great satisfaction, as did participating in the publication of the exhibition catalogue in English, German, and French. With his rich knowledge obtained over two decades, Laslo contributed to the catalogue with two papers – one discussing Zagreb's architectural production before and after World War I, from 1880 to 1918 and from 1918 to 1937. These texts are complemented by biographies of selected architects. Simultaneously, Laslo, along with Vladimir Bedenko, Tomislav Odak, and Branko Silađin, is one of the authors of the thematic issue "Zagreb – Agram" of the Swiss magazine *Werk, Bauen + Wohnen* from 2001, entirely dedicated to Zagreb (Laslo, 2001a).

After *Shaping the Great City*, a masterful "framework sketch," Laslo, as the most authoritative local expert, provided detailed scholarly expertise on the architecture of Art Nouvau and interwar period in Zagreb considering all its complexity. Once again, the direct incentive came from exhibition projects, this time local – *Art Nouveau in Croatia* (2003) and *Art Déco and Art in Croatia between the Two Wars* (2011) at the Museum of Arts and Crafts (MUO; Laslo, 2003, 2011b). Laslo demonstrated extensive expertise in these texts, drawing upon the socio-political context to address a wide range of topics. These were architectural types, public and residential buildings, new constructions, building technologies and materials, experiments in the field of form, urban equipment, architects and investors, dissemination within national borders, and presentation abroad. Although both texts are similarly structured, covering the same range of topics, they differ significantly in style. *Art Nouveau* is a comprehensive, scientific work, while *Art Déco*, much like the 1920s themselves, is considerably more relaxed and unpredictable in expression.

Contribution of Jewish Architects to the Construction of Zagreb

Collaboration on the Adolf Loos exhibition in Vienna served as an impetus for a solo exhibition about Zlatko Neumann titled *Seven Lamps of the New Building* at the Modulor Gallery in Zagreb in 1990. The latter marked the beginning of Laslo's second lifelong project – research of the contributions made by Jewish architects and builders to the construction of Zagreb. The contributions of Leo Hönigsberg, Julius Deutsch, Rudolf Lubynski, Hugo Ehrlich,

8 Laslo's works still to this day serve as the foundation for unwritten monographs on Lubynski and Baranyai (Laslo, 1983/1984a, 1984/1985).

9 Laslo briefly took over the role of editor of *Arhitektura* from M. Hržić during his study visit to the USA.

10 Excerpts from the texts of Petar Knoll, Viktor Kovačić, Drago Ibler, Stjepan Planić, Ernest Weissmann, Iso Kršnjavi, and Miroslav Krleža were published (Vrkljan, 1987; Šegvić, 1987; Ćorak, 1987).

11 They were Otti Berger, Ivana Tomljenović, and Gustav Bohutinsky (Košćević, 1987a).

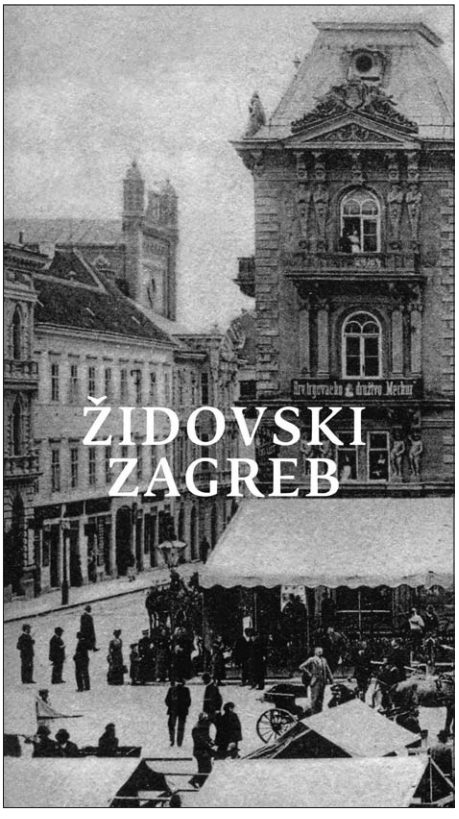
12 The report was signed with a Magyarised version of his name.

13 The visiting exhibition was not realised (Laslo, 1986b; S.R., 1986).

14 The article was supplemented with additional illustrations (Laslo, 1991a).

FIG. 6 EXHIBITION "INTERNATIONAL COMPETITION FOR THE JEWISH HOSPITAL IN ZAGREB ZAGREB 1930/31", ALEKSANDER LASLO AND TAMARA BJAŽIĆ KLARIN, CASA GLYPTOTHEQUE, ZAGREB, 2005

FIG. 7 JEWISH ZAGREB: CULTURAL HISTORICAL GUIDE, ALEKSANDER LASLO AND SNJEŠKA KNEŽEVIĆ, 2011



Slavko Benedik, Otto Goldscheider, Ignjat Fischer, Alfred Albini, Slavko Löwy, Ernest Weissmann, and, of course, Neumann was comprehensively presented for the first time in the text "Croquis for a Conspiracy of Memories: Exploring the Architecture of Modernism in Zagreb". Laslo was, of course, also interested in Jewish investors and construction entrepreneurs who deserved "separate treatment" (Laslo, 1989a: 10). His engagement with Jewish Zagreb continued through ongoing collaboration with the Jewish Community and the Cultural Society "Miroslav Šalom Freiberger". The society brought together experts who are not members of the community "but have an interest in studying the science, history, and culture of Jews, thereby contributing to the overall cultural and scientific life".[15] In 1997, the society launched the online edition of the Jewish Biographical Lexicon (Cro. *Židovski biografski leksikon*)[16] and published the magazine *Novi Omanut*, to which Laslo contributed several biographical entries about architects and builders, as well as research on the history of the community building in 16, Palmotićeva Street designed and constructed by Hönigsberg and Deutsch on the occasion of the 100th anniversary of its construction (Laslo, 1998b). The research also covered the genesis of the micro-location – Palmotićeva and Petrinjska streets, where the first synagogue in Zagreb was located (Laslo, 1998a,b). While doing research in the Hönigsberg and Deutsch archive, Laslo discovered plans for the reconstruction of the Zagreb synagogue built in today's Praška Street in 1867, and demolished by the authorities of the Independent State of Croatia in 1941/1942.[17] This discovery led to the exhibition *Synagogue and Zagreb* at the Archaeological Museum in 2001, in collaboration with Snješka Knežević, Mario Beusan, and Mira Wolf (Laslo, 2001b). The theme of the next exhibition was the international design competition for the Jewish Hospital in Zagreb in 1930/1931, held at the Glyptotheque of the Croatian Academy of Sciences and Arts in 2005, with the author of this text also taking part (Laslo and Bjažić Klarin, 2005; Fig. 6). The competition was unique in the history of Croatian architecture in terms of the number of submissions, with a total of 225 entries. The construction of their own hospital, open to all citizens, represented the pinnacle of the power of Zagreb's Jewish community. Meanwhile, the pinnacle of Laslo's research into the history of Zagreb's Jews is *Jewish Zagreb: A Cultural-Historical Guide* (Laslo and Knežević, 2011; Fig. 7). Published in 2010 with Snješka Knežević, the guide is a testament to the breadth of Laslo's intellect, diverse interests, and extensive knowledge of the city's political, economic, social, and cultural life, viewed through the lens of Zagreb's Jewish community, which experienced its heyday right in the period of his research interest.

ČOVJEK I PROSTOR DURING WARTIME – YEARS OF FULL RECOGNITION

Following the international acclaim, marking perhaps the first participation of a Croatian historian of nineteenth and twentieth-century architecture in a project like the Adolf Loos exhibition at the Albertina in Vienna, there ensued a *downturn* – a period characterised by considerable professional turbulence and undertaking of the responsible task of editing the journal *Čovjek i prostor* (ČIP) during the war years, from 1992 to 1995 (Fig. 8). Under Laslo's editorship, ČIP continued to be published at a slower pace with an established editorial concept, regular columns – on current events (exhibitions, books, conferences, lectures, etc.), constructed buildings, conceptual designs, heritage, interviews, *in memoriams*. The novelties include the column *Profil*, which provides an overview of the work of contemporaries, and the role of guest editors.[18] During the war years of 1991 and 1992, the Croatian Architects' Association (UHA) also published a series of special bilingual editions of the ČIP journal, featuring reviews of architecture and urban planning in besieged Croatian cities and photographs of their destruction. These editions form part of the "war series," reflecting the protest of Croatian architects against the war in Croatia, "... and the unequivocal demonstration of solidarity by the international professional community during the most severe aggression against our country, on the eve of its full international recognition" (Laslo, 1992). The thematic issues of ČIP focusing on Vukovar, Dubrovnik, and Osijek, urban and architectural heritage which is one of the elements in shaping national identity, also look towards the future, the upcoming reconstruction. The wartime destruction led Laslo to increasingly ponder the issues of conservation and reconstruction of modern architectural heritage. With great enthusiasm in 1993, he founded the Croatian working group of the Docomomo organisation, an "autonomous nonprofit section" of the Croatian Architects' Association tasked with creating a national register of Croatian interwar architecture, serving as the basis for the development of the organisation's international registry.[19]

In 1990's Laslo published in ČIP a guide of the Upper Town's classicist architecture and biographical "guides" – reviews of the architectural works of Bastl, Kovačić, and Zemljak, continuing fundamental monographic research on the major protagonists of Zagreb's modernism.[20] At the same time, for the Encyclopedia of Croatian Art (Cro. *Enciklopedija hrvatske um-*

jetnosti), a publishing project of the Miroslav Krleža Institute of Lexicography, he wrote encyclopedic entries about architects Stjepan Podhorsky and Dionis Sunko, Neumann, Bogdan Petrović, Löwy, Miro Marasović, and Ivan Kozjak.[21] The first major exhibition in Zagreb also had a monographic character – a retrospective of architect and sculptor Frane Cota at the Glyptotheque of the Croatian Academy of Sciences and Arts, which he realised with Lidia Roje-Depolo in 1995, accompanied by a catalogue (Fig. 9; Laslo, 1995.b).

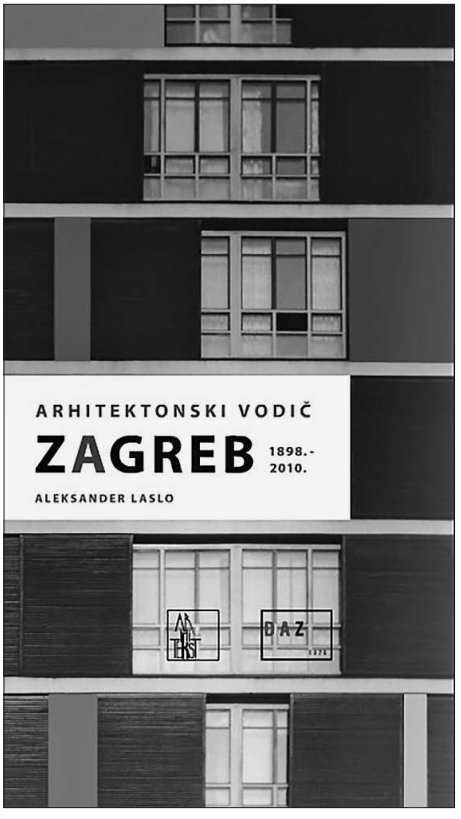
The results of two decades of scientific and editorial work, along with the presentation of Zagreb's architecture and city building at the exhibition *Shaping the Great City*, earned Laslo the *"Neven Šegvić"* award from the Croatian Architects' Association (UHA) in 2000, for *outstanding journalistic, critical, scientific-research, and theoretical work in the field of architecture*. After the aforementioned large-scale exhibition projects at the Museum of Arts and Crafts, Laslo finally published the long-awaited *Zagreb: Architecture Guide 1898-2010*, available, of course, in both Croatian and English editions. He authored both, the guide's concept and 95 catalogue entries encompassing buildings and housing developments from the period of his narrower expertise, 1898 to 1941 (Fig. 10).[22] Their floor plans and photographs, represent the guide's significant contribution, and reference for architecture historians and practicing architects. Laslo chose the façade of the National Bank residential complex at the corner of Laginjina and Vojnovićeva Street by Ivan Vitić for the cover of the guidebook. Following that, he also wrote a text titled "Solo Architect in a Collectivist Environment" for the monographic issue of *Arhitektura* dedicated exclusively to that architect (Laslo, 2006).

Fig. 8 Neven Šegvić, Zvonimir Krznarić and Aleksander Laslo (from left to right) in Zagreb, in the early 1990s

Fig. 9 Exhibition "Frane Cota", Aleksander Laslo and Lida Roje-Depolo, CASA Glyptotheque, Zagreb, 1995

After 2011, Laslo's publishing activity came to a standstill. To the great detriment of the historians of Croatian architecture, he failed to pass on or document much of his knowledge. Thanks to his pioneering international engagements, he integrated Croatian architecture into the history of Central European architecture. He enriched the history of Croatian architecture with interpretations of architectural achievements through the transmission of knowledge within the Central European architectural circle on the one hand, and by exploring the causal-consequential connection between spatial organisation, construction, materials and, ultimately, form, on the other. The pinnacle of Laslo's work are the synthesis texts published in the catalogues of the Museum of Arts and Crafts (MUO), which, due to their comprehensiveness and exhaustive data, serve as an indispensable starting point for all further research on the architecture and architects of Zagreb from 1880 to 1941. Laslo also left behind an extensive documentation fund, journals, books, photographs and drawings, that is, a plethora of collected and just barely *scraped* topics awaiting new researchers. The archival documentation of Alexander Laslo, a bequest now stored at the Institute of Art History, will inspire and assist them to piece together further the complex mosaic of Zagreb's architectural heritage to which Laslo dedicated a full three decades of his life and work.

Fig. 10 "Zagreb: Architecture Guide", Aleksander Laslo, 2011



15 Kulturno društvo "Miroslav Šalom Freiberger" (Refer to: https://www.zoz.hr/hr/kulturno-drustvo-miroslav-salom-freiberger/).

16 Edited by Ivo Goldstein (Refer to: https://zbl.lzmk.hr/).

17 The Archive is located at the Documentation Collection of the Ministry of Culture and Media of the Republic of Croatia in Zagreb.

18 The guest editors were Feđa Vukić, Vladimir Mattioni, Đivo Dražić, and Snježka Knežević.

19 An overview of the 1930s Croatian Architecture was presented by Darja Radović Mahečić (A.L., 1993; Radović Mahečić, 2007).

20 In 1994, he presented a paper on Kovačić at a scientific conference in the Croatian Museum of Architecture of the Croatian Academy of Sciences and Arts (Laslo, 1991b, 1993, 1995h; Laslo and Knežević, 1991; Laslo and Radović Mahečić, 1997).

21 In 1987, he wrote entries on Lubynski and Neumann for the Yugoslav Encyclopedia of Fine Arts (Cro. *Likovna enciklopedija Jugoslavije*) (Laslo, 1987b,c; Laslo, 1995c-g,i-k).

22 Laslo also writes some of the entries about buildings constructed after 1945.

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Illustration sources

Fig. 1	Laslo, 1977
Fig. 2-3, 6, 8	Laslo Family, Zagreb
Fig. 4	Croatian Architects' Association, Zagreb, photo Miljenko Bernfest
Fig. 5	Author's archive
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Author's biography

Tamara Bjažić Klarin, Ph.D., architect, Senior Research Advisor at the Institute of Art History in Zagreb. Her research focus is 19th and 20th-century architecture. She authored awarded books, *Ernest Weissmann. Socially Engaged Architecture, 1926-39* and *"For Zagreb, Grand and More Beautiful!" – Architecture and Urban Planning Competitions of Interwar Zagreb, 1918-41*, and contributed to the MOMA exhibition *Toward a Concrete Utopia. Architecture in Yugoslavia 1948-1980.* She was an academic guest at GTA ETH in Zürich and a French Government Fellow.

Note

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The Archive of Aleksander Laslo, a bequest stored at the Institute of Art History in Zagreb, served as a motivating factor for project application.

Fig. 1 FNN Sustainability Centre:
a) entrance façade,
b) garden at the facade-shell interface,
c) green roof

Gökhan Uşma[1], Deniz Erdoğan Ölçer[2]

[1] Adana Alparslan Türkeş Science and Technology University, Faculty of Architecture and Design, Department of Architecture, Adana, Türkiye
https://orcid.org/0000-0002-7293-123X

[2] Adana Alparslan Türkeş Science and Technology University, Faculty of Architecture and Design, Department of Architecture, Adana, Türkiye
https://orcid.org/0000-0001-5380-6268

usmagokhan@gmail.com
derdogan@atu.edu.tr

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Development and Assessment of a Post-Occupancy Evaluation Scale for Sustainable Office Environments

Insights from the FNN Sustainability Centre

GREEN BUILDINGS
POST-OCCUPANCY EVALUATION
SUSTAINABLE ARCHITECTURAL DESIGN
SUSTAINABLE OFFICE
USER SATISFACTION

This study explores the relationship between users and the built environment through a post-occupancy evaluation (POE) conducted at the FNN Sustainability Centre, a noteworthy sustainable building in the region. The study involved a comprehensive approach, encompassing site visits, managerial interviews, and staff surveys. To establish a robust evaluation framework, a scale was developed by analysing pertinent literature, and indicators were identified to gauge various aspects of the building's performance. Throughout the scale development process, the SPSS data analysis program was used, and expert opinions were solicited to ensure a rigorous and comprehensive methodology. Evaluation categories included lighting, acoustics, climatic comfort and indoor air quality, use and comfort of systems, quality of space and perception, awareness of sustainability and productivity. The building emerged as a physically and psychologically conducive workplace that heightened employee awareness of sustainability. Specific concerns were identified, such as noise disturbance for open-office workers and glare-related issues, which serve as valuable feedback for potential adjustments.

INTRODUCTION

In the last two centuries especially, as humans are the only living species that is prone and capable of intervening in the environment and making it fit their needs instead of adapting to it, human activity has caused irreversible damage to the environment and nature, and thus to human lives. The planet on which we live is in danger of becoming unsustainable. With the process of globalisation and changes in consumption habits, the physical and environmental comfort needs of human beings have been increasing day by day. As a result, the damage to the ecosystem and natural resources has also been increasing. As the world becomes more urbanised and its population grows, the efficient use of limited, rapidly depleting resources and the widespread use of renewable energy sources are becoming increasingly important. It is essential that buildings, which account for approximately 40% (United Nations Environment Programme, 2017) of the world's energy consumption and carbon emissions, are sustainable and use energy efficiently throughout their lifecycle, from design to demolition.

A sustainable building can be defined through a design and practice that is environmentally responsible and encompasses processes throughout its life cycle, such as the siting decision, the design process, the construction site, the operation of the building, maintenance, repair, renovation and demolition (Darko et al., 2019: 501-511). The environment, society and economy as three components of sustainability, need to be considered in all buildings throughout a building's full life cycle in order for it to be deemed sustainable. Beyond just meeting physical requirements, a sustainable building or structure must also meet economic, environmental, and social standards that benefit or at the very least do not harm current and future generations (Feige et al., 2013: 7-34).

Reducing a building's energy consumption is the initial driver for green building development, as energy consumption is one of the most important aspects of building performance. Energy saving design is given the highest credit in almost all green building rating standards. Recent years have also seen an increase in research into whether green buildings, once occupied, achieve the designed energy saving target, as a result of the recognition of the performance gap. Therefore, studying the energy performance of buildings has become important (Geng et al., 2019: 500-514). Green building or high-performance building are other terms for sustainable building design. Several certification programs rate the sustainability of buildings, including LEED, BREEAM, CASBEE, Greenstar, GeSBC, and HHEQ. LEED was created by organizations in different countries (Wang and Adeli, 2014: 1-2). LEED (Leadership in Energy and Environmental Design) certification, one of the most effective, is organised by the U.S. Green Building Council. LEED is the most widely used green building rating system in the world and categorises buildings as Platinum, Gold, Silver and Certified. LEED v4.1 calculates this rating based on the following sustainable criteria: site and transportation, sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality (USGBC LEED Rating System). Sustainable buildings are commonly known as building design strategies that focus on minimising environmental impact by reducing energy and water consumption and minimising environmental disturbance from the construction site. Although less well known, sustainable buildings also aim to improve human health through the design of healthy indoor environments. Energy and water efficiency have been the subject of much research and documentation, but the human health benefits of sustainable buildings are less well understood. In terms of indoor environmental quality, sustainable buildings had lower levels of volatile organic compounds (VOCs), formaldehyde, allergens, environmental tobacco smoke (ETS), nitrogen dioxide (NO_2) and particulate matter (PM). Therefore, the benefits of indoor

environmental quality in sustainable buildings are reflected in better self-reported health outcomes across a range of indicators. These include fewer Sick Building Syndrome symptoms, fewer reports of respiratory symptoms in children, and better physical and mental health. Occupants also report benefits that indicate that they are more productive at work in sustainable buildings (Allen et al., 2015: 250-258).

Studies on the interaction between sustainable buildings and their occupants have shown mixed results. This study aims to observe the relationship between the users and the building through a post-occupancy evaluation (POE) in sustainable buildings. In this context, FNN Sustainability Centre, one of the few sustainable buildings in the region, was selected for the POE, which involved visiting the office, interviewing the manager and surveying the staff.

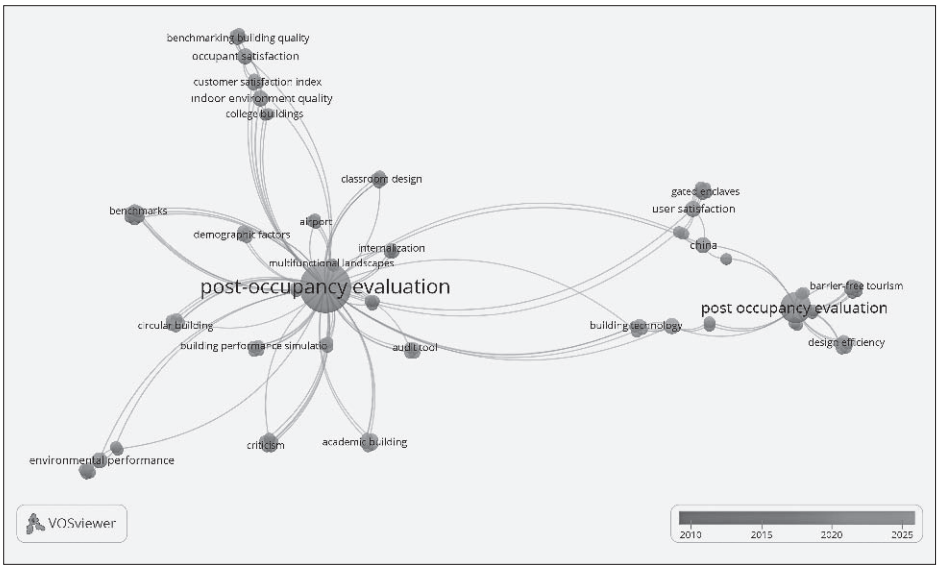


Fig. 2 Bibliographic data map of keywords (Generated by VOSviewer)

Post-Occupancy Evaluation (POE)

In order to find reliable sources of information on Post-Occupancy Evaluation, a search and analysis was carried out using the Web of Science. An analysis of the Web of Science search for "Post-Occupancy Evaluation" shows that 129 out of the 934 publications in the core collection are in the field of architecture (Web of Science Core Collection). These 934 sources related to Post-Occupancy Evaluation were exported as "Tab delimited file" for use in the VOSviewer database and a map based on bibliographic data was created. In the full counting method, "Co-occurance" analysis type and "Author keywords" analysis unit were selected. This bibliographic data map is shown in Fig. 2. As can be seen in this map, although POE is focused on building performance and user satisfaction, it is close to many concepts, evaluations are made with different indicators.

Post-Occupancy Evaluation (POE) is defined by Zimring and Reizenstein as the assessment of the effectiveness of an occupied, designed environment for the human user. These specific evaluations, usually concentrated on a single type of designed environment, tend to give a description rather than manipulation, and are usually application-oriented. Although they vary within this broad framework, it is useful to catalogue them in terms of generality, breadth of focus and applicability (Zimring and Reizenstein, 1980: 429-450). Post-occupancy assessment is a diagnostic tool and system that helps facility managers to systematically detect and appraise important aspects of building performance. In the 1960s, POE was introduced due to significant issues with building performance, particularly focused on the viewpoint of the building occupants (Preiser, 1995: 19-28). The information obtained from POE provides a better definition of what is valuable or useful, based on real knowledge, and thus defines what users want or need. The data obtained from the POE is also used to improve the next design and production processes, in addition to improving the functioning of the building (Zimmerman and Martin, 2001: 168-174).

Depending on the purpose and target of use, different techniques can be used individually or in combination in POEs. Data collection and profiling, walkthroughs (walk around the study site and take a visual record for the purpose of evaluation; Preiser and Vischer, 2005), on-site physical measurements, questionnaires, interviews, focus group meetings are some of them (Leitner, Sotsek and Santos, 2020). The duration of the POEs also varies greatly. For some a single interview or visit may be sufficient, while for others it may take years of keeping or accessing data (Bae, Martin and Asojo, 2021: 445-459). Furthermore, some are limited to a single area or building, while others use the same indicators across many buildings (Park, Loftness and Aziz, 2018). POE can also be carried out in adaptive re-use buildings. User satisfaction and the suitability of the new use may be in question (Hamida and Hassanain, 2020: 29-40). POE can be performed shortly after occupation to provide feedback to the design process in designed buildings, and repeated at intervals for more accurate results, revised if necessary.

Even though POE has not yet become the norm in the construction industry, it has grown quickly over the past ten years and will

TABLE I INDICATORS AND SUB-INDICATORS OF THE SCALE AND SOURCES/AUTHORS

Indicators (dimensions)	Sub-indicators	Sources/authors
Lighting	Natural lighting	Asojo, Bae and Martin, 2020 Bakker et al., 2017 Kong et al., 2018 Freihoefer et al., 2015 Hamida and Hassanain, 2020 Hassanain and Mahroos, 2023 Bortolini and Forcada, 2021
	Sunshade shell	
	Artificial lighting	
	Reflection-glare	
Acoustic	HVAC-induced sounds	Park, Loftness and Wang, 2022 Park, Loftness and Aziz, 2018 Mahbub, Kua and Lee, 2010 Thatcher and Milner, 2012 Hamida and Hassanain, 2020 Hassanain and Mahroos, 2023
	Indoor sounds	
	Outdoor sounds	
Climatic comfort and indoor air quality	Heating	Darko et al., 2019 Geng et al., 2019 Allan et al., 2015 Leitner, Sotsek and Santos, 2020 Juan, Gao and Wang, 2010 Park et al., 2018 Bortolini and Forcada, 2021 Frontczak et al., 2012 Ildiri et al., 2022 Bae, Martin and Asojo, 2021 Geng et al., 2019 Thatcher and Milner, 2012 Hamida and Hassanain, 2020 Hassanain and Mahroos, 2023
	Mechanical ventilation	
	Cooling	
	Natural ventilation	
Use and comfort of the systems	Automation system	Hassanain and Mahroos, 2023 Bortolini and Forcada, 2021 Messinger et al., 2011 Baudach et al., 2013
	Building maintenance	
	Waste management	
Space quality and perception	Building design	Feige et al., 2013 Hamida and Hassanain, 2020 Li, Froese and Brager, 2018 Allen et al., 2015 Ildiri et al., 2022 Hassanain and Mahroos, 2023
	Interior design and material choices	
	Location-transportation	
	Space size-number of users relation	
Awareness of sustainability and productivity	Green roof	Feige et al., 2013 Thatcher and Milner, 2014 Bryd and Rasheed, 2016 Leder et al., 2016 Kellert, 2005 Thatcher and Milner, 2012 Bortolini and Forcada, 2021 Hassanain and Mahroos, 2023
	Sustainable material	
	Efficient use of water	
	Climate change and renewable energy sources	
	Dissemination of sustainable buildings	
	Productivity	

continue to do so as more people become aware of how critical it is to assess actual real-time performance and the significance of occupant input. From a deeper look, it is encouraging that occupant input has become the primary focus of POE research outside of the area of social scientists. Even in studies within the building sciences, which have traditionally concentrated on the physical performance of the structure, an occupant survey has become a fundamental component of most POE approaches. This reflects the fact that a broader spectrum of researchers now recognize that the people who occupy the spaces have the power to determine a building's success or failure (Li, Froese and Brager, 2018: 187-202).

METHODOLOGY

The indicators of the scale used in the study were determined by analysing relevant studies in the literature. The studies analysed are given below. In the research, FNN Sustainability Centre building located in Adana, Turkey is considered. In order to conduct a post-occupancy evaluation of the building and to obtain the opinions of its users, a questionnaire survey was conducted.

Post-Occupancy Evaluations are divided into several categories, depending on the focus they seek to achieve. POE uses different indicators, subdividing them into sub-indicators to understand different relationships. One of the most widely used types of POE is those that focus on thermal comfort and energy efficiency, evaluating the thermal performance predicted at design and measured by determining the energy performance (Geng et al., 2019: 500-514; Juan, Gao and Wang, 2010: 290-297; Park, Loftness and Aziz, 2018: 1-24). Several POE papers focus on Indoor Environmet Quality and examine it in different situations and indicators (Bortolini and Forcada, 2021; Frontczak et al., 2012: 119-131; Ildiri et al., 2022; Bae, Martin and Asojo, 2021: 445-

TABLE II TOTAL VARIANCE EXPLAINED OF THE SCALE (FACTOR ANALYSIS)

Component	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11,548	32,993	32,993	11,548	32,993	32,993	9,161	26,175	26,175
2	6,439	18,398	51,392	6,439	18,398	51,392	5,655	16,156	42,331
3	4,883	13,952	65,343	4,883	13,952	65,343	5,654	16,154	58,485
4	3,858	11,024	76,368	3,858	11,024	76,368	3,909	11,167	69,652
5	2,737	7,821	84,188	2,737	7,821	84,188	3,897	11,133	80,786
6	2,018	5,766	**89,954**	2,018	5,766	**89,954**	3,209	9,169	**89,954**

Extraction method: Principal component analysis

459; Geng et al., 2019: 500-514). Under the headings of lighting conditions, natural and artificial lighting, automatic or manually controlled lighting, daylight and glare, POE was used to assess visual comfort (Asojo, Bae and Martin, 2020: 239-250; Bakker et al., 2017: 308-321; Kong et al., 2018: 135-148; Freihoefer et al., 2015: 457-472). Since indoor air acoustic quality affects the health, comfort and productivity of users, both noise from the external environment and acoustic problems from internal sources have been an important part of POE studies (Park, Loftness and Wang, 2022; Mahbub, Kua and Lee, 2010: 213-223; Thatcher and Milner, 2012: 3816-3823, Hamida and Hassanain, 2020: 29-40; Hassanain and Mahroos, 2023: 564-581). Studies on the relationship of users to the built environment, the reflection of this relationship in business life, the level of satisfaction and comfort of employees and their productivity are also common (Feige et al., 2013: 7-34; Thatcher and Milner, 2014: 381-393; Bryd and Rasheed, 2016; Leder et al., 2016: 34-50). The studies focusing on physical and psychological health issues support the studies in this area by providing feedback (Allen et al., 2015: 250-258; Ildiri et al., 2022).

After analysing the existing studies, the indicators to be included in the scale were determined. The indicators of the scale are lighting, acoustic, climatic comfort and indoor air quality, use and comfort of the systems, space quality and perception, and awareness of sustainability and productivity (Table I).

After the scale and indicators were determined, a questionnaire form with evaluation propositions was prepared to evaluate each of the indicators. The questionnaire consists of two parts. In the first part, demographic information of the users including gender, age, occupation and education level were requested. In the second part; evaluation propositions were included under six headings: lighting, acoustic, climatic comfort and indoor air quality, use and comfort of the systems, space quality and perception, and awareness of sustainability and productivity.

The first version of scale and questionnaire was reviewed by two green building experts, two architects, employees of a green building consulting firm, and two professors conducting green building research for both content validation and applicability in the office building. After the revisions made following the expert opinions, the questionnaire was updated. Various analyses were then carried out using SPSS data analysis software to measure the validity and reliability of the scale. First, exploratory factor analysis (EFA) was conducted to determine the construct validity of the scale and to reveal its factor structure. Principal components and varimax orthogonal rotation methods were used for this purpose. As a result of EFA, it was found that the scale consisting of 38 items was formed in a structure with six sub-dimensions (factors) and these six factors explained 89.954% of the total variance. When the literature was analysed, this rate was considered sufficient to explain the phenomenon. According to the researchers, a rate between 40% and 60% is considered sufficient (Büyüköztürk, 2020; Tavşancıl, 2019). Therefore, it was concluded that the scale is valid. Furthermore, the first subdimension explained 32.993% of the variance, the second 18.398%, the third 13.952%, the fourth 11.024%, the fifth 7.821%, and the sixth 5.766% (Table II).

After the validity analysis, Cronbach Alpha reliability analysis was carried out to determine the reliability of the scale and it was found to be a=0.906 (Table III). In addition, the reliability of the lighting sub-dimension was a=0.791, the reliability of the acoustic sub-dimension was a=0.707, the reliability of the climatic comfort and indoor air quality sub-dimension was 0.719, the reliability of the use and comfort of systems sub-dimension was 0.854, the reliability of the space quality and perception sub-dimension was 0.739 and the reliability of the sustainability and productivity awareness sub-dimension was 0.895 (Table IV). Therefore, it is accepted that the scale, including the sub-dimensions, is a reliable measurement tool. This is because a Cronbach alpha value of 0.70 or more is considered sufficient for the reliability of a measurement tool (Büyüköztürk, 2011: 171). The radar chart tool was used to visualize the data. The user opinions obtained for each indicator were presented on the radar chart together with the sub-indicators.

After revisions, the finalized questionnaire was distributed to all employees in the office building. Twelve out of 14 employees of FNN Sustainability Centre completed the questionnaire, representing a response rate of approximately 86%. The findings related to the six indicators analysed with the evaluation

Table III Total reliability statistics of the scale

Cronbach's alpha	Cronbach's alpha based on standardized items	N of items
,906	,921	38

Table IV Reliability statistics of the dimensions

Dimension	Cronbach's alpha	Cronbach's alpha based on standardized items	N of items
Lighting	,791	,808	5
Acoustic	,707	,682	3
Climatic comfort and indoor air quality	,719	,696	4
Use and comfort of the systems	,854	,852	5
Space quality and perception	,739	,704	8
Awareness of sustainability and productivity	,895	,897	13

FIG. 3 FNN SUSTAINABILITY CENTRE: A) MUSEUM SECTION, B) ARCHIVE SECTION, C) OFFICE SECTION

TABLE V DEMOGRAPHIC INFORMATION OF PARTICIPANTS

		n	%
Gender	Female	3	25
	Male	9	75
Age	18-29	2	16.7
	30-39	7	58.3
	40-49	2	16.7
	50-59	1	8.3
Education Status	Primary and secondary school	0	0
	High school	1	8.3
	Undergraduate	7	58.3
	Graduate	4	33.3
	Doctorate	0	0
Occupation	Executive	3	25
	Office staff	6	50
	Other	3	25

propositions in the questionnaire are presented in graphs and comparisons are made. The manager of FNN was interviewed to obtain information about the green building certification process of the building. Under the guidance of the manager, the active systems used in the building and the passive methods preferred in the design process were examined and photographed.

STUDY CASE PROJECT: FNN SUSTAINABILITY CENTRE

FNN Sustainability Centre selected for the study is located in the city of Adana in the Mediterranean region of Turkey. The building was selected because it is one of the most important examples in the region in terms of having sustainable, green building qualities and incorporating sustainable design strategies in its construction, design and use processes.

In 2017, a competition was organized for a building to contain an archive, museum (exhibition) and administrative offices. Within the scope of the program; the archive section that will include all the projects of the construction company to which the building will belong, the museum where old equipment and visual materials with memorabilia value will be exhibited, and the offices of the relevant maintenance units were requested to be located together. The project, which was selected and deemed worthy of implementation as a result of the competition, was requested to be built in accordance with sustainable design strategies and green building standards. The building, which has 2775 m^2 of closed area, is structurally constructed of steel and reinforced concrete. The construction process was completed in 2020. While the archive section is designed as a closed area as a program, it is structurally constructed as a reinforced concrete structure. The office areas are designed to show the steel structure completely within the building, supported by transparent glass facades. The museum is considered as the foyer and meeting point of two different programs at the intersection of this fully closed and fully open program. A steel shell wraps these programs, which are separated from each other by their different characters from the outside and brings them together. The semi-permeable and dynamic steel shell creates gardens, private and social spaces at the façade-shell intersection by moving away from and approaching the building, and by descending and ascending from time to time. This shell also helps to provide climate control by preventing the building from direct sunlight (Figs. 1, 3; Arkiv, n.d.).

The FNN Sustainability Centre was awarded "Platinum" certification in the "LEED v4 Building Design and Construction: New Construction & Major Renovation" category by the LEED (Leadership in Energy and Environmental Design) green building rating system, which aims to develop and disseminate standards for environmentally responsible design, implementation and operation at the building and city scale. The building received 84 out of 110 points (USGBC, n.d.).

Preliminary efficiency analyses on the use of water and energy resources were carried out in the early stages of the project and the project design was guided by this data (Altensis, n.d.). There are solar panels on the roof to meet some of the energy needs of the building from renewable energy sources. Energy efficient armatures and systems are preferred in the building. To save water, rainwater is stored and the stored water is used for green roof and green area irrigation and toilet reservoir water needs. Electric vehicle charging stations are located in the parking areas and priority parking spaces are reserved for low emission vehicles. Emissions from vehicle use have been reduced with bicycle parks. To reduce the heat island effect, it is seen that the use of light colours is dominant in the selection of roof and floor materials. This is also supported by the green roof application.

According to the information received from the team conducting the certification process of the building, the VOC (volatile organic compounds) content of the construction chemicals used in the interior spaces during construction was checked for compliance with international limits. The necessary design criteria for the ventilation of interior spaces were integrated into the project by ASHRAE 62.1-2010 standard (Altensis, n.d.).

Findings and Analyses

A survey was conducted with 12 of the 14 employees of the building examined within the scope of the study. The findings regarding the demographic information of the participants are presented in Table V.

In the study, various indicators were examined to evaluate the post-occupancy performance of the building. These are lighting, acoustic, climatic comfort and indoor air quality, use of systems and maintenance, space of quality and perception and awareness of sustainability. Indicators were divided into sub-indicators and comparison analyses were carried out with the sub-indicators. Finally, the main indicators of the study were analysed comparatively.

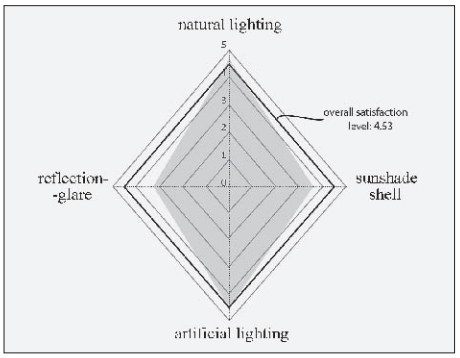
The lighting indicator was assessed using four sub-indicators as natural lighting, sunshade shell, artificial lighting and reflection-glare (Fig. 4). According to the survey study; the satisfaction level of natural lighting has been reached as 4.66 out of 5. Sunshade shell's satisfaction level is 3.7; the satisfaction level of artificial lighting is 4.58 and the satisfaction level of reflection-glare is 3.31. According to the findings, natural lighting and artificial lighting are found sufficient by users. On the other hand, compared to the natural lighting and artificial lighting sub-indicators, the satisfaction levels of the reflection-glare and sunshade shell sub-indicators were lower and their values remained below 4. It is understood that the users have problems on reflection and glare situation due to the excess of glass surfaces on the facade. It can be interpreted that the sunshade shell, which surrounds the structure and has semi-permeable properties, is insufficient to eliminate these problems.

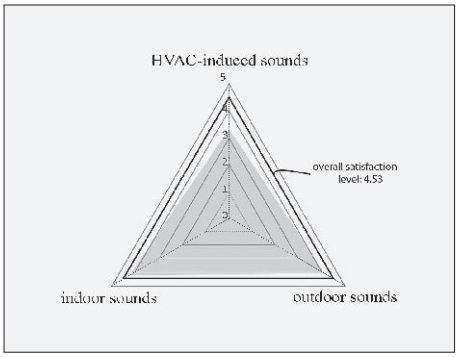
The acoustic indicator has been examined over three sub-indicators as HVAC-induced sounds, indoor sounds and outdoor sounds (Fig. 5). The satisfaction level of HVAC-induced sounds has been reached as 3.41 out of 5. Outdoor sounds' satisfaction level is 4.16 and the satisfaction level of indoor sounds is 4.25. The level of satisfaction with the HVAC-induced sounds sub-indicator was lower than the other sub-indicators. While the satisfaction levels of the indoor sounds and outdoor sounds indicators were above 4, the satisfaction level with the HVAC-induced sounds sub-indicator remained below 3.5. According to the findings, it is understood that the noise caused by the HVAC (heating, ventilating and air conditioning) systems used in the building reduces the satisfaction level of the users in the working environment.

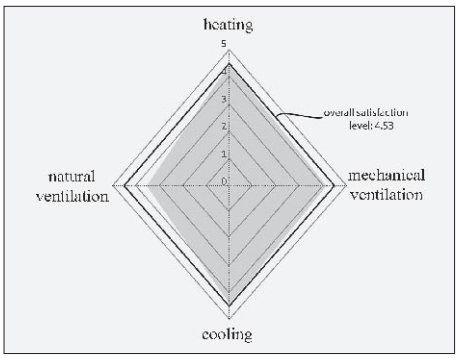
The climatic comfort and indoor air quality indicator have been examined over four sub-indicators as heating, mechanical ventilation, cooling and natural ventilation (Fig. 6). The satisfaction level of heating has been reached as 4.5 out of 5. Mechanical ventilation's satisfaction level is 4.08, cooling's satisfaction level is 4.41 and the satisfaction level of natural ventilation is 3.58. When the values are examined; it is seen that the satisfaction level of natural and mechanical ventilation is lower than that of heating and cooling. In particular, the satisfaction level in the natural ventilation sub-indicator was measured as around 3.5 and remained below the satisfaction levels of other sub-indicators. It can be said that the insufficient natural ventilation facilities of the building and the insufficient number of openable windows in the offices are effective in the lower satisfaction level of the natural ventilation sub-indicator compared to other sub-indicators.

The use and comfort of the systems indicator has been examined over three sub-indicators as automation system, building maintenance and waste management and recycling (Fig. 7). The satisfaction level of the automation system has been reached at 4.67 out of 5. Building maintenance's satisfaction level is 4.67 and the satisfaction level of waste management and recycling sub-indicator is 4.25. According to the data obtained; it is understood that thanks to the automation system used in the building, users can easily control the systems and the sensitivity levels of the systems are satisfactory. In addition, waste management, waste segregation and recycling activities in the building are also welcomed by the users. It is seen that the level of satisfaction regarding the periodical maintenance processes of the building is also high.

The space quality and perception indicator has been examined over four sub-indicators as building design, interior design and material choices, location-transportation and space size-number of users' relation (Fig. 8). The satisfaction level of building design has been reached as 4.75 out of 5. Interior design and material choices' satisfaction level is 4.24, location-transportation sub-indicator's satisfaction level is 3.9 and the satisfaction level of space size-number of users relation is 4.33. According to the results; users are very







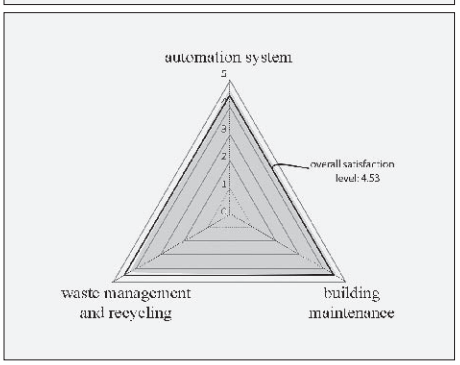


Fig. 4 Satisfaction with sub-indicators of lighting

Fig. 5 Satisfaction with sub-indicators of acoustic

Fig. 6 Satisfaction with sub-indicators of climatic comfort and indoor air quality

Fig. 7 Satisfaction with sub-indicators of the use of systems and maintenance

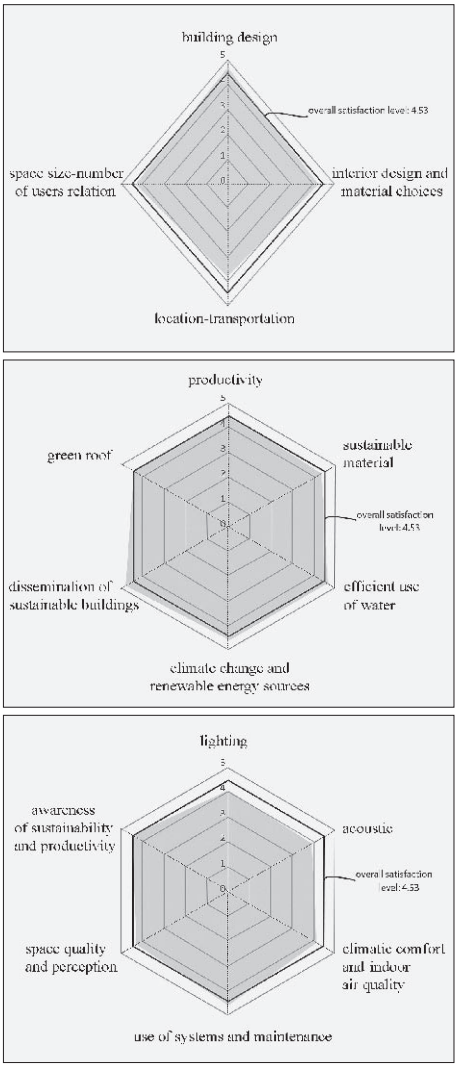


Fig. 8 Satisfaction with sub-indicators of space quality and perception

Fig. 9 Values about awareness of sustainability and productivity

Fig. 10 Comparison of satisfaction values of indicators

satisfied with the design of the building. It is seen that the satisfaction level in subjects such as interior design, material selections and the size of the spaces are positively received by the users, with values above 4. Compared to other situations, users' satisfaction level is lower in location and transportation. It can be interpreted that the fact that the building is located far from the city center, that public transportation is limited and that it is not sufficiently convenient for transportation by alternative transportation methods such as bicycles are factors in these results.

The awareness of sustainability and productivity indicator has been examined over six sub-indicators as green roof, sustainable material, efficient use of water, climate change and renewable energy sources, dissemination of sustainable buildings and productivity (Fig. 9). The level of green roof has been reached as 4.5 out of 5. Sustainable material's level is 4.33, efficient use of water sub-indicator's level is 4.62, climate change and renewable energy sources' level is 4.6, the level of dissemination of sustainable buildings is 4.77 and the level of productivity is 4,5. According to the findings, it can be said that the users' awareness about sustainability has increased thanks to the systems used in the building they work in and the sustainable qualities of the building. On the other hand, it is seen that users think that their productivity has increased after switching to a sustainable office.

Finally, a comparative analysis of lighting, acoustic, climatic comfort and indoor air quality, use of systems and maintenance, space quality and perception and awareness of sustainability, which are the main indicators used in the study, was made (Fig. 10). Lighting's satisfaction level has been reached as 4.06 out of 5. Acoustic's satisfaction level is 3.94, climatic comfort and indoor air quality's satisfaction level is 4.14, use of systems and maintenance's satisfaction level is 4.6, space quality and perception's satisfaction level is 4.3 and the level of awareness of sustainability and productivity is 4.56. In general terms, it can be said that satisfaction levels are high in the climatic comfort and indoor air quality, use of systems and maintenance, and space quality and perception indicators in the building. Users' awareness of sustainability has also been high. It is observed that user satisfaction is relatively lower in lighting and acoustic indicators compared to other indicators. As explained in detail above, the main reasons for this can be listed as the problems experienced in the control of natural light due to the large glass surfaces on the facade of the building and the noise problem due to the HVAC systems.

Discussion and Conclusion

According to Kellert, the green architectural design criteria included in green building certification systems can reduce the impact on the environment, but they are not sufficient to strengthen and enhance the bond between man and nature that supports human well-being and productivity (Kellert, 2005). In addition, Thatcher and Milner conducted a study to measure the physical and psychological well-being of users of green buildings. The design of the study is longitudinal and consists of two different times. Time 1 refers to before any of the users moved, and Time 2 refers to six months after the treatment group moved into the green building. There is a treatment group in which employees have moved from their existing buildings to the new green building and a control group in which employees have remained in their existing buildings. The authors compared the results of the well-being status according to an online survey of about 1200 people from each group. Contrary to the claims of some green building certifications, users in the treatment group reported no noticeable physical or psychological well-being or increase in productivity during the six months between Time 1 and Time 2. However, physical conditions such as thermal comfort, noise, and ventilation were significantly better in the Green Building at Time 2 (Thatcher and Milner, 2012: 3816-3823). On the contrary, in this study, it was observed that users' satisfaction values were high in awareness and productivity indicators. Users found their current working environment more productive than the building they worked in before. In this respect, the study overlaps with the study conducted by Bortolini and Forcada in 2021. According to Bortolini and Forcada, building age is associated with overall end-user satisfaction, as newer buildings are more satisfying to occupants, mainly because they meet higher standards of comfort (Bortolini and Forcada, 2021).

By analysing a case study from Saudi Arabia, Hamida and Hassanain conducted a post-occupancy evaluation of an adaptive reuse building in 2020. The original design of the case study building was meant for student accommodation at a university campus and was converted into an office building. This study has shown that an adaptively reused building can be aligned with the performance requirements of its new use. POE results showed that occupants are generally satisfied with identified performance categories including thermal, visual and acoustic comfort, indoor air quality, fire protection, furnishings and parking (Hamida and Hassanain, 2020: 29-40). In the building examined

in this study, thermal, indoor air quality and parking were considered adequate by the users (›4), while satisfaction with acoustic and visual parameters was lower.

Another POE study, by Hassanain and Mahroos, assessed the satisfaction of occupants working on one typical floor of a five-storey office building. This research involved three data collection methods, namely walk-through assessment, user interviews and satisfaction survey. Thermal comfort, visual comfort, acoustic comfort and user awareness of the fire safety system were included in the technical performance factors. Except for visual comfort, the case study office building users were generally satisfied with all the technical performance elements. Functional performance factors included the layout, circulation and facilities. Two functional performance elements, office layout and building equipment, were also unsatisfactory (Hassanain and Mahroos, 2023: 564-581). The results of this study and those of Hassanain and Mahroos' study are similar in terms of visual comfort and thermal comfort. Although visual comfort was low in both studies, the importance of reflection and glare on user satisfaction was revealed. In terms of thermal comfort, both studies were positive. In terms of acoustic comfort, the level of satisfaction was found to be higher in Hassanain and Mahroos' study.

The importance of designing adaptable spaces and providing user-centred control of HVAC and lighting systems is underlined by another study in this area. Allowing occupants to control over the lighting and the indoor environment is shown to improve satisfaction. Facility managers, who should also provide occupants with control over their indoor climate, operable windows and blinds, are responsible for implementing energy efficiency measures (Bortolini and Forcada, 2021). In the current study, it is seen that the satisfaction level of the users is high in terms of the use and control of the systems. The systems can be controlled by users through automation and manually.

Although the actual energy use of green buildings varied widely, on average the energy performance of green buildings was better than that of conventional buildings in the same region. Once occupied, a building's energy use can differ significantly from that as designed, and many green buildings saved less energy than expected (Geng et al., 2019: 500-514). The use of sustainable design approaches such as solar panels and green roofs in the analysed building increases the energy performance of the building, and it has been determined that the awareness of the users has increased thanks to the direct relationship and use of these systems.

In 2011, Messinger et al. produced a comprehensive project funded by FOSTA (Forschungsvereinigung Stahlanwendung e.v.) and supported by the German Federal Ministry of Economics and Technology through the Joint Industrial Research and Development Programme. The P881 project, launched in January 2011, was supported by and involves architecture and engineering firms, partners from the IT sector, steel producers and construction companies. An interdisciplinary research team worked on the development of tools that would support engineers and architects in the decision-making process for sustainable building design. They considered environmental, economic, architectural, socio-technical and socio-cultural aspects of sustainability. The team aimed to produce a handbook with recommendations for action, a catalogue of components and an IT tool that incorporates different aspects of sustainability and their assessment (Messinger et al., 2011: 740-749). According to Baudach et al., who are the part of the P881 project, the life-cycle approach to building design is a prerequisite for sustainability. The socio-technical systems approach, shows how buildings can have a direct impact on social quality through concepts of concentration, communication and regeneration opportunities for employees and organizations. The analysis of future changes in office work concludes that flexibility in building design is crucial for long-term productivity and value. It is found that office buildings made of steel and steel composite construction have the necessary characteristics for the creation of such flexible conditions (Baudach et al., 2013: 18-25). In the building, the company's own production steel is used as the structural system, and the steel material is also used as a sunshade shell on the facade. This structural element, which forms a second envelope, has enabled the creation of interior gardens with flexible use in the design. While the users found these inner gardens positive, they did not find the semi-permeable sunshade shell sufficient for reflection and glare.

The FNN Sustainability Center is a pioneer in the use, diversity and awareness of regionally sustainable systems. This study aims to evaluate the sustainable office building of the centre after use and specifically aims to measure the satisfaction levels of office users through surveys. Within the scope of this study at the FNN Sustainability Center, a special scale was developed to use the survey. The development process of the scale included a detailed examination of relevant studies in the literature and was also enriched by obtaining expert opinions. Following this process, the validity and reliability analyses of the scale were carried out meticulously using the IBM SPSS data analysis program. Validity and reliability analyses of the developed scale were carried out using the SPSS data analysis program. These analyses included a comprehensive evaluation to show that the questions of the scale accurately measured the targeted topics and that the results were reliable. In this way, the scientific validity and reliability of the study was increased by establishing a solid basis for the strengths and usage areas of the scale. This scale development process provides a solid basis for the methodological framework of the study and contributes to making the data obtained more reliable and meaningful.

The effective use of sustainable systems of the FNN Sustainability Center, its diversity in structure and the general awareness of these systems assume an important role on a regional scale. The Post-Occupancy Evaluation (POE) study shows that the office building provides a positive experience for employees, both physically and psychologically, and raises awareness about sustainability. Based on the survey results, it has been determined that some individuals working in open-plan office areas are generally disturbed by noise, while another group of employees are disturbed by sun reflection and glare. This feedback means that office design and layouts can be revised to provide a better user experience. Simple layouts and optimized office layout can increase employee satisfaction. Additionally, employees making comparisons with old office buildings stated that working in a sustainable office is more productive and enjoyable. These findings suggest that sustainable office buildings can have a positive impact on employees' work performance and overall satisfaction. In this context, disseminating sustainable office practices and increasing awareness in this field can be important steps towards making working environments more sustainable and user-friendly.

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Source of illlustrations and tables

Figs. 1-10 Authors
Tables I-V Authors

Authors biographies and contributions

Assoc. Prof. **Gökhan Uşma,** Ph.D. His current research interests include architectural design, architecture and environmental psychology, physical environmental control in architecture, housing and sustainability.
Lect. **Deniz Erdoğan Ölçer,** M.Sc. Her current research interests include building physics, energy efficient building design, integration of renewable energy into architecture and sustainable campus design.

Conceptualization: G.U. and D.E.O.; methodology: G.U. and D.E.O.; software: G.U.; validation: D.E.O.; formal analysis: G.U. and D.E.O.; investigation: G.U. and D.E.O.; resources: D.E.O.; data curation: G.U.; writing – original draft preparation: G.U.; writing – review and editing: D.E.O.; visualization: G.U. and D.E.O.; supervision: G.U. Both authors have read and agreed to the published version of the manuscript.

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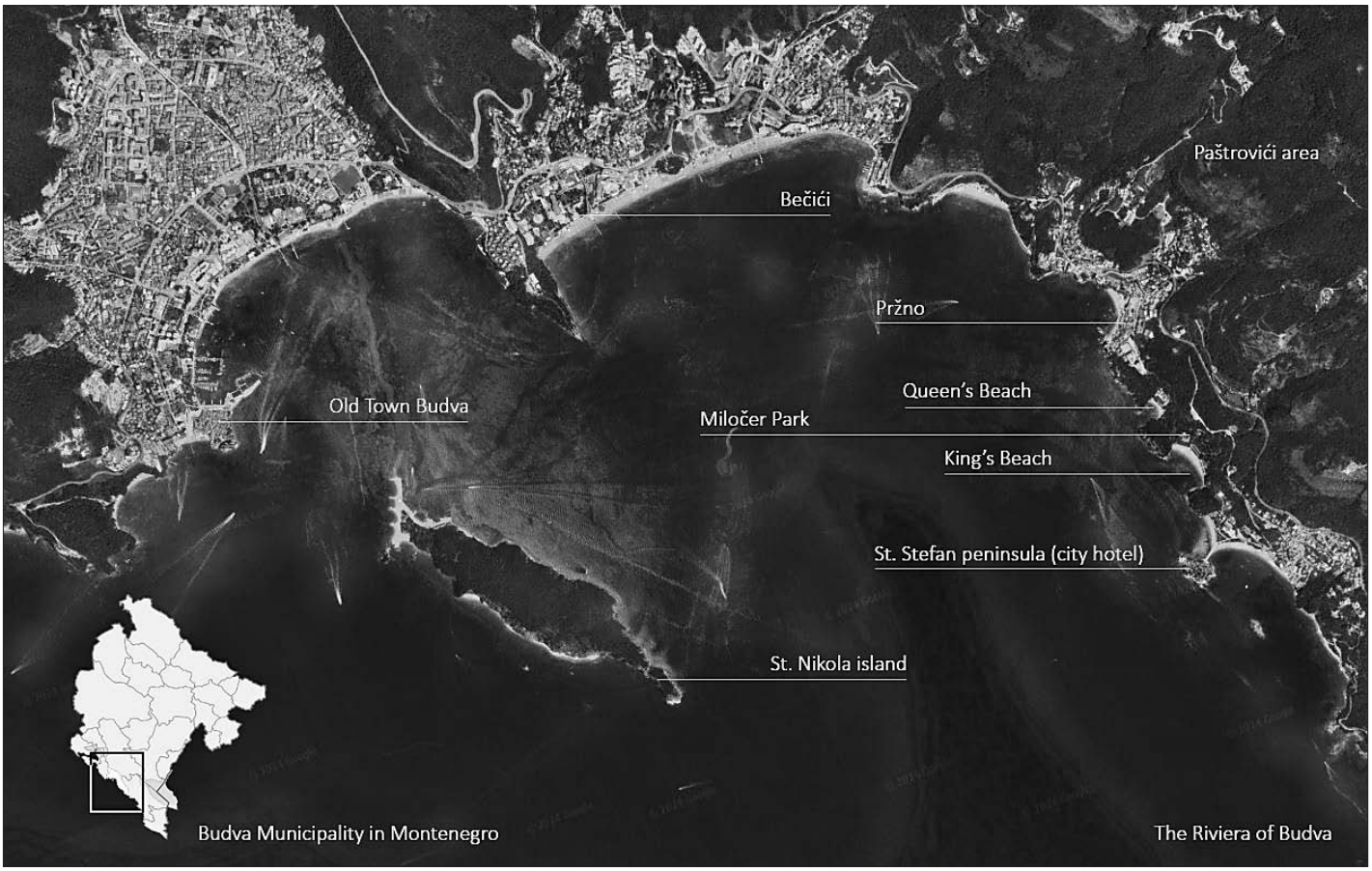

Fig. 1 Map of Budva Municipality Riviera

Danilo Bulatović

Politecnico di Torino, DAD – Department of Architecture and Design, Italy – 10125 Torino, Viale Pier Andrea Mattioli, 39
https://orcid.org/0009-0009-6530-8659
danilo.bulatovic@polito.it

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Tito's Residential Complex in Miločer, Budva (1975-1980)
From Vernacular to Regional Architectural Practice

Miločer, Budva
Montenegro
regionalism
state-residence
Tito, Josip Broz

The subject of this paper is the development of a conceptual design proposal for the official residence for the President of Yugoslavia Josip Broz Tito on the Adriatic coast of Miločer, Budva (1975-1980). The research aims to unveil patterns of the regionalist approach within urban and architectural thought in the Socialist Republic of Montenegro (SR Montenegro) through the project of the presidential complex, shown here for the first time since its official presentation to the president himself in 1976. In methodological terms, the paper examines multiple layers of historical background of Miločer that affected the designers' process of thinking, followed by a clear-cut description of the planning procedures, methodologies and reasoning that emerged from the archives and first-hand witnesses of the whole process. The final results reflect on the critical approach within the practice of the post-war generation of Montenegrin architects, successfully balancing between the poles of power-representation and contemporary architectural currents.

INTRODUCTION

The last decade has recorded a significant upsurge of an academic interest on the topics of design and urban practices in the Socialist Federative Republic of Yugoslavia (SFRY) between 1945 and 1990. However, sharing a doubled peripheral status both as part of the federal union, wretched between the communist East and capitalist West, and the least developed among six federal republics at the same time, the Socialist Republic of Montenegro (SR Montenegro) earned marginal space within the overall scholarship. Only recently have new findings zoomed out from capturing individual oeuvres and expansions on a comprehensive network of urban planners, architects and engineers who played a crucial role in the development process across Montenegro during the socialist period (Stamatović Vučković, 2023). Those hidden actors of modernizations represent an essential foundation for further examination of subaltern architectural and urban practices within the wider Yugoslav mosaic.

Being the most underdeveloped part of the country after World War II, Montenegro served as an ideal terrain to implement many of the newly proclaimed development programmes that would improve its socio-economic status. Such development directly reflected on design concepts across the Montenegrin Riviera, serving at the same time as a litmus test for observing fluctuating dynamics in the implementation of new architectural languages respective of each decade (Bulatović, 2022). At the end of the 1960s, the high-modernist approach was gradually replaced by regionalist tendencies vividly displayed within the layers of conceptual design developed between 1975 and 1980 for the residential complex of the president of Yugoslavia Josip Broz Tito in Miločer, Budva (Fig. 1). Although the project was never completed, coming to a halt soon after Tito's death in 1980, the project's idea serves as a hybrid that successfully synthesized the ideas of the local heritage, contemporary architectural currents and the cult image of the highest political figure.

The following chapters analyse the process from its initial design phase to the final presentation before the president himself. The first chapter maps Tito's residences in Montenegro, where he stayed between 1945 and 1980 while in Montenegro and the reasoning behind a decision for a new residence in Budva Municipality. The second chapter brings to light the history of the leisure industry of Miločer and the federal competition for conceptual urban-architectural proposal for the tourist area Sveti Stefan-Miločer-Pržno from 1964, which marks the first major influx of new ideas into the local architectural practice. The third chapter presents the traditional Paštrović house as an exemplar unit of the coastal building tradition in Montenegro. Finally, the last chapter shows a symbiotic relationship between the former influences incorporated within the presidential complex proposal and its official presentation to the president in Miločer in 1976 (Fig. 2).

TITO'S RESIDENCES IN THE SOCIALIST REPUBLIC OF MONTENEGRO

There were at least 34 official or temporary residences throughout ex-Yugoslavia in which President Tito spent longer or shorter periods of time during his travels (Niebyl, 2020). These were used for coordination and management of his official duties while in the country, but also as a place for leisure and relaxation, dominant in the 1970s. Although

1 Tito visited Montenegro in 1946, 1951, 1959, 1963, 1969, 1970, 1972, 1973, 1975, 1976, 1977, 1978, 1979.

2 Along with rehabilitation spaces in the building, it also served as the main administrative and logistical center of the president, with spaces such as meeting rooms, offices, library and various accommodation units.

3 Compared to the residences in Herceg Novi, the Miločer complex showed by far the most advanced approach in urban composition, architectural language and relationship with the landscape, deeply rooted in the history of the Paštrovic building tradition, both in terms of its recent experimental discourse and its vernacular background.

some of them were purposefully constructed for the president, many others were acquired through the process of nationalization after WWII. This was particularly relevant in the case of the Karađorđević royal family of Yugoslavia, who were deposed by the Yugoslav Constituent Assembly and whose lavish properties ended up being used by most prominent party officials. These included castles, hunting lodges, seaside manors and luxury palaces.

During the war, Tito had many informal settlements of which the most important one was in Bare Žugića, Žabljak from where he commanded the troops in the region in 1940 (Broz Tito, 1959). From 1945 onwards, without a newly built residence in Montenegro, until 1976, Tito usually stayed in the former royal "Miločer" castle (Fig. 3) in Budva Municipality or even in a hunting lodge in Žabljak (1970) near the Black Lake (Fig. 4).[1]

The deterioration of Tito's health condition in the mid-1970s anticipated an urgent need to find a new place for his stay and rehabilitation, as his personal residence in Brijuni (Brioni), Croatia, was unsuitable due to humidity. Without an official residence for executive bodies of the federal government in the whole of Montenegro, it was decided that new facilities would be built in the city of Herceg Novi and Budva, choosing the most adequate positions with respect to the environment, climate and historical circumstances. With "the strength and influence of the Yugoslav military which offered preconditions for the rapid and effective completion of construction" (Radulović, Alihodžić Jašarović, Žarić, 2020: 70) Villa "Galeb"[2] (Igalo) was designed by architect Milorad Petijević and finished in January 1977. In addition, Villa "Lovćen" designed by Tihomir Ivanović, was built on the initiative of the Yugoslav Army in Meljine in the same year, which was later characterized by Tito himself as "irrational and unnecessary spending of funds by the army" (Radulović, Alihodžić Jašarović, Žarić, 2020: 72).

While villas in Herceg Novi were important for therapeutic reasons, Miločer, on the other hand, was most likely marked as the twin counterpart to the other "White Houses" scattered across Yugoslavia, which carried their own symbolic and historical meanings.[3] Namely, the succession of power from royalism to communism, reflected through the occupation of the "White House" in Belgrade as a „symbol that the masses already knew well" (Kulić, 2009: 94) and "Bijela Vila" (white villa) at Brioni, probably made the case for Karađorđević's white palace complex in Miločer park to become a new emblematic example of this symbolic power shift in Montenegro.

Fig. 2 Official presentation of the residence conceptual proposal to President Tito in Miločer, Budva (1976); President of the People's Assembly of the Socialist Republic of Montenegro Vidoje Žarković, Prime Minister of Yugoslavia Džemal Bijedić, Chief of the President's Protocol Mirko Milutinovic, President of the Executive Council of the Socialist Republic of Montenegro Marko Orlandić, President of SFRY Josip Broz Tito, architect Vasilije Đurović, Head of the Republic Institute for Urban Planning and Design (Titograd) Professor Božidar Pavićević (from left to right)

Fig. 3 President Tito and his wife Jovanka Broz, with Vladimir Mitrović (director of Sveti Stefan hotel complex), visiting the Miločer castle in the 1970s.

Therefore, after a few visits to Miločer in 1969, 1972, 1973 and 1975, a decision brought by the highest army officials to build a new residence in this location was communicated to the representatives of the Republic Institute for Urban Planning and Design in Titograd (RZUP) by the end of 1975. The development of the project, classified as highly confidential, started in two parallel phases. Urban, architectural and construction projects were developed in the first phase by RZUP and finished in 1976, while the infrastructure system was developed by the Institute for Security in Belgrade, guided by Police General Jovan Popović, and finished in 1980.

Miločer as an Architectural Laboratory

A growing interest for leisure activities in Miločer began as early as in 1952 upon the

Fig. 4 Villa "Galeb" in Igalo (left), Villa "Lovćen" in Meljine (middle), Villa in Žabljak (right)

FIG. 5 CONCEPTUAL DESIGN PROPOSAL FOR TOURIST COMPLEX IN MILOČER BY EDVARD RAVNIKAR'S TEAM (1964)

suggestion of the high official of the Communist party Edvard Kardelj. The idea was to "transfer the last inhabitants and the transformation of the city [Sveti Stefan] into a hotel-village", after which the new hotel-city was inaugurated on July 13th 1960 with "80 restored houses, with the interiors completely redone, 110 comfortable apartments and 237 beds" (Lajović, 2015: 1).[4] The authors of the transformation process were architects Branko Bon[5], Vojislav Đokić[6] and Radmilo Zdravković[7] and executed by construction company "Crna Gora" from Nikšić (Đ.Z., 1963: 42). Moreover, the "Megayear 1964" (Banham, 1976: 70) brought a completely new wave of innovations in the leisure industry.[8] Adopted as the main theme of Triennale di Milano (1964), the idea of the holiday village was perceived in two ways – "small self-sufficient town or miniature town" and "the concept of a mega-structure as the most suitable system for the creation of leisure-time settlements in any type of seaside or mountain landscape" (Savorra, 2018: 133). Such an approach was primarily reflected through new "mega-structural agglomerations of individual unit cells, more or less formal in organization" already present in France, Portugal and Spain, while "in part drawing inspiration from the systemic thinking of Team 10" (Kulić, 2014: 1).[9] At the same time, a federal competition call was released for the development of a conceptual urban-architectural proposal for the tourist area Sveti Stefan-Miločer-Pržno. The first prize[10] was awarded to the team led by architect Edvard Ravnikar, Majda Kreger and Edo Ravnikar Jr. from Ljubljana (Fig. 5). According to the jury committee "the work is consistently based on the idea of respecting the landscape, freeing large areas of the complex south of the road for recreation, intactness of nature in its elementary forms, adaptation to the terrain to the maximum, respect for the agglomerative value of St. Stefan and the formation of new modern agglomerations, experiencing the Mediterranean" (Minić, 1965: 64).[11] In addition to the intersecting volumes enriching the morphology of the terrain, Ravnikar carefully guided tourists through the set of visual sequences from ground level to the accommodation units up in the hill. Framing the views with the rectangular volumes of the room, architects created an extended spatio-visual experience closely tied to the natural surroundings.

Although second and fourth prize were not awarded to any of the competitors, there were three third prizes.[12] Echoing the proposal of Edvard Ravnikar, architect Zoran Kvajtmejer from Ljubljana *(Jedro)* designed descending accommodation units, intercon-

4 As the Non-Aligned Movement (1961) of which Yugoslavia was one of the founders, gained pace and started to become widely appraised throughout the world, the city hotel also served as a venue for hosting world celebrities, thus identifying with popular Mediterranean resorts in the West.

5 Branko Bon (1912-2001). Further biography in: Šentija, 1982.

6 Vojislav Đokić (1902-1984). Further biography in: Martinović, 2021.

7 Radmilo Zdravković (1912-1992). Further biography in: Markuš, 2008.

8 The term "Megayear 1964" was introduced by Reyner Banham in: *Megastructure: Urban Future and Recent Past* (1976) describing the year in which the implementation of 'megastructures' typology culminated, experimenting on the issue of mediation between architecture and global socio-economic issues.

9 Examples include Michel Bezancon's Tourist Complex on the Grande Plagne Savoy (1966-1980), Aquitaine Architectes Associes's Tourist Village Anglet (1969) and Julio Lafuente's Hotel Gozo (1967).

nected with passages, with shared spaces at the bottom of the hill (Fig. 6). The jury stated that the "author provides a very transparent zonal organization, making thus clear and rational contribution to the competition task" (Minić, 1965: 65).

Two mentions[13] were awarded to the teams led by architect Vladimir Belikov from Belgrade *(Stena)* and architects Marjan Debelak, Braco Mušič and Marko Mušič from Ljubljana (*Hommo Additus Naturae*; Fig. 6). Both proposals differed greatly from their predecessors since the authors decided to experiment both with the form and the location of the buildings. In the case of the *Stena* team, an effort to free the hinterland from construction as much as possible made the cliffs of Queen's and King's beach coalesce with the structure of the hotel. The second proposal followed a similar organic pattern, emphasizing an elaborated hotel-urban agglomeration in the foreground, while preserving the natural environment in the background. The authors situated a requested capacity program in the small village of Pržno in the form of a ziggurat shaped "tourist town" (Minić, 1965: 65) from which the tourist activity would then disperse throughout Miločer park.

Such a diversity in approaches and number of important regional actors who took part in the competition in 1964, reflected the clear idea of the "post-war period in which tourist resorts came to be understood, similar to the colonies in former days, as 'free-places' for the exploration of new urban and architectural concepts and ideas" (Avermaete, 2004: 22) present throughout Europe.[14] This gave a significant impulse to the architectural and planning dynamics of the Socialist Republic of Montenegro, as it helped move the focus from the vocabulary of high-modernism commonly exercised until the mid-1960s and marked the first major influx of the experimental international tendencies.

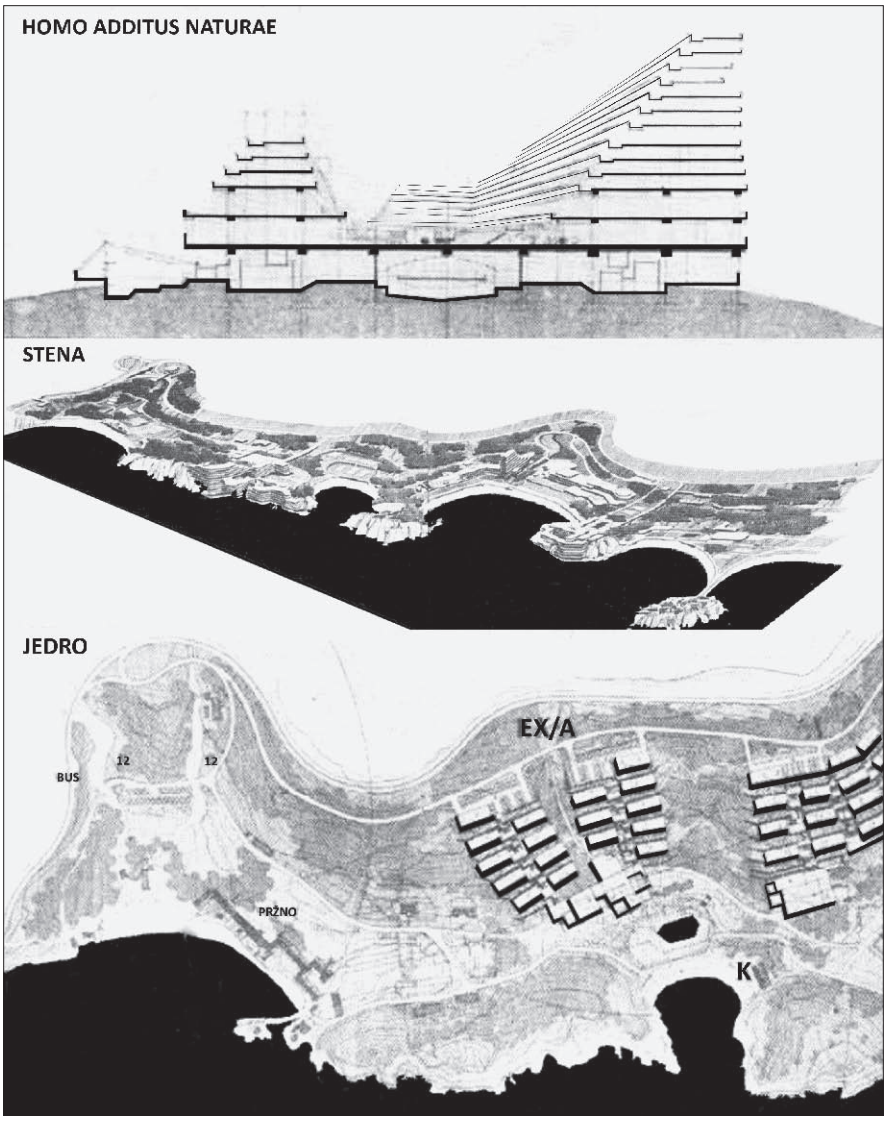


Fig. 6 Conceptual design proposals for tourist complex in Miločer by the team *Jedro* (bottom), team *Stena* (middle) and team *Homo Additus Naturae* (top) (1964)

In Search of the 'Genius Loci' of Paštrovići

At the turn of the decade, the transformative tendencies in Europe sought to include "more fleeting references, though still present, such as natural elements – the coast, the trees the terraces – or historical elements of the 'environment' – towns, isolated settlements road networks – which may provide ideas for the settlement to be built from scratch." (Aymonino, 1970: 18-19).

Adding to the previous Yugoslav scholarship[15], the Regional Development Program for South Adriatic[16] attracted numerous international ac-

10 The prize consisted of 3,500,000 dinars, while the team was competing under the code name *Natel*.

11 While Hotel Maestral in Pržno (1970-1971) represents only a small part of the whole complex that was actually completed, the idea paved the way for the integration of local practice with the evolving architectural currents across the world.

12 The prizes worth 1,500,000 dinars were awarded to teams under code names *Jedro*, *14109* and *25115* (Minić, 1965: 65).

13 Mentions of 1,000,000 dinars each were awarded to the teams under code names *Stena* (Cliff) and *Homo Additus Naturae* (Minic, 1965: 65).

14 The proposal from *Natel, Jedro* and *Stena* represented a "mega-structure" approach with dispersed accommodation units, while the team *Hommo Additus Naturae* put forward the "miniature town" concept with the main building aggregating the social and physical activities of the whole area, referencing the themes from Milano Triennale (1964).

15 In Yugoslavia, the pioneering writing on oriental housing by Dušan Grabrijan and Juraj Neidhardt in

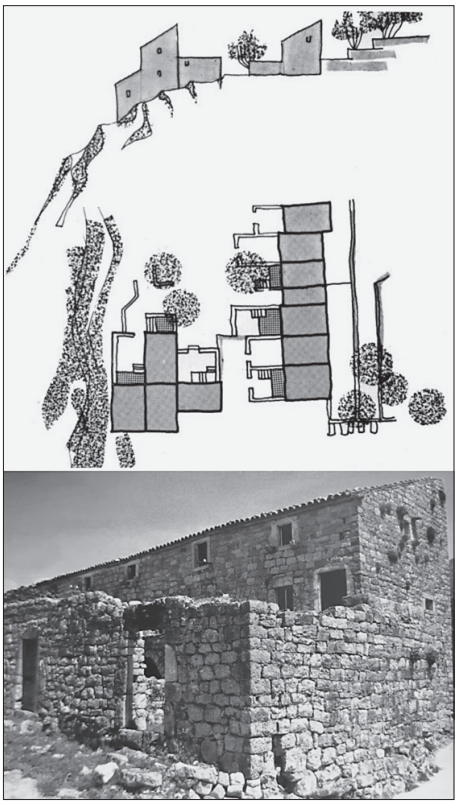


FIG. 7 TYPICAL PAŠTROVIĆ HOUSEHOLD

FIG. 8 URBAN CONCEPTION OF THE COMPLEX DESIGNED BY ARCHITECT VUKOTA TUPA VUKOTIĆ AND TECHNICIAN SLOBODAN KOKOTOVIĆ: A – PRESIDENTIAL VILLA, B-F – GUESTS' VILLAS, 1,2 – COMMON BUILDING FOR THE ENTOURAGE, 3 – PRIVATE BEACH PAVILION

tors, including Georges Candilis and Konstantinos Dioxiadis and it served as an ideal platform for the research of "genius loci" within Montenegrin coastal villages. Particular attention of domestic and foreign experts was dedicated to the analysis of the Paštović house[17], which belongs to the "Dalmatian type of folk architecture" (Kekovic, Petrović, Ćurčić, 2019: 686-687), specific both from the urban and architectural point of view.

A linear urban formation[18] was bonded with traditional urban artefact that served as a public meeting space not just in Paštrovici (Adriatic Sea) but also in Crmnica (Skadar Lake) and Gornja Lastva (Boka Bay), commonly called 'guvno' (usually with the circle form). The architectural composition of the Paštrović house complements the environmental conditions of the site, while the household contour follows the configuration of the terrain (Fig. 7). The houses are comprised of three floors, each serving a specific function. The basement was usually divided in two rooms that served for storing household necessities while the staircase led directly to the main room on the first floor, which served as a sleeping area. The top floor was used as a kitchen most often with the fireplace. The most conspicuous element of the house is a single-pitched roof "convenient for its conforming to the contour line of the terrain and protecting from the north wind – the *bura*, by channeling the wind stream down the slope" (Kekovic, Petrović, Ćurčić, 2019: 686-687). The terraces are built of stone with a brick fence and profiling in sight benches known as 'pižun' usually covered with wooden pergola with grapes. Thus, the building exemplified a physical condenser of the social, cultural and pragmatic layers of the ethnographic traits of Paštrovici, while providing a vast field for contemporary interpretation aligned with an emerging critical discourse on domestic and international level.

THE SYNTHESIS: PRESIDENTIAL COMPLEX PROPOSAL (1975-1980)

Upon the receipt of the executive order to make a conceptual design for the new residence complex for President Tito in Miločer in 1975, the RZUP, guided by Božidar Pavicevic[19], launched the procedure of creating working groups for the project. The supervisor of the design team was engineer Vladimir Stanković[20], who oversaw the working groups[21] guided by architect Milorad Vukotić[22], construction engineers Veljko Belada and Aleksandar Jovanović. The urban conception of the complex was proposed by architect Vukota Tupa Vukotić[23] and technician Slobodan Kokotović. The first phase of the project was finished in May 1976, when it was officially presented to the president in the courtyard of the Miločer castle[24] (Fig. 2).

In accordance with the accumulated architectural background of Miločer, the new proposal for the presidential complex required a thoughtful and reflective approach in response to the program of the new residence. Compared to the design of those in Herceg Novi, where the formal interpretation of both buildings stands in sharp contrast to the location, the one in Miločer differed greatly both in terms of size and form, respecting the fragility of the local landscape. The words of the chief architect Milorad Vukotić that "the Montenegrin coast will never be attractive only because of the buildings ... but because of the unique configuration of the terrain, which cannot be found in this form anywhere else in the world." (Vukotic, 1975)[25] clearly reflected this position.

Settled on the Queen's beach, north from the castle "Miločer" and south of the hotel "Maestral" in Pržno, the urban plan envisioned an exclusive resort with the presidential villa (A), five additional buildings for official guests (B, C, D, E, F), a common building for the guests' entourage (1, 2) and a private beach with an auxiliary pavilion (3; Fig. 8).[26]

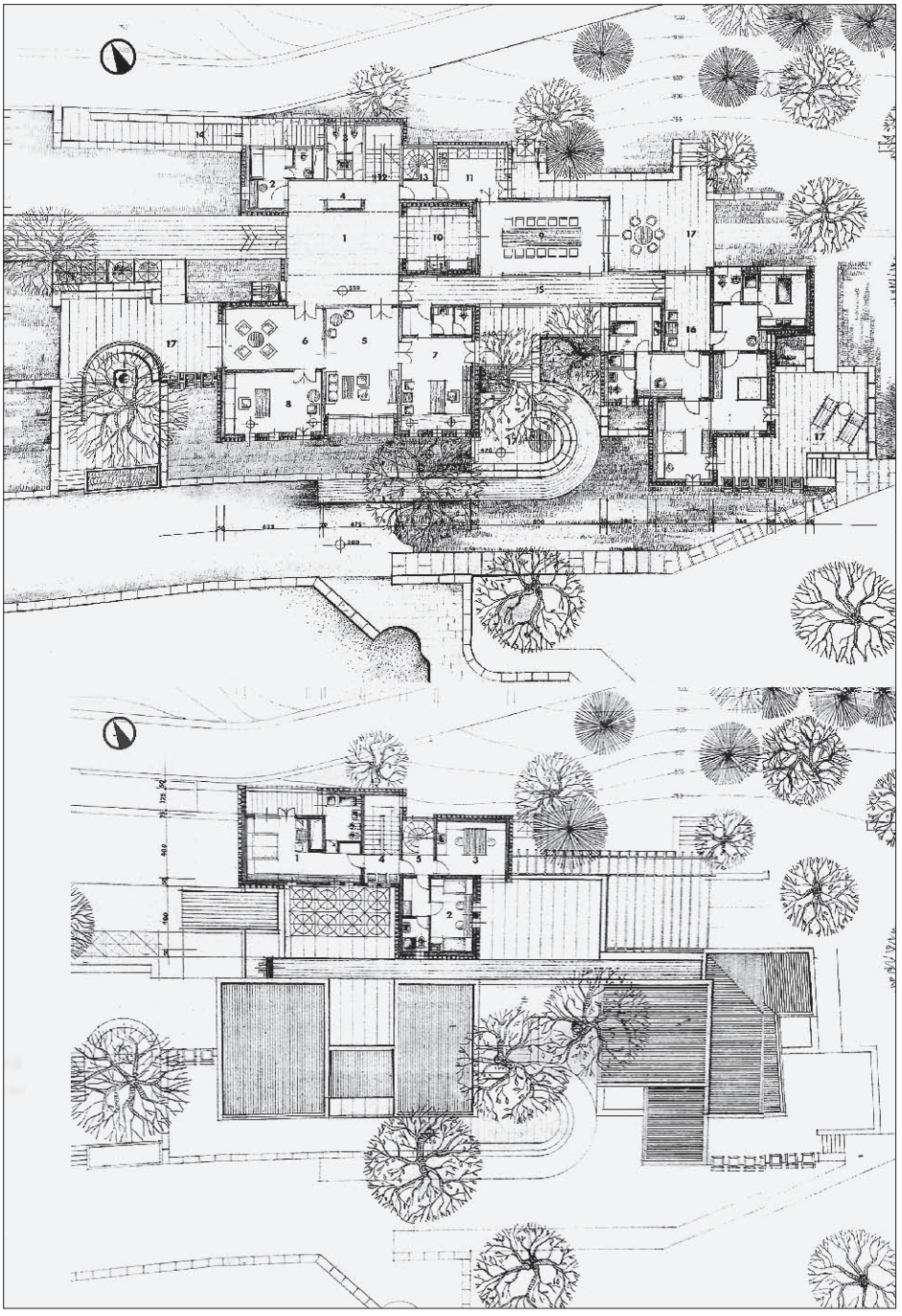


Fig. 9 Ground floor (up) and first floor (down) of the presidential villa in Miločer. Ground floor includes: 1. Entrance hall; 2. Officer's apartment; 3. Guests' toilets; 4. Guests' cloakroom; 5. Male salon; 6. Female salon; 7. Workroom 1; 8. Workroom 2; 9. Dining room; 10. Fireplace; 11. Office; 12. Staircase; 13. Service staircase; 14. Service entrance; 15. Hallway; 16. Guests' apartments; 17. Terraces. First floor includes: 1. Sami-apartment; 2. Doctor's room; 3. Office; 4. Staircase; 5. Service staircase.

Scattered across the Miločer park, the complex aligned with the organic approach introduced in the competition proposals from 1964, whereby the process of decomposition served as the common strategy for better integration with the natural environment.[27]

When asked about the design difficulties from the president himself, although reluctantly, Božidar Pavicevic outlined two main issues: "The first and most important one is

Arhitektura Bosne i put u savremeno (1957), shifted the interpretation from vernacular to contemporary reading, while such approach was also exploited by Aleksandar Deroko, Zoran Petrovic, Branislav Kojic, Brana Milenković and Milan Zlokovic at Belgrade University. In "L'architecture rurale de Boka Kotorska" and "Maison et Palais" (1964), Petrovic, Kojic and Zlokovic analyzed the vernacular housing of Boka Kotorska "representing an important chapter in the history of the local cultural heritage and serving as a model in the realization of contemporary proposals" (Zlokovic, 1964: 58).

16 The Regional Development program was developed upon the request of the Federal Government to the UDNP, between 1967 and 1972 and included the area between the city of Split and Ulcinj.

17 Park Miločer is situated within the wider region called Paštrovici in the coastal part of Montenegro, with St. Stefan as its core.

18 This is particularly reflected through continual rows of tightly arranged plots of land of different 'brotherhoods' *(bratstvo)*, conditioned by the rules of territorial defence and rational exploitation of land resources in the mountains above the sea.

19 Božidar Pavicevic (1933) graduated from the Faculty of Engineering, University of Belgrade in 1959 and worked in Organizational and Construction Company (OGP) in Montenegro from 1959. From 1974, Pavicevic held the head position in the RZUP in Titograd. Apart from recognized role on federal level, from 1985 he was employed at University of Montenegro, Faculty of Engineering. Pavicevic is still active and contributes to the relevant issues related to urban planning, engineering and design (Pavicevic's personal archive).

20 Vladimir Stankovic (1933-2005) graduated from Faculty of Engineering in Sarajevo in 1959 and obtained his Ph.D. in Skopje in 1989. Stankovic was the Technical director of RZUP (1975-1990; RZUP archive).

21 The architecture team was comprised of several prominent Montenegrin architects including Vasilije Đurovic, Milan Popovic, Pavle Popovic, Nikola Drakic, Slobodan Slovinic (for detailed biographies: Markuš, 2008) and technicians Bogic Vukcevic, Dušan Ratkovic, Sonja Savic and Slobodanka Radunovic.

22 Milorad Vukotic (1932-1978) was the chief responsible for the architectural design in Miločer. However, after his deteriorated health conditions this position was given to architect Vasilije Đurovic, who presented the project to the President in 1976.

23 Vukota Tupa Vukotic (1932-2002). Further biography in: Markuš, 2008.

24 President Tito visited Miločer on the same occasion of the opening ceremony of the Belgrade-Bar railway (nearby Miločer) on May 28th 1976.

25 Radio Televizija Crne Gore Archive (1975), Crnogorsko primorje: Arhitekta Milorad Vukotic interview [video].

26 The general disposition of the buildings, resulted from an effort to preserve valuable plantations, takes advantage of the best views and ensure optimum insulation conditions, considering the lack of a predominantly west-oriented location.

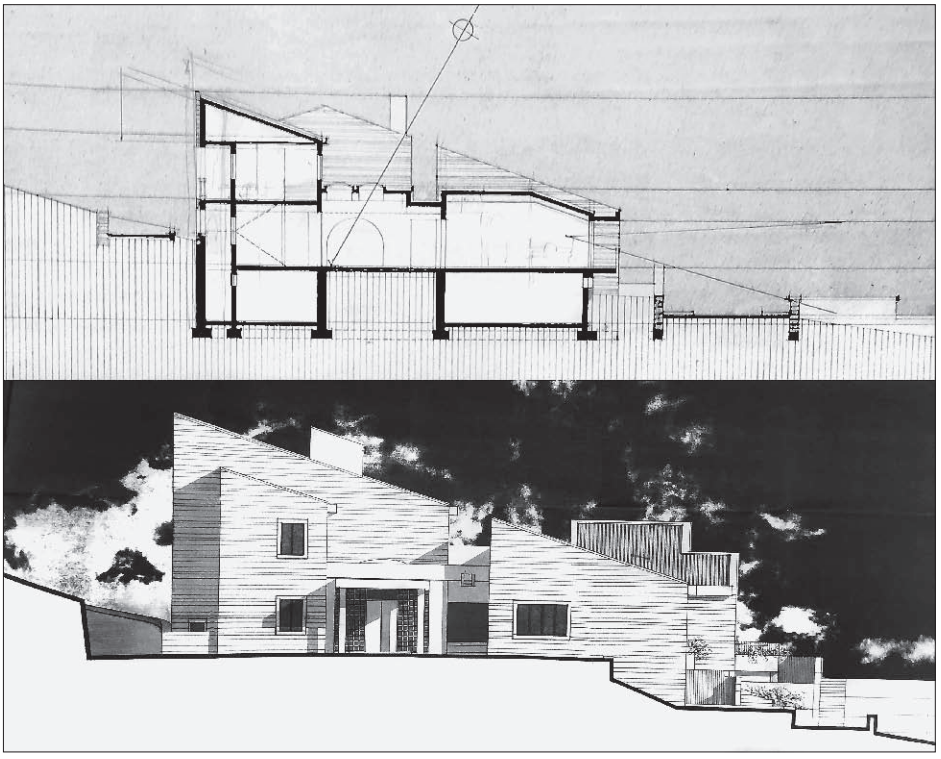


FIG. 10 A-A SECTION (TOP) AND WEST ELEVATION (BOTTOM) OF THE PRESIDENTIAL VILLA IN MILOČER

related to overcoming the sloping terrain and moving seamlessly between different levels, while the second one has to do with the style of the interior design" (Bulatović and Pavićević, 2024).[28] Tito's answer to the first question discarded any worry about the differentiated levels giving designers "full liberty of organizing the complex according to what chief engineer thinks should be done" (Bulatović and Pavićević, 2024), while the second question was left for Jovanka Broz to be discussed later on.

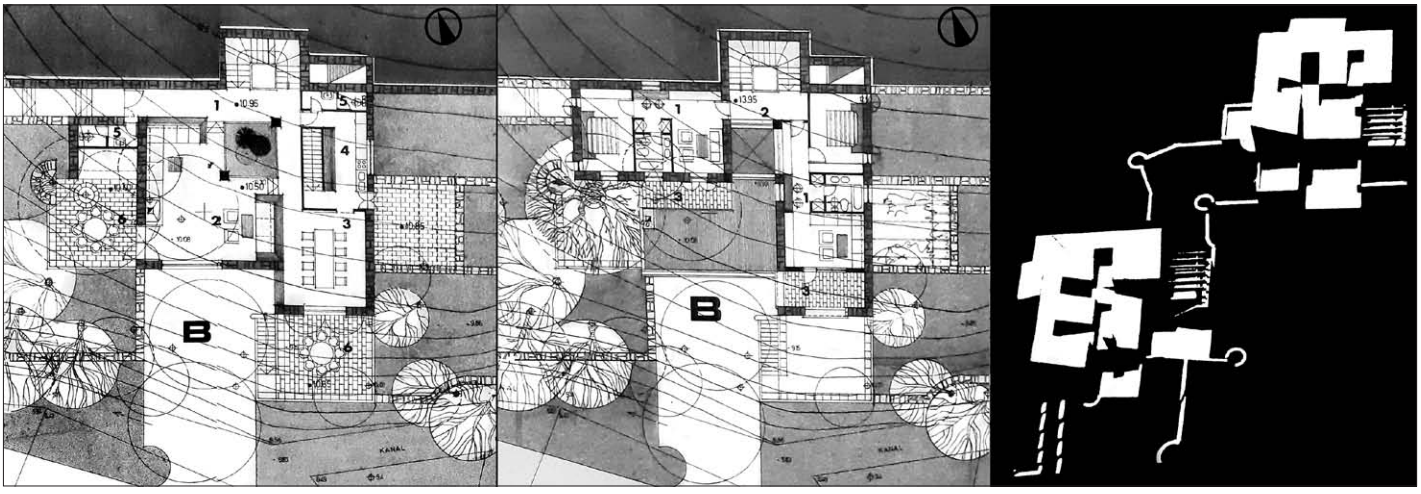
The micro-location of the presidential villa was fully defined by a detailed urban plan and it occupies the southernmost part of the complex near the beach. The sloping land towards the sea, cleared by previous interventions and refined with sub-walls, was characterized by the presence of a large number of olives, fir, cypress, oak and other trees. This is why the architects judged that "the value of the ambience of this area as a whole and the exceptionally beautiful view had a decisive influence on the choice of the location of the building in this place" (RZUP, 1976).[29] The villa consisted of the basement, at an elevation of +2.70 m, ground floor, connected to the main entrance at an elevation of +5.50 m and first floor at an elevation of +8.80 m. The ground floor and first floor (with the president's semi-apartment and health service) were connected to the main staircase from the hall, and all three floors were connected by the service staircase (Fig. 9).

The villa developed parallel to the slopes of the terrain, in accordance with the vernacular principles of the Paštrović house. Levels of privacy, with public spaces in the north and private spaces on the south side, changed accordingly along the main compositional axis (north-south).[30] This division also represents the main feature of the proposal, clearly reflected through the volumetric ramification of the building units according to each functional zone (Fig. 12).

The contents of the first floor were separated, whereby a semi-apartment for the president (hall, bathroom, room and loggia) was directly connected to the main staircase, while the office and doctor's room with a bathroom relied on the service stairs. The decision for the secluded orientation of the presidential apartment towards the mountain was due to security reasons, also implemented in his residence in Herceg Novi.

Furthermore, the architects insisted on the symbolic extension of the living space provid-

FIG. 11 TYPICAL VILLA (B, C, D). GROUND FLOOR INCLUDES: 1. ANTRE, 2. SALON, 3. DINING ROOM, 4. KITCHENETTE, 5. TOILET, 6. TERRACE (LEFT); FIRST FLOOR INCLUDES: 1. APARTMENTS, 2. ANTRE, 3. TERRACE/LOGGIA ((IN THE MIDDLE). MODEL EMPHASIZES SINGLE-PITCHED ROOFS, PERGOLAS, TERRACES, *PIŽUN*, *GUVNO* AND ARCHES IN ACCORDANCE WITH THE PAŠTROVIĆ HOUSE TYPOLOGY (RIGHT).



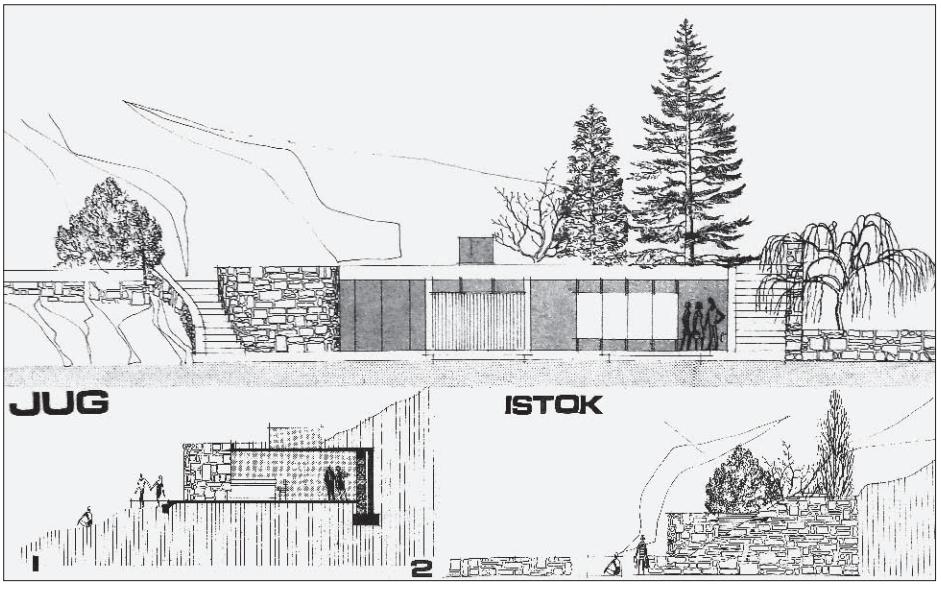
ing a continuous visual relationship throughout the ground floor with the environment of the Miločer park (Fig. 10). The internal courtyard of the villa, with the semi-circle form, referenced the traditional urban artefact called "guvno", whereby such urban agglomeration articulates a subtle connection between household functional units, as it did between different brotherhood households in Paštrovići. Furthermore, this approach can also be traced in the design for villas dedicated to the official guests of the president, members of the federal government and the republic's representatives (Fig. 11). Composed of a dining room, kitchenette, salons and bathrooms on the ground level and two master bedrooms with terraces at the first floor, altogether developing around the central courtyard, the buildings complemented the inherited building traditions. This is particularly reflected through the usage of arches, pergolas, "pižuns", "guvno" and single-pitched roofs[31] responding to the local topographical, climate and social prerogatives of the area, while simultaneously complementing contemporary requirements of the presidential protocol activities.

Moreover, along the regionalist approach adopted by the team[32], it could be argued that the proposal also reflected a range of pragmatic concerns related to the legitimization of Tito as a leader figure. Namely, as argued by Vladimir Kulić in the case of the popularization of Tito's birth-house in Kumrovec, it "was of utmost importance to present Tito as 'one of the people'" (Kulić, 2009: 114). Consequently, the implementation of vernacular principles of the Paštrović house aligned with a representational agency of the Tito cult, turning it into a cohesive connection with the ethnographic traits of this historic community in the Socialist Republic of Montenegro (Fig. 12).

Fig. 12 Model of the presidential villa in Miločer (made and photographed by Savo Đorđević)

Finally, along the northern part of the complex which was dedicated to the accommodation of

Fig. 13 Presidential beach pavilion at the private Queen's beach



27 The issue of managing height differences in such a small area was something that was particularly relevant for the authorities. Anticipating the upcoming period of Tito's hobbling condition in the second half of the 1970s, adjutant colonel Marko Rapo was explicit to Božidar Pavićević not to mention any obstacles in the design process to the president during his official visit to Miločer.

28 The interview with Professor Božidar Pavićević was conducted in January 2024 at his home in Danilovgrad, Montenegro.

29 Extract from the project documentation 'Objekti reprezentacije saveznih organa: Područje Opštine Budva, Miločer' from 1976 [100×80 cm], Podgorica.

30 Officer's room, dining room and kitchenette were oriented towards the mountain, while the western part oriented to the sea was reserved for the everyday use of salons, workrooms and guests' apartments.

31 This was the first time those elements were interpreted and put together reflecting the authentic architectural approach on the Montenegrin coast, while their reinterpretation was later successfully deployed in post-earthquake (1979) design concepts for Hotel complex "Slovenska plaža" (1984) in Budva and "Dubrovački vrtovi sunca" (1988) in Dubrovnik, designed by Slovenian architect Janez Kobe (Karač, Premović, 2021: 634-657).

32 At the same period, a similar example of the regionalist approach could be traced in the presidential villa Gorica in Bugojno (1978), whereby architect Zlatko Ugljen proposed a sophisticated concept of spatial continuity fully integrated with the surrounding environment (Bernik, 2002).

the guests' entourage (1, 2) with the double storey building of 40 hotel rooms, the proposal included a wide network of gravel pathways that led to several private beaches. At the Queen's presidential beach, architects proposed a small pavilion that blended within the rocky background of Miločer cliffs (Fig. 13). The small facility was equipped with a dressing room and bar to serve the needs of those using the beach, while its composition reflected a clear idea of the subtle relationship between natural and artificial permeating the whole complex, from its greatest to its smallest unit.

CONCLUSION

The project for the presidential complex in Miločer emerges as an important artefact in the historical analysis of the Yugoslav architectural mosaic. Juggling between the issues of spatial arrangement, function, typology, scale, connection with the socio-ethnographic and physical features of the Paštrovići region, while striking a balance between strict program requirements and subtle political representation, the team from RZUP demonstrated a sophisticated level of the local architectural practice. In fact, it could be rightly said that the complex in Miločer represents a valuable contribution to the more accurate examination of the regionalist approach and its exploitation in Yugoslavia at the same time evaluating its position within the shifting discourse of the international architectural scene of the time.

Moreover, it is also a daunting reminder of an obvious reversal in the field of architectural and urban practice on the Montenegrin coast for the last half century. Stuck in the gap between an everlasting transition from a highly-regulated socialist system to the complete discharge of the liberalized (mis)governance of space, the socialist heritage serves as a guiding tool for – questioning our current positions. It stands in sharp contrast to the speculative approaches currently underway in the same area, offering neo-liberal concepts of dwelling, fundamentally opposing both normative and natural characteristics of the location. However, as erroneous as these practices may be, it is through these errors that they facilitate, that they can actually play a vital role in expanding the possibilities of reimagination and with the critical approach to historical discourse again play an active role in innovative localizations. This can become just one of the possible ways towards comprehensive practices which would guarantee more nuanced paths of future development.

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Illustration sources

Fig. 1	© Google Earth
Fig. 2	Božidar Pavićevic's private archive
Fig. 3	Vladimir Mitrović's private archive
Fig. 4	Author's archive (left), © Slavica Kosić (middle), © Obrad Pješivac (right)
Fig. 5	© Design Studio 'Ambient' (Ljubljana)
Fig. 6	Minić, 1965: 64-65
Fig. 7	RZUP, 1969: 34-58
Figs. 8-13	RZUP, 1976: 1-12

Author's biography

Danilo Bulatović is a Ph.D. candidate in Architecture History and Project and holds MSc degree in Architectural Design and History from Politecnico di Milano (2021) and MA degree in Architecture, History and Theory from University of Westminster (2022). He held the position of a teaching associate at University of Montenegro (A.Y. 2022/3). His current research focuses on the architectural heritage of the former Yugoslavia.

Fig. 1 Guangxi province, view on the traditional Dong settlement

Wei Wu[1], Xun Liu[2]

[1] Wuzhou University, School of Jewelry and Art Design, Wuzhou, Guangxi, China
https://orcid.org/0009-0001-0869-070X

[2] Yunnan Arts University, Academy of Fine Arts, Yun Nan, Kunming, China
https://orcid.org/0009-0000-7299-7389

weiwu284@outlook.com
372301035@qq.com
xunliu864@outlook.com
76510539@qq.com

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Wood Construction Practices of the Dong Ethnic Group (Guangxi Province, China)

Eco-design and Cultural Philosophy

building sustainability
Dong eco-design
house construction
resource usage optimization
wooden architecture

This exploratory multiple-case study aims to analyse the ecological design of wooden houses in Dong villages (Guangxi province, China). Residential and public Dong houses were investigated from ecological and cultural perspectives. The results show that topography (i.e., building near the river in a mountainous area) is the main factor influencing the Dong building construction process. It also affects the building layout decisions. The life cycle assessment was applied to collect general information about the exterior and interior design of the Dong settlements. For this, a range of pictures and historical facts (e.g., demand for fire ponds and balconies, ornament usage, etc.) was analysed. The study suggests fir timber as a basic ecological resource for wooden house buildings. Yet, it is highly flammable and increases the fire risk. A brief discussion on the cultural heritage of the Dong people and its influence on their building system is presented. The present findings can be used in future eco-design projects as a brief guideline for creating a traditional-style ethnic wooden house.

Introduction

The ecological design (or eco-design) discourse has reached a global dimension over recent decades (Qi et al., 2021). Different countries have adopted unique ecological norms and concepts (Bahrami, Jakobsson, and Söderroos, 2023). While Europe benefits from a successfully adopted passive housing scheme, the Middle and Far East continue to seek unity with nature. The United States shows interest in the energy efficiency of housing (Bahrami, Jakobsson, and Söderroos, 2023). The goal of eco-design is to make the most sustainable housing from natural materials while causing minimum damage to the natural environment (Qi et al., 2021). In the context of the scientific and technical revolution, the concept of ecological design becomes gradually pragmatic and limited by technical requirements, design standards, and international regulations (Plouffe et al., 2011).

Nevertheless, eco-design remains a spiritual and practical phenomenon that embodies the cultural identity of a certain ethnic group (González-García et al., 2011). Ecological design is the embodiment of contemporary human desire to preserve their species and save the environment in its primaeval form. From this perspective, ecological design plays not only a functional but also a spiritual role in human-environment interaction, especially in conditions of increasing urbanization (Kalayci Onac et al., 2021).

A group of scientists, led by Chris Perry, a founder of Pneumastudio, has created a project demonstration named "Not for 'us' alone". It demonstrates possible and close consequences of human influence on different forms of life on Earth (Kallipoliti, 2018). The general description of the project denotes a big part of soil together with flora and fauna inhabitants, which were displaced from their natural habitat. It has been done to demonstrate human-non-human connections within the natural environment. Ecological resilience has become a key aspect on the ecological agenda.

In the existing literature, considerable attention is paid to the global, continental and country-level features of ecological design, while ethnic groups as independent microenvironments receive little attention (Grabner, Buchinger, and Jeitler, 2018). This gap in the ecological design research can significantly affect the overall development of contemporary architecture, for the world is not a unitary single system. It consists of separate conceptual parts – ethnic groups – each distinguished by specific architectural and cultural patterns that dictate the general architectural trends of a nation.

The novelty of this study lies in the examination of how traditional wooden houses ecological design and the natural resource optimization course in the construction industry affect the construction practices of the Dong ethnic group. This study presents a significant contribution to determining the general trend of ecological design development and the effect of ethnic architectural microconcepts on sustainability and resource optimization.

Literature Review

At present, wood continues to be the optimal resource for ecological construction: it is energy-efficient and biodegradable, has a vast number of application options, denotes the do-no-harm-to-the-environment principle, and has an aesthetic appearance. Wood-frame buildings are associated with substantially lower-life-cycle carbon emissions compared to concrete-frame buildings (De Araujo et al., 2016; Fletcher and Goggon, 2001). Subsequently, wood-based frames can effectively address finite resource depletion and the accumulation of non-biodegradable waste in terrestrial and marine environments (Coloma-Jiménez, Akizu-Gardoki, and Lizundia, 2022).

According to the 2018-2021 statistics, the percentage of private timber dwellings varies significantly across the globe, ranging from 26-30% in the United States to 35% in Asia (De Araujo et al., 2020) and 40% in Europe (Ottelin et al., 2021). Due to the widespread use of green design and resource optimiza-

tion strategies, it has become a successful tool of influence in the hands of international construction companies. To date, this concept affects fluctuations in the global economic market, subjecting it to its requirements and parameters of development (Jang et al., 2015). Under the influence of environmental trends, some green design standards have appeared, becoming a key characteristic of certain regions or countries. Some examples include the US Leadership in Energy and Environmental Design (LEED), the UK Building Research Establishment Environmental Assessment Method (BREEAM), Singapore's BCA Green Mark, and Australia's NABERS rating system (Wood et al., 2016).

When considering green construction, architects usually draw attention to a variety of focal points, such as raw materials, labour, machinery, construction certification and more, following the motto: "Let us save the Earth for our children!" These points often become the cause of political manipulations (Bahrami, Jakobsson, and Söderroos, 2023). For instance, China with its population of 1.5 billion people treats the issue of environmental protection and resource conservation as particularly acute. This apparent rise of interest causes the unveiling of a strict green construction policy, which integrates the international strategic planning platform GGP (Geng and Doberstein, 2008).

At the same time, some scientists highlight the primary importance of ideological and cultural components of the architectural design process (Ames and Shepard, 2019). The vast majority of historical Chinese buildings are made of wood. Such structures are practical, ecological, and quick to manufacture but they also have a low threshold of thermal efficiency (Recht, Schalbart, and Peuportier, 2016). Modern scientists believe that this problem can be fixed in modern wooden architecture using the latest energy-saving technologies. Some technologies involve the use of timber-framed modular systems as the main building material. In harsh weather conditions (strong wind, frost), modular timber houses consume less heating energy (Gündoğdu and Birer, 2021). They also have a well-designed ventilation system, which provides high heat storage capacity (Schauerte, 2010). As can be seen, architects manage to make building projects energy-efficient, relatively cheap and culturally inspired (Ge et al., 2022).

In the scientific community, considerable attention is paid to the theory of natural environment importance and its influence on people's well-being and behaviour. It has been proven that daily contact with nature, in particular with natural materials, significantly improves one's well-being, emotional state, and spiritual fulfilment (Liu et al., 2022).

Mankind, due to increased technological progress and total mechanisation, has disturbed the balance of the environment. Environmental pollution itself has become one of the key issues on the global ecological agenda for future generations. The concept of eco-architecture has developed as a result of this understanding. The main criteria of ecological design include:

– positioning of buildings using a rational ecological approach;
– solving issues related to the design of buildings, their shape, organization in space, choice of materials, installation of a sanitary system, etc.;
– minimizing the use of non-renewable energy and limiting the resources needed during building operation;
– rational usage of natural ecological systems (giving preference to solar energy, natural air conditioning and green spaces);
– minimization of soil pollution and water basins contamination;
– construction site with minimal damage to the natural environment.

Ecological design denotes sustainable systems that function according to agreed ecological criteria, integrating human society and the natural environment for the benefit of both. In terms of ecological criteria, S. Kellert's approach should be mentioned. It contains six important elements, three of which were environmental specifics, natural shapes and forms, natural processes. In other words, the first three elements are directly connected with nature. The next element is light and space; it needs not only nature conditions but also space. The last two elements are fully place dependent and need people (people-nature relationships, people-space relationships; Li, Chau, and Aye, 2020).

At the same time, insufficient attention is paid to the issue of the influence of the features of private housing construction on the life of minority society, in particular, the ethnic group in which the so-called green construction takes place. There is also a lack of significant scientific research on optimizing the use of natural resources in ethnic environments and the impact of such optimization on the country's economy as a whole.

Problem Statement

This study is concerned with optimizing the ecological design of wooden structures and gathering new data about the key characteristics thereof. The focus is on China's ethnic sub-culture as an example. The aim is to analyse the ecological design of wooden houses in Dong villages (Guangxi province China) in accordance with ancient cultural philosophy.

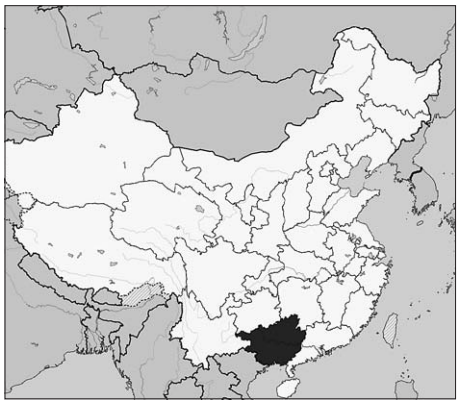


Fig. 2 Location of Guangxi within China

The objectives of the study are (1) to analyse the ecological and technical sides of the Dong-style eco-house design process and (2) to summarize the theoretical knowledge about resource utilization and optimization among the Dong people.

Materials and Methods

Research Design and Analysis

This exploratory multiple case study took place in the southwest of China in Guangxi province (Fig. 1). This research is connected with the question of ecological design of traditional Dong buildings, including also the basics of their settlement conception (topography, space orientation and plants) and design conception (building shape, spatial organisation, architecture). Buildings that were not recovered or decorated were taken for this purpose in the downtown area of Dong village. 40 buildings were taken for the analysis (the majority of them were residential and only some were public). The analysis included a continuous 4-years experiment with building monitoring and photography documentation of received data.

According to 2020 statistics, this province has 50.1 million people (Ge et al., 2022). Dong architecture was chosen for the study as a main research subject. The study examines eco-design policies classified into 3 categories according to architecture-based interactions they cover: architecture-nature, architecture-human, and architecture-resources.

The *first category* embraces some construction considerations: location, type of construction, animalistic elements, and type of building (residential houses, drum towers, covered bridges, etc.). The *second category* concerns cultural peculiarities and contains three main pillars: religious ceremonies to be conducted before building architectural structures; spiritual linkage between tree planting and childbirth; and building with or in harmony with nature. The *third category* deals with design considerations: type of material, optimization of wood use, floor capacity, lighting design, and thermal comfort.

The analysis of the research results was carried out according to the selected criteria of ecological design. Thus, the structure of the analysed buildings, their exploitation condition (good, satisfactory, unsatisfactory) were considered. In addition, the ownership factor was also viewed: which of the buildings are private and which public. The list of the main criteria of the eco analysis also included an item regarding the selection of materials for the construction (stone, wood, bamboo, etc.). Particular attention is paid to the criteria of spatial organisation, environmental friendliness from the point of view of renewable resources, solar and wind energy usage. Design and decorations are another ecological aspect of the investigation.

Some multiple case studies discussed the content and meaning behind the ecological design of Dong-style wooden houses. Some energy saving principles of wooden houses construction were described by Li and Yao (2020). The ways of protection of the traditional Guangxi settlements as a clue to sustainable design development were named by Lu and Ahmad (2023). The findings show that these eco-designs follow the following three principles: being environmentally conscious (ecological principle), designing with rich cultural content (cultural principle), and resource usage optimisation (Vestin, Säfsten, and Löfving, 2021).

In previous research, the main method used to describe the Dong people's lifestyle and the places where they live was the life cycle assessment (Rossi, Germani, and Zamagni, 2016). This study used the given method to gather general information from pictures and historical facts collected between 2018 and 2022. The investigation covers the history of the Dong people in China from the Ming dynasty to the present. The life cycle assessment was used to analyse interior decisions, such as floor plans, lighting design, and thermal regulation solutions.

Future research can be expanded to include traditional house constructions other than wooden-structured. For example, the houses built of clay, timber, earth, stone or bamboo can be investigated according to their sustainability and usability. The comparative study may focus on the Sasui altar as one of the most significant public buildings in Dong village. The religious side of Dong people's life is prominent and should be studied deeply. Future research can also investigate other branches of the offsite wooden construction industry within China, including the effect of ethnic motives in architecture on the urban design process.

Research Limitations

The current investigation is limited by the shortage of to-date information about ethnic groups in China. Most data is general and not related to architecture. Though the style and characteristics of ancient Chinese wooden buildings are recorded in many ancient books, it is difficult to find comprehensive information about pole-and-rail constructions in each province inhabited by ethnic minorities separately.

The majority of wood structure buildings classification gather theoretical information about all southern minorities in general.

Results

The ecological designs examined in this study reflect two aspects of Dong architecture: (1) the harmonious coexistence between architecture and its natural environment – settlement conception, and (2) a strong connection between architecture and humans in particular – design conception. The ecological character of wooden-stilt house designs in Dong architecture manifests itself in the construction site and appearance.

Settlement Conception

• Topography and space organization – As for the sun orientation, 32 buildings were placed (80%) with respect to the sun path, other 8 – were not appropriately oriented (20%). 25 dwellings (62.5%) were placed in accordance with dominant wind, other 15 buildings (37.5%) – were not. It can be stated, that the majority of buildings were built in accordance with energy usage minimisation criteria because these passive climate techniques help reduce the necessity of energy consumption.

Most houses were built in a place surrounded by mountains and bodies of water; the architectural structures were constructed in a shape of a fir tree. The private residential buildings are built along the slope. The Dong people mostly live in the mountainous areas of Hunan, Guizhou, and Guangxi, where flat and open land is a scarce resource. Adapting to the terrain, buildings stand on wooden pillars of varying heights, which allows levelling with the terrain without damaging the natural environment too much. The use of stilts also enables optimal resource utilization on the limited flat land. As rural tourism continues to develop, architects seek to construct residential buildings in a certain manner that will promote the coordinated development of the economy and environment.

• Planting – Analysed settlement is placed in a natural environment, where humans and nature interact with maximum sustainability. The settlement is located in the river bed. Traditionally, it is protected from different sides by forest and mountain range. This keeps the land from shifting during heavy rains and also minimizes the influence of wind. Traditionally, the view of environmental culture among local residents implies maximum non-interference in the natural environment.

Design Conception

• Structure of buildings – Structural state of chosen 40 dwellings under analysis was as follows: 15 in a quite good condition (with some traces of initial degradation; 37.5%), 19 in an adequate condition (with visible material and structural degradation; 47.5%). 6 buildings were in unsatisfactory state in (with strong material and structural degradation; 15%). This aspect demonstrates the sustainability of buildings if they are saved in good and optimal condition in the majority of cases.

• Ownership factor – As for the ownership criteria of chosen 40 buildings, 37 of them were private residential houses (93%) and 3 – public ones (7%), including Drum Tower, Wind and Rain bridge, and the village gate.

The wooden Dong buildings serve both residential and public purposes. Examples of non-residential buildings include, but are not limited to, the drum towers, wind and rain bridges, walled gates, and well pavilions. All these buildings are symbolic of the Dong culture. The Drum Tower (Fig. 3) was built entirely by local dwellers to defend against foreign enemies. The drum towers reflect Dong nationality and social cohesion in Dong villages.

The Wind and Rain Bridge is another architectural structure of public significance in the Dong community. The covered corridor of the Wind and Rain Bridge shelters people from the winds and rains (Fig. 4). It also houses shrines and altars to worship specific gods, thereby transmitting the religious beliefs of the Dong people.

As the only entrance to the Dong village, the walled gate is the nodal point in the village landscape, but it also resembles a ceremonial focus. In ancient times, it was used to prevent theft and defend people against foreign invasion (Fig. 5). Today, it retains its welcoming and inviting role (such as toasting and singing songs at the "Zhaimen" to show respect for the guests). In the past, the village gates were painted with mysterious cultural colour to prevent “demons” from entering the village. Dong village gates reflect the unique cultural beliefs of the Dong people, as well as their hospitality.

Fig. 3 The Drum Tower (Sanjiang, 2022)

Fig. 4 The shrine inside the Wind and Rain Bridge (Sanjiang, 2022)

Fig. 5 The village gate (Sanjiang, 2022)

Fig. 6 Fire pond (Sanjiang, 2022)

The timber dwellings reflect the cultural ecology of the Dong people. For instance, houses have fire ponds (Fig. 6), which occupants view as a gathering place for family activities. The balcony provides inhabitants of the house with enough space for manual work (e.g., embroidering, weaving), falling in love, and socialization (Fig. 8).

• Material selection – Among all analyzed buildings, 30 of them (75%) were made out of wood, and 10 (25%) – out of stone. In fact, used materials are natural and eco-friendly. By the way, stone buildings are quite ecological: they help cool indoors in summer while keeping them warm in cold season. Stone and wood composite buildings are both ecological due to the natural insulating properties of these materials. Therefore, the materials require less energy consumption during production and usage.

Dong architects use traditional locally sourced building materials, which come from local fir trees to reduce transportation. The main concern of sustainable construction is resource optimization, which refers to the use of land and building materials (in our case, timber). The most common material used in Dong houses is fir timber, and there are some rules among Dong people on how to utilize it properly. Fir wood comes in varying lengths and thicknesses depending on its building application. For example, central pillars located in the middle of the interior space are the tallest and thickest columns in the construction, while shorter pieces of wood can serve as gold and eave pillars. Finally, melon pillars are the shortest among all upright columns in the structure (Fig. 7).

Fig. 7 Wooden pillars of varying lengths in the Dong building (Sanjiang, 2022)

The earliest roofs in Dong houses were made of bark tiles, which is an example of optimal resource usage. The architectural wooden structures are mobile. If the building needs to be moved, one can mark the position of its individual parts with special symbols, then disassemble the entire structure, and put it back together in the new location. If the building is partly damaged, the layout material can be replaced.

• Building envelope – The indoor space utilization of Dong houses is high. The ground floor is for storing farm tools and keeping domestic animals. The second floor serves as a living quarter with windows providing the best lighting for routine activities such as embroidering, weaving, etc. The middle of the room is darker and serves as a bedroom space. The third floor is for grain storage. Modern Dong timber buildings are higher than the traditional ones. Some villagers have transformed their houses into homestays. The first floor is no longer used for raising livestock. The rooms above the second floor serve as guest rooms and master rooms.

Timber floors and partition walls can generate noise. To avoid it, double flooring is reinforced with a sound insulation cotton material or wall insulation slabs are used. Such a low-cost technology is a slight improvement upon the traditional ways of construction with the potential to promote the organic renewal of traditional architecture. Not to mention that it can meet the physiological and aesthetic requirements of contemporary people while maintaining the traditional style of Dong buildings.

Ecological thinking has influenced the Dong-style wooden building construction sequence drastically. Dong people have a range of ancient customs and ceremonies, one of which – tree planting – is to be conducted before the construction starts as a way to ask their relatives for support.

• Design and decorations – The wooden-structured public and residential buildings reflect cultural ecology through decor, which is crafted with love and reverence for nature. The Dong people express their worship of natural animals by incorporating embellishments into architectural design, resulting in distinctive emotions conveyed in unique ways. It can be a pig's nose, an image of a bird, or something else (Figs. 9 and 10). The Pig is associated with the period of harvest, while the Bird symbolizes hope for a better life.

One can also see different shapes (e.g., gourd fruit, flower, or bat) on the Dong-style roof ridges created with flat tiles (Fig. 11). Dong people use flower decorations in wooden eco-designs to express their yearning for a better life (Jin and Zhang, 2021).

To sum up, one should note that the results could be rather wider and deeper but some residential houses could not be examined because of the residents' reluctance. Some of Dong villagers didn't understand the importance of the analysis and prevented its development.

Fig. 8 Residential house balcony (Sanjiang, 2022)

Discussion

Ethnic wooden houses are a widespread phenomenon in China. They carry not only a special architectural flavour, but also embody the folklore features of the locals (Yuan et al., 2023). While the majority of the population is concentrated in cities, Dong settlements remain an ethnic focus of rural areas in Chinese provinces (Wang and Cao, 2022). The presented study examined the houses characteristic of the Dong settlement in southwestern China, in the provinces of Guizhou, western Hunan, and northern Guangxi (Yuan et al., 2022).

Dong residential and public buildings are built with the usage of fir wood. Among all analysed buildings, 30 of them (75%) were made out of wood, and 10 (25%) – out of stone. The building material used by Dong people in eco-design is environmentally friendly and recyclable (Pralea, Sficlea, and Pop, 2019). When burning, some elements such as propane-1,2-diol, acetaldehyde and C1–C8-carboxylic acids generate dangerous emissions that harm the environment (Schieweck, 2021). Fir wood can regulate seasonal and climate changes in temperature and humidity (Sipahi and Kulözü-Uzunboy, 2021). One of Turkish studies contains a case analysis of Mersin residential buildings (Gündoğdu and Birer, 2021). Considerable attention is paid to the sustainability question and to the aspect of settlement and design criteria contradiction. Therefore, it is mentioned that climate conditions strongly influence the state of buildings and residents' usage of renewable energy and ecological materials.

It also should be noted that Dong houses are not stable enough: 15 in quite good conditions (with some traces of initial degradation; 37.5%), 19 in adequate conditions (with visible material and structural degradation; 47.5%). 6 buildings were in an unsatisfactory state (with strong material and structural degradation; 15%).

Nevertheless, the building material is not without its drawbacks: it is mildly flammable and internal household items or accessories only increase the speed of fire spread. In ancient times, with the rapid spread of fire, Dong villages burned completely (Wang et al., 2022). That is why many modern architects hold the opinion about the need to combine materials for construction (it is optimal to use concrete structures but to landscape them with the help of individual parts; Kamalakkannan and Kulatunga, 2021; Mitterpach and Štefko, 2016; Wang et al., 2018). Housing open-oriented blocks also became very popular in 2016 among global building companies (Huang, Mori, and Nomura, 2023).

In modern ecological construction, there is a concept of a close relationship between man and the environment, which is interconnected like the threads of a web (Munro, Tavares, and Bragança, 2021). This relationship can be traced in both directions (a person should not only take from nature but also give to it in return, to maintain harmony and balance; Vilčeková et al., 2015). According to cultural and religious beliefs, Dong people must plant trees to give birth to their children. In their eyes, planting trees is equal to cultivating people. The children grow up, and the tree grows, turning into wood that can be used to build a house for the children to live in. In this way, the forest and trees can be lush, and the balance of climate and local ecology can be ensured (Monsjou, 2019). The same situation can be traced looking at the example of German eco-settlement Freiburg's Vauban. It demonstrates sustainable urban life with green city planning. The main specific of this region is a plenty of greenery and minimum of transport (it causes air and land contamination too). A net of pedestrians and paths for bicycles create a well-organised natural system (Küçük and Findik, 2020).

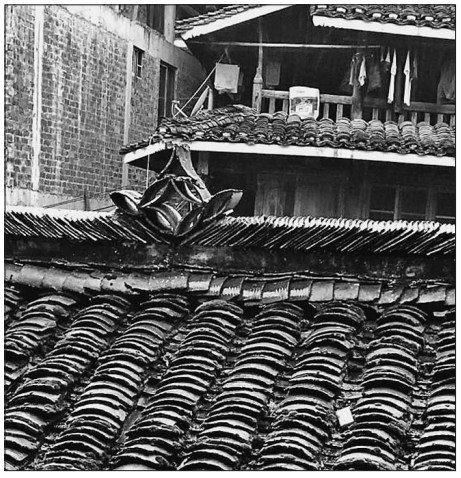
Ecological design deals tightly with the concept of social dimension (Kim et al., 2020). It can be easily traced to the example of Dong house-building traditions. Before building a house, one should first inform the mountain spirits and pray for success before starting to cut down the wood. There is a belief that natural objects have their souls and a certain type of thinking (Hill, 2017). Before building a house, one needs to choose a good time after the sacrificial ceremony. During the construction, relatives, friends, and people in the village come to congratulate and help. They will help each other in building the house. Such customs have been passed down from generation to generation, reflecting their simple and united national ideology (Hill, 2017).

As a scarce resource, land plays an irreplaceable role in the economic development of the Dong ethnicity. As for the sun orientation, 32 buildings were placed (80%) with respect to the sun path, the other 8 – were not appropriately oriented (20%). 25 dwellings (62.5%) were placed in accordance with dominant wind, the other 15 buildings (37.5%) – were not. Mountainous climate and territorial conditions strongly influence the way of building and interior design in particular (Hermawan, Prianto, and Setyowati, 2020). The rational use of land resources affects the population it can carry, the quality of the ecological environment, and the local economic growth rate (Dostatni et al., 2022). Summarizing the above-mentioned concepts and theories, it is possible to identify the basic principle of eth-

Fig. 9 The upturned eaves are decorated with bird figures (Sanjiang, 2022)

Fig. 10 A door frame featuring a pig's nose (Sanjiang, 2022)

Fig. 11 Flat tiles placed on the roof ridge to create a flower (Sanjiang, 2022)



ic eco-design peculiarities: a strong cultural and religious background that influences the way of building even in modern times.

Conclusion

This study highlights the following main factors influencing the ecological design of the traditional wooden architecture of the Dong ethnic group:

(1) Not enough space for construction and living in a mountainous area resulted in the two-storey (sometimes three-storey) building design. Moreover, 32 buildings were placed (80%) with respect to the sun path, other 8 – were not appropriately oriented (20%). 25 dwellings (62.5%) were placed in accordance with dominant wind, other 15 buildings (37.5%) – were not.

(2) Living in a rural area has influenced the Dong people's lifestyle; that is reflected in the outside architecture through the images of birds, domestic animals, and plants symbolizing a good harvest and faith in a prosperous future. 100% of analysed buildings had such inner and outer decorations.

(3) The cultural aspect affected the timber building design in several ways. The architectural structures are designed in a manner that allows worshipping spirits; the construction process itself takes place with the involvement of relatives and friends; and members of the Dong community plant trees to promote birth. For the Dong people, it was extremely important to maintain a balance between man and the surrounding environment. Among all analysed buildings, 30 of them (75%) were made out of wood, and 10 (25%) – out of stone.

The practical value of the research lies in the scientific exploration of the ecological design of China's ethnic minorities, which has the potential to affect further development of ecological architecture in the country. The findings can be used in ecological design projects for the preservation of cultural heritage and identity. Future research can analyse other ethnic building concepts that involve other building materials. For example, the houses built of clay, timber, earth, stone or bamboo can be investigated according to their sustainability and usability. The comparative study may focus on the Sasui altar as one of the most significant public buildings in Dong villages.

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Figs. 3-10	Photos taken by the authors
Fig. 11	Elaborated by the authors

Authors' biographies and contributions

A holder of a master's degree, **Wei Wu** lectures in the School of Jewelry and Art Design in Wuzhou University. The author's research interests include: building sustainability; Chinese eco-design; ethnic architecture; resource optimization; wooden architecture.

A holder of a doctoral degree, **Xun Liu** lectures at the Academy of Fine Arts of YunNan Arts University. The author's research interests include: building sustainability; Chinese eco-design; ethnic architecture; resource optimization; wooden architecture.

Conceptualization: W.W.; methodology: X.L.; software: W.W.; validation: X.L.; formal analysis: W.W.; investigation: X.L.; resources: W.W.; data curation: X.L.; writing – original draft preparation: W.W.; writing – review and editing: X.L.; visualization: W.W.; supervision: X.L.; project administration: W.W.; funding acquisition: X.L. Both authors have read and agreed to the published version of the manuscript.

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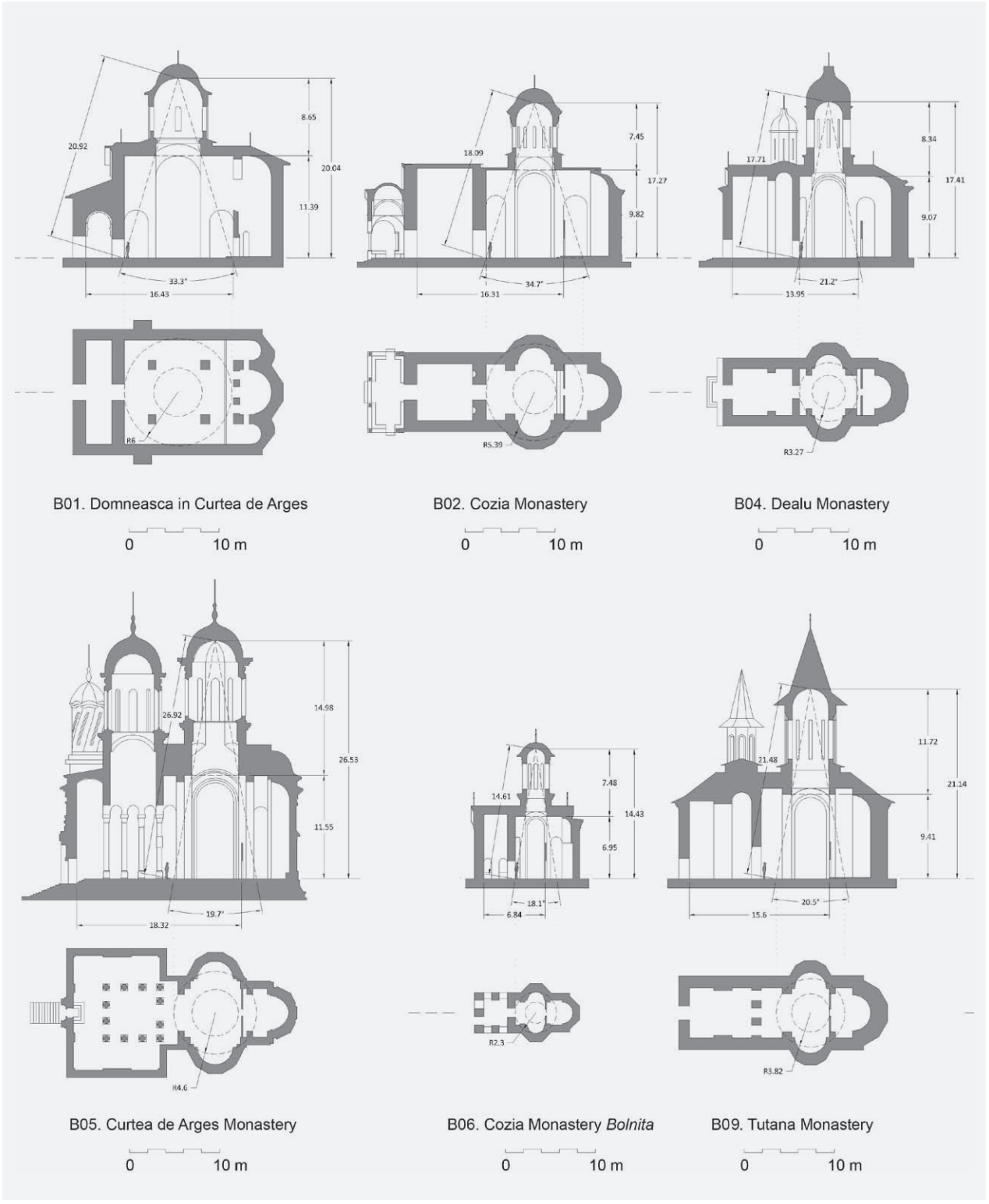

Fig. 1 Section comparison between relevant churches at the same scale

Fco.-Javier González-Pérez[1], Omar-Fabrisio Avellaneda-López[2], Marilena Christodoulou[3], Luis Giménez-Mateu[4]

Polytechnical University of Catalonia, Barcelona School of Architecture – Av. Diagonal 649, 08028 Barcelona, Spain
[1] https://orcid.org/0000-0002-7558-8668
[2] https://orcid.org/0000-0002-6759-9017
[3] https://orcid.org/0000-0002-5637-3768
[4] https://orcid.org/0000-0002-4025-1977

fco.javier.gonzalez@upc.edu
omar.fabrisio.avellaneda@upc.edu
marilena.christodoulou@upc.edu
lluis.gimenez@upc.edu

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Geometric Parameters to Enhance the Perception of Architectural Spaces

Case Study Applied to Romanian Orthodox Churches

architectural visualization
buildings classification
Orthodox churches
space emotions
spatial proportions

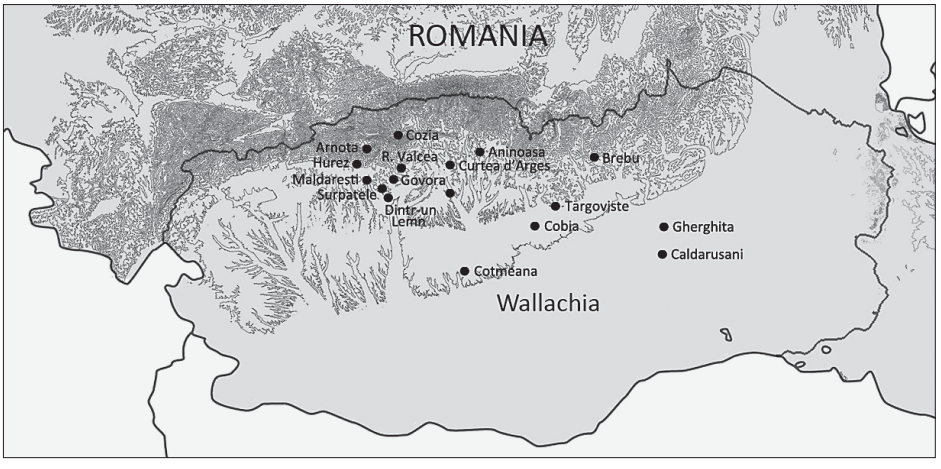
The challenge in obtaining objective parameters for evaluating the aesthetic appeal of buildings is what we try to explain through a case study, presenting a pioneering methodology that can be applied and adapted to different architectural styles. Our focus is on a substantial investigation of Romanian Orthodox churches in the Wallachia region, which exhibit striking similarities from their early stylistic developments in the 16th century to contemporary examples. By examining the geometric relationships within their interior spaces, we aim to derive objective insights that enable an alternative classification. This classification, in turn, helps us measure the emotional impact these spaces have on users or visitors, influencing emotions based on spatial proportions. Through these relationships, we can evaluate the importance of different buildings of the same category, classify them and, objectively explain their differences. Applying the findings of this study, along with specific variables, to other architectural contexts allows us to address user preferences more effectively to enhance architectural designs by improving comfort and the quality of life.

Introduction

The present architecture of Romanian Orthodox churches is a testament to a rich tradition that traces its roots back to ancient Byzantine models, remarkably preserved to this day. Every architectural facet responds to worship needs and the technical conditions of constructing a new church. These considerations have given rise to a distinctive style, preserved for centuries, with recent churches in Romania and beyond, continuing in the same tradition.

The research conducted in the 1930s by the Commission of Historical Monuments in Romania, led by architect Nicolae Ghika-Budesti, marked the first serious attempt to register and classify Romanian Orthodox churches in the historical Wallachia region, now Muntenia and Oltenia in southern Romania (Fig. 2). Ghika-Budești and team extensively surveyed churches and monasteries, meticulously documenting them to create the first comprehensive register of Wallachia's Orthodox heritage. They classified monuments by style and era, elevating to the category of historical monuments those that best identified the styles of each era, from the beginning of the s. XIV until the end of its golden period, in the s. XIX, focusing on their stylistic aspects, analysing external features, construction techniques and various formal aspects observed during execution (Ghika-Budesti, 1927, 1930, 1933, 1936).

Fig. 2 Romania map within the Wallachia region and the churches under study



Wallachian churches have a distinct and expressive interior characterized by the configuration of spaces, proportions, connections and the play of light or colours on the walls that define the character of each church. A distinctive feature is the slender space, which could be likened to a tower, beneath the church dome.

While the dome base is the external form that most clearly identifies these buildings as churches, it is not merely a formal tool; its function is integral to worship and can only be understood within the church. The base of the dome serves as a support and division for the dome itself, which contains the image of Christ Pantocrator. This portrayal symbolizes Jesus and the heavens in a contemplative manner, as he gazes down upon the congregation. This visual relationship influences the squared anatomy of the nave and establishes proportions that condition different metric parameters defining the geometry of the lantern tower and the nave. Aspects, as we will see below, studied by Nikos K. Moutsopoulos (Moutsopoulos, 1962) and Cecil L. Striker (Striker, 1995). Moutsopoulos examined a variety of Greek cross-square churches, and Striker applied the same analysis to the churches of Constantinople, with similar results. According to research, the layout of the plan and the elevation determination may have been two distinct activities, and the relationships inside the building may be better described as architectural than as geometric.

From the perspective of the believer seeking a meaningful spiritual experience, perceptual parameters, often intangible, differentiate one church from another. These parameters depend on metric or visual relations and spatial proportions, making functions measurable and tangible concepts. This text aims to analyse rational parameters among specific measurements of various Romanian Orthodox churches, enabling a comparative assessment from the believer's standpoint.

Comparing Churches

When viewed collectively, it's evident that Orthodox churches in Wallachia exhibit a remarkable similarity to one another, both in their internal arrangements and external appearances. This often leads the region's residents, perhaps exaggerating a bit, to perceive all these churches as identical. Admittedly, such a perception is not entirely accurate in the strict sense, but it's not entirely unjustified. Primarily designed to serve their respective communities, these buildings were replicated throughout the territory, with varying degrees of fidelity to the original pattern but without a deliberate effort to make each structure unique.

In a way, this viewpoint contrasts with the study mentioned earlier by Ghika-Budesti and the Commission of Historical Monuments of Romania, published in 1936. Despite the catalogue format, Budesti's essay includes a table proposing a specific classification of the documented churches (Fig. 3).

The table serves more as a graphic synthesis, as the study was not intended for typological analysis. Instead, it aims to respond to criteria that might be considered anecdotal or less relevant from an architectural standpoint.

While these criteria are relatively common in Byzantine architectural studies, they remain open to questioning, as highlighted by Professor Cyril Mango when referring to these types of studies: "*... Buildings are labeled and pigeon-holed like biological specimens according to formal criteria: where a resemblance is found a connection is assumed even across a wide gulf in time and space. A simplistic system of classification may thus set up artificial categories and can easily misdirect scholarly inquiry.*" (Mango, 1991: 41)

Certainly, attempting to link two churches by, for example, the number of columns in the porch or archivolts on the lantern tower's windows could lead to artificial conclusions. However, this doesn't necessarily mean that comparative analysis should be discarded. Despite the architectural uniformity of Wallachian churches, the perceptual experience suggests they are not identical. The sensations and emotions experienced by visitors and believers also vary, and although outside the scope of this study, they may be a possible line of research as indicated in the conclusions.

These differences don't rely on the parameters typically considered in art history studies but are perceptible to visitors, presenting nuances that may be observed through certain dimensions.

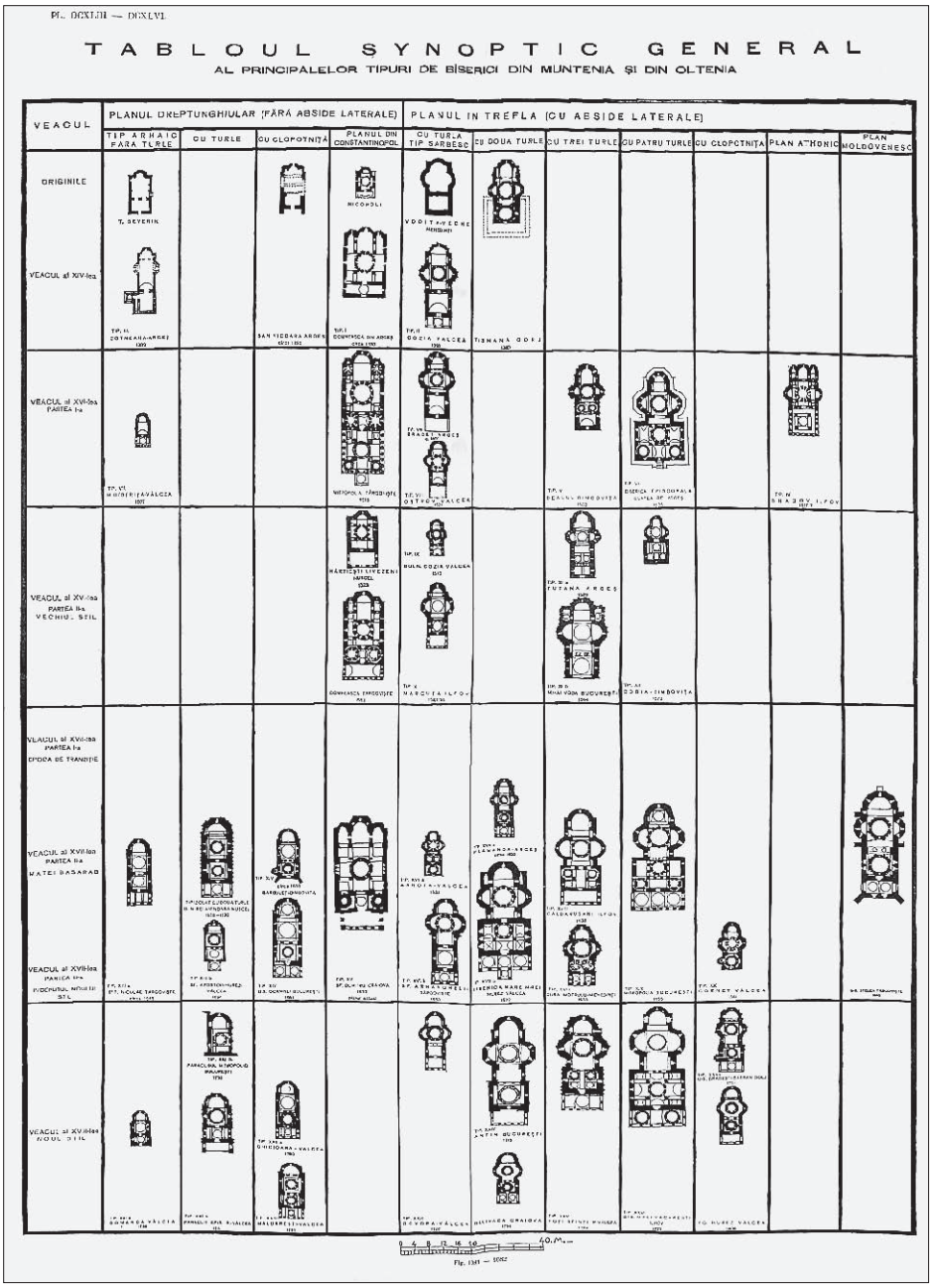


Fig. 3 Final classification table of churches from the 14th to the 18th century carried out by the Commission of Historical Monuments in Romania

The Scale

Referring to Byzantine constructions, architectural historian Robert Ousterhout highlights the significance of scale as the most crucial aspect. He laments that discussions about function and typology often overlook this factor, stating: "*... scale is the hardest aspect of architecture to convey without an actual site visit, but it was probably the critical factor in the selection of a plan or a building type. From a purely practical point of view, buildings of different sizes demanded differ-*

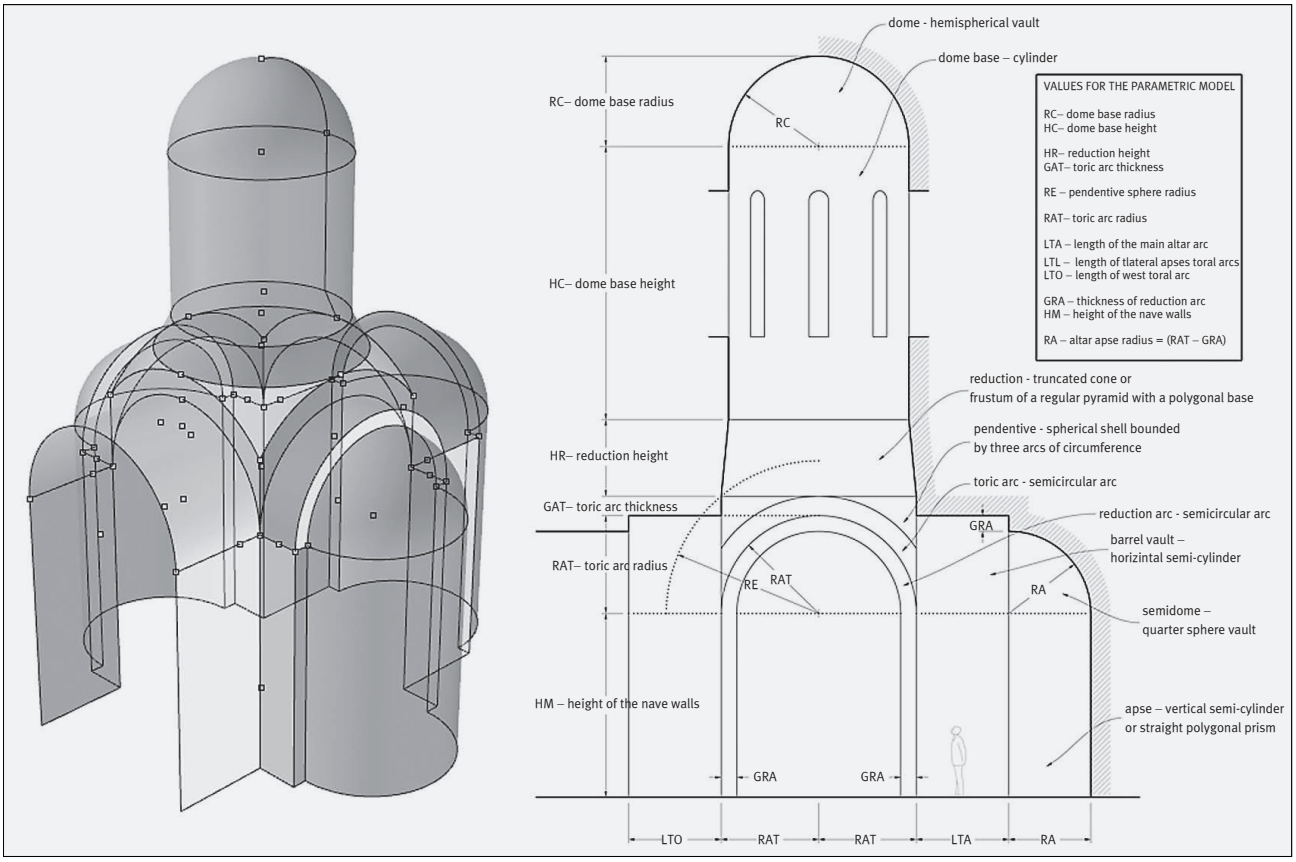


Fig. 4 Parametric model of the inner shell of a church, valid for all those in the study

ent structural systems, and thus the development of various church "types" may have come from a consideration of scale." (Ousterhout, 1999: 30)

Indeed, all construction systems have their limitations in terms of dimensions. In this paper it's deduced that it's impossible to scale the same typology infinitely. The increase of charges and efforts requires changes in construction techniques, altering the geometry. Even if we stick to the same typology, it becomes apparent that scale plays a significant role in differentiating churches (Fig. 1). Even with maintained geometric structures and proportions, the scale notably influences the relationship between individuals and architectural space. Consequently, the perception differs in a small church compared to a more expansive one.

Scale, by definition, is a relative value rooted in comparison. So, when we talk about a church having a larger or smaller scale, it's always in comparison to another. Undoubtedly, the most accurate way to assess the scale of one church relative to another is by comparing their respective graphic representations at the same scale. This fundamental principle is unfortunately often overlooked in publications, with some positive examples as in Curcic's book on architecture in the Balkans (Curcic, 2010).

The Parametric Model

In all the various trefoil and single nave plans (the rectangular ones without side apses), the same geometric setup is repeated within the nave: the square floor plan is created by connecting four piers with four toric arches at the top. The gaps between piers match the arches' diameter, and the sections of the piers are the same size as the arches.

Right on top of the keystone of those four arches, there's a ring or horizontal hoop, forming the base of the lantern tower. So, unless someone decides to make things smaller, the lantern tower's diameter is the same as the arches, which, of course, is also the gap between the piers in the nave. The part between the arches and the lantern tower is built with shells that support the weight of the dome on the arches, as in "Aproximación de superficies para la ejecución de bóvedas tabicadas" (Giménez-Mateu, Navarro and Cabrera, 2016).

The lantern tower culminates with a dome of the same diameter or, in the absence of plans

Table I Table of main interior dimensions gathered in the study

	dome base radius	dome base height	reduction height (if any)	toric arcs thickness	toric arc radius	length of the main altar arc	length of lateral apses toral arcs	length of west toral arc	thickness of reduction arc (if any)	height of the nave walls	altar apse radius = (RAT - GRA)
Church selection from 26 examples	**RC**	**HC**	**HR**	**GAT**	**RAT**	**LTA**	**LTL**	**LTO**	**GRA**	**HM**	**RA**
01. Domneasca of Curtea de Arges	273	398	65	129	251	366		350		888	251
02. Cozia Monastery	205	396		144	219	405	70	320	34	763	185
04. Dealu Monastery	160	630	20	24	163	327	73	141		744	163
05. Curtea de Arges Monastery	242	1189		37	260	325	92	83		924	260
06. Cozia Monastery Bolnita	100	450	148	50	119	173	18	111	19	576	100
09. Tutana Monastery	200	704	202	67	212	527	62	333	36	729	176
11. Domneasca of Targoviste	253	596		47	253	607		284		911	253
13. Arnota Monastery	127	402	98	53	137	227	35	122	22	454	115
15. Dintr'un lemn Monastery	154	775		40	154	218	34	86	20	487	134
16. Brebu Monastery	240	634	231	104	296	307	39	327	38	638	258
17. Caldarusani Monastery	250	545	500	30	235	676	31	359		545	235
19. Stelea of Targoviste Monastery	212	715	275	35	306	231		343	45	540	261
21. Govora Monastery	205	648		30	205	232	30	144	30	589	175
22. Aninoasa Monastery	223	423	87	47	270	267	28	125		518	270
23. Hurez Monastery	230	736	75	45	267	420	80	308	48	753	219
24. Maldaresti church	125	436	53	42	190	158	64	63		409	190
25. All Saints of Ramnicu Valcea	225	933	125	54	245	142	54	88		743	245
26. Surpatele Monastery	180	532	105	47	194	229	32	135	28	550	166
Average among the 18 churches (cm units)	**200,22**	**619,00**	**152,62**	**56,94**	**220,89**	**324,28**	**49,47**	**206,78**	**32,00**	**653,39**	**203,11**

to expand the nave, a diameter that corresponds to the toric arches. As mentioned, this diameter aligns with the separation between the piers of the nave. Similarly, without reductions, this pier separation determines the width of the apse and, consequently, the diameter of the quarter-sphere vault over the altar. Meanwhile, the square shape of the nave's floor plan ensures that the lateral apses have dimensions identical to those of the altar's apse.

In summary, in a church without geometric reduction (which is the majority), the separation between nave piers determines the diameters of the dome, lantern tower, apse, and corresponding spherical vaults. Essentially, nearly all dimensions of the church hinge on this single parameter. The model's geometry is precisely defined by the separation between piers, determining whether it expands or contracts. This singular variation in scale supports the argument that those who claim all churches are the same may be right. These geometric conditions establish direct links between the dimensions of various elements and those of churches parameterized through the 3D parametric model (Fig. 4). The model showcases real-time geometric connections, demonstrating the impact of modifications in any of these dimensions on the entire structure.

The Metric of the Churches

The examination of historical models by Ghika-Budesti reveals that the historical expansion of Orthodox churches across Wallachia's territory was rooted in the repetition of a standardized model with a few variations. This repetition often involves a direct reproduction of an existing church taken as a template. However, it's not uncommon to observe variations in dimensions while maintaining the same typology. In this section, our goal is to assess the extent of these variations in each case, considering their extreme values as well as their average.

By selecting the most significant models identified in the Commission of Historical Monuments study, a statistical projection has been undertaken based on a sample of 18 significant churches (Table I). While the sample size is relatively small and non-randomly chosen, the model status of these selected churches deems them adequately representative within the total set of Wallachian churches. With this consideration in mind and leveraging a parametric model, we have

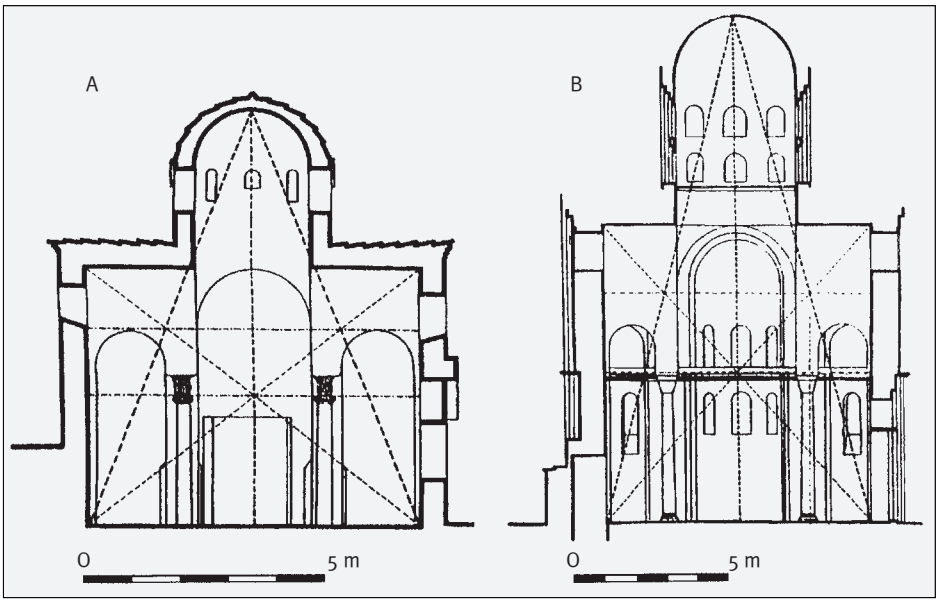


Fig. 5 Diagrams with the "harmonic sections" in Byzantine churches: A – Church of Saint John the Theologian, Athens; B – Church of Panagia Chalkeon, Thessaloniki

generated tables that, in turn, facilitate further analysis and reflections, leading to several interesting conclusions.

The comparative table presented (Table I) indicates that the distance between piers (RAT×2) has an average value of 4.40 m, resulting in an average surface area of the square nave at 19.36 m² (4.40²). If we associate this value with the current density standards for places of worship (0.25 m²/person), the capacity is estimated at 77 people (this number should be reduced if the area adjacent to the presbytery is unsuitable, for the purposes of affordability, but here it is considered compensated with the additional surface of the lateral apses). The table also reveals that B02-Monastery of Cozia is the church closest to the average value (4.38 m), followed by B09-Monastery of Tutana (4.24 m) and B21-Govora (4.10 m). These can be considered references for medium-sized churches in Wallachia. Furthermore, the maximum nave area is observed in B19-Stelea of Targoviste with 37.45 m² (6.12²), with a capacity of more or less 150 people. This aligns with expectations, considering it's an example of a church with a Moldavian vault[1] type, allowing for a broader nave. Conversely, the smallest value is found in B06-Bolnita of Cozia, with 5.66 m² (2.38²), suitable for only 23 well-distributed people.

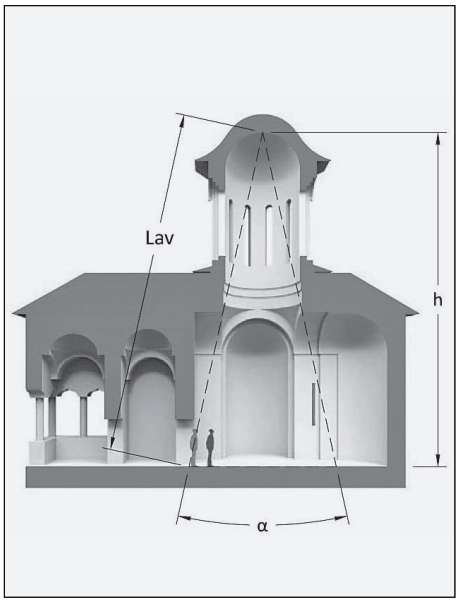
It's noteworthy that while the majority of the plan's measurements are tied to the separation between piers, the height of the nave and the lantern tower are independent of the plan's dimensions. There is no doubt, however, that these are two transcendent measures in the architectural definition of these spaces. It makes sense, therefore, to make comparisons within the framework and draw some conclusions from them.

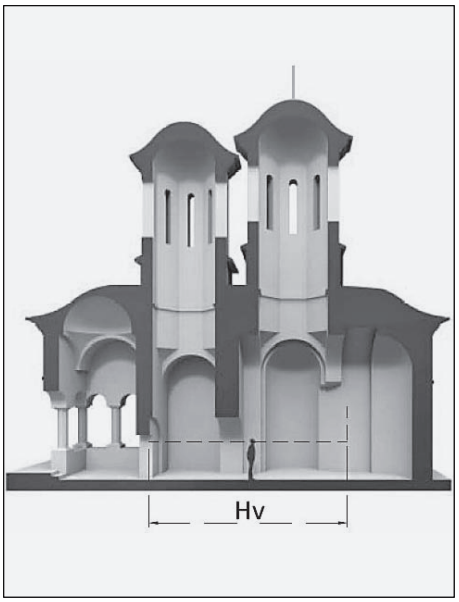
The Applied Geometry

The builders of Wallachian churches remain anonymous figures without written evidence about their patterns and technical references for projecting and constructing these buildings. Due to their typological simplicity and the consistent repetition of the same scheme, they likely had a strong command of the geometric relationships between arcs and domes. Unfortunately, we lack precise information about their technical knowledge or construction strategies, even though advanced studies have been conducted on historical examples of Byzantine constructions in Constantinople. These studies commonly refer to empirical geometric layouts as regulators of the patterns used. A contribution that must be cited, prior to that of Moutsopoulos, is that of "He Aisthetike tou Chorou tes Hellenikes Ekklesias sto Mesaiona" (Kalligas, 1946). However, it was the historian Moutsopoulos, who examined Greek churches with a Greek cross inscribed plan. Analyzing geometric relationships in the cross-section of the naves, he identified an isosceles triangle with its base representing the dimension of the nave's floor and its top vertex at the zenith of the dome's lantern tower (Fig. 5). Repeating this process for various churches with different proportions, he observed that the two symmetrical sides of the triangle consistently passed through the keystone of the corresponding toric arch. This geometric scheme established a relationship between the transversal sections' maximum length and the height of the nave, as well as the diameter and height of the lantern tower (Moutsopoulos, 1962). Archaeologist and architectural historian Striker conducted a similar study on the churches of Constantinople, obtaining comparable results in the text "Applied Proportions in Later Byzantine Architecture" (Striker, 1995). Even when comparing two churches with the same nave width, the height and diameter of the lantern tower were determined by the aforementioned isosceles triangle.

Both studies focus on the interior of the churches, disregarding their exterior forms.

1 This is a support system structured in two levels to reduce the diameter of the dome: the lower level consists of the usual four half-point arches, with four pendentives at the corners to form the circle; then, at a second level, four new diagonal half-point arches are arranged, starting from the respective keystones of the arches at the first level; finally, four new pendentives at the angles of these new arches define a new circle, with a considerably smaller diameter than the first one, from which the dome rises.





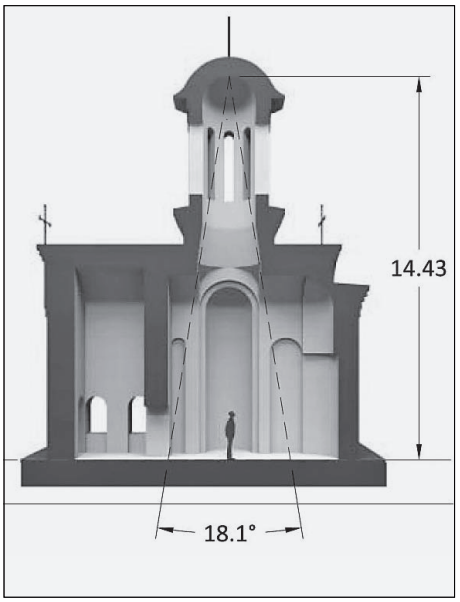


Fig. 6 Graphical definition of *Lav* (low angle view) parameter

Fig. 7 Graphical definition of *Hv* (horizontal view) parameter

Fig. 8 Graphical definition of *SD* (slenderness) parameter. α represents the angular aperture of the inscribed cone.

This approach aligns with the logic of Orthodox Christianity, where the church's interior holds the utmost symbolic and essential significance. Considering that defining the soffit is a crucial step in church construction, emphasizing the interior geometry also makes sense from a constructive standpoint. Therefore, the geometry of the interior significantly influences the shaping of the exterior through the formwork.

The Perception Coefficient

Using the 3D model, we applied the layouts proposed by Moutsopoulos and Striker – already cited – to both transversal and longitudinal sections of the previously analysed Wallachian churches. The outcome reveals nearly identical sections in both directions, a logical result given the consideration of square plans with double symmetry. However, the visual relationship between believers and the Pantocrator figure (dome) holds paramount importance in the symbolic realm of Orthodox rituals. Consequently, the naves of the churches are proportionally scaled to ensure a clear view of the Pantocrator from any point on its floor.

• **The Low angle view** *(Lav)* – Upon entering the nave from the narthex, the believer's gaze spans a visual journey from the iconostasis (horizontal view at eye level) to the Pantocrator (low angle view), covering a vertical angle of approximately 80°. Given the proportions of these churches, the low angle view of the Pantocrator represents the lengthiest visual experience within the building, marking a mystical zenith for the believer entering the nave. Positioned within the section, the low angle view aligns with an inclined line originating from the zenith of the dome's lantern tower, passing through the keystone of the toric arch, and reaching the ground at the nave's floor limit. As the nave is bi-symmetrical, this low angle view replicates identically in the side apses and the presbytery. Therefore, it is logical to conceptualize the cone generated by rotating this visual line around a vertical axis passing through the dome's zenith, appropriately labelled as "the nave's cone."

The length of the low angle view *(Lav)* quantifies this essential aspect of the believer's visual experience in the nave. Expressed as $Lav = h / \cos(\alpha/2)$, where h denotes the height of the cone's vertex, and α represents the aperture angle (Fig. 6).

The base of the dome's cone defines the area from which the toric arches do not obstruct the view of the Pantocrator. In the majority of the cases under study, the floor plan of the nave is dimensioned using the circumference of the cone's base as a template. This approach ensures that the distance between the center of the nave and the walls, whether from the narthex, the lateral apses, or the iconostasis, approximates the radius of the said circumference.

• **The horizontal view** *(Hv)* – If, before entering the nave, the visitor's sight is shorter than the low angle view of the Pantocrator, it creates a significant contrast in their perception. This effect, ranging from surprise to admiration, becomes more pronounced if the narthex is shorter or if the wall separating it from the nave has a particularly small opening.

Table II Table with the alternative classification by Perception Coefficient value

	vertical lenght from pavement to pantocrator	distance from entry to iconostasis	distance from nave entry to pantocrator	Low Angle View / Horizontal View	opening angle in degrees	ratio between cone base and interior height	**Contrast + Slenderness**
Church selection from 26 examples	**Interior height**	**Horizontal View**	**Low Angle View**	**Contrast**	**Cone opening angle**	**Slenderness**	**PERCEPTION COEFFICIENT**
01. Domneasca of Curtea de Arges	2004	1643	2092	1,27	33,3	1,67	2,94
02. Cozia Monastery	1727	1631	1809	1,11	34,7	1,60	2,71
04. Dealu Monastery	1741	1395	1771	1,27	21,2	2,67	3,94
05. Curtea de Arges Monastery	2652	1832	2692	1,47	19,7	2,88	4,35
06. Cozia Monastery Bolnita	1443	684	1461	2,14	18,1	3,14	5,28
09. Tutana Monastery	2114	1560	2148	1,38	20,5	2,77	4,14
11. Domneasca of Targoviste	2060	1623	2129	1,31	29,2	1,92	3,23
13. Arnota Monastery	1271	705	1293	1,83	21,0	2,70	4,53
15. Dintr'un lemn Monastery	1610	852	1628	1,91	17,0	3,35	5,26
16. Brebu Monastery	2143	2214	2206	1,00	27,5	2,04	3,04
17. Caldarusani Monastery	2105	2036	2149	1,06	23,1	2,45	3,50
19. Stelea of Targoviste Monastery	2083	1714	2137	1,25	25,8	2,18	3,43
21. Govora Monastery	1677	1086	1713	1,58	23,5	2,40	3,98
22. Aninoasa Monastery	1568	1427	1647	1,15	35,7	1,55	2,71
23. Hurez Monastery	2106	1739	2158	1,24	25,3	2,23	3,47
24. Maldaresti church	1255	921	1280	1,39	22,8	2,48	3,87
25. All Saints of Ramnicu Valcea	2325	1578	2364	1,50	20,8	2,72	4,22
26. Surpatele Monastery	1608	918	1646	1,79	24,8	2,27	4,07
Average among the 18 churches (cm units)	**1.860,67**	**1.419,89**	**1.906,86**	**1,42**	**24,67**	**2,39**	**3,81**
	cm	cm	cm		degrees		

Another noteworthy perspective is the horizontal view when the visitor enters the church and faces the altar. Through the openings in the narthex, the framed view extends from the door to the iconostasis. It serves as the first visually striking image upon entering the church, providing the initial perception of its interior dimensions, which are challenging to gauge from the outside (Fig. 7).

• **The contrast** *(Ct)* – To enhance the comparison of different churches, we introduce a new parameter called contrast *(Ct)*, defined as the proportional relationship between the lengths of the low angle view *(Lav)* and the horizontal view *(Hv)*.

$$Ct = Lav/Hv$$

A contrast value of 1 would suggest that the two views are of equal length, while values greater than 1 indicate a greater vertical depth of field than horizontal. The perceptual experience suggests that higher contrast leads to a more significant impression on the visitor.

This parameter can be calculated for all churches with a lantern tower, allowing for comparisons regardless of their size, geometry, or the nave's position. It is also applicable to churches with an inscribed Greek cross plan, although, in this case, the nave may have shaded areas outside the nave's cone, where a direct view of the Pantocrator is not available.

In the majority of the studied examples, the low angle view is longer than the horizontal, resulting in a contrast larger than 1. There are only two cases where the value decreases almost to 1, namely B16-Brebu and B17-Caldarusani. It doesn't appear coincidental that these churches also deviate from the rule of the nave's cone. In these two large churches, it is possible that their reconstruction or adaptation was not considered, possibly due to ignorance, of the empirical rules that the ancient builders seemed to have had quite clear.

• **The slenderness** *(Sd)* – Slenderness is introduced as a new parameter directly linked to the angular aperture of the cone (Fig. 8). Regardless of the church's scale and size, a smaller angle results in a slimmer nave. Therefore, the slenderness *(Sd)* value can be calculated as the ratio between the base of the cone and its height:

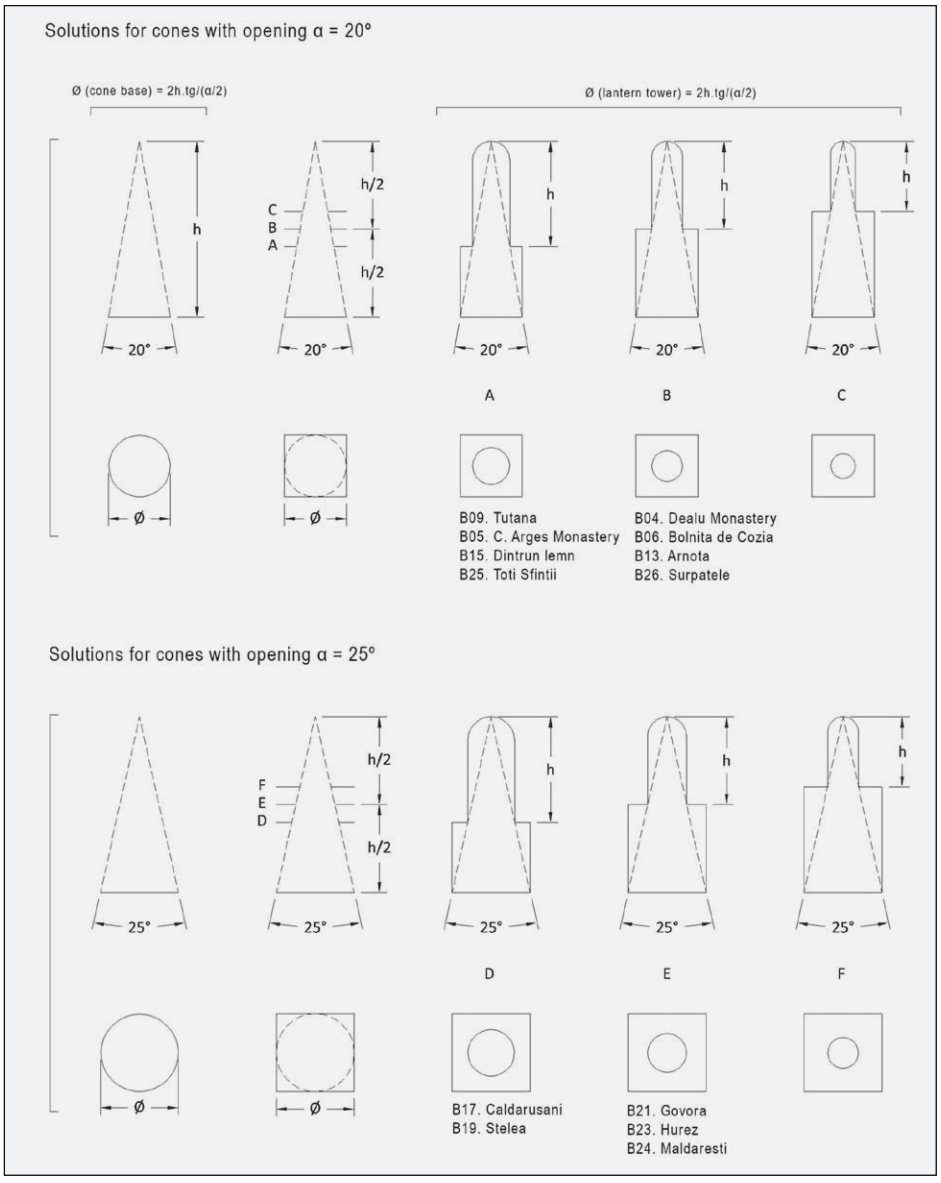


Fig. 9 Some examples are shown for different openings at 20° and 25°, combined with different variants of dome height

$$Sd = 0{,}5 / tg(a/2)$$

It is found that the small churches, such as Bo6-Bolnita of Cozia or B15-Dintrunlemn, they are slenderer, with cone opening angles of 18.1° and 17°, respectively. On the other hand, cases like B22-Aninoasa or Bo2-Monestir of Cozia, they turn out to be less slender, considering their large dimensions, with angle values of 35.7° and 34.7°, respectively.

Slenderness is quickly noticeable in the section due to the lantern tower's cylinder proportion. Visitors often appreciate more slender and stylized churches. In addition to contrast, slenderness is a parameter universally applicable to the interior spaces of churches.

• **Perception Coefficient** *(PC)* – Both contrast and slenderness are quantifiable numeric values applicable to the models under study. As products of the relationship between two measurements, they are objective and measurable. By combining these two values, a third value is obtained, referred to as the "Perception Coefficient" *(PC)*. This coefficient allows for the classification of churches based on symbolic proportions intrinsic to Orthodox churches. In this study, the PC is a size-independent value focusing on the essence of the inner sacred space. A classification based on the PC enables arranging churches by objective parameters that reflect their symbolic significance and the impressions they convey to visitors.

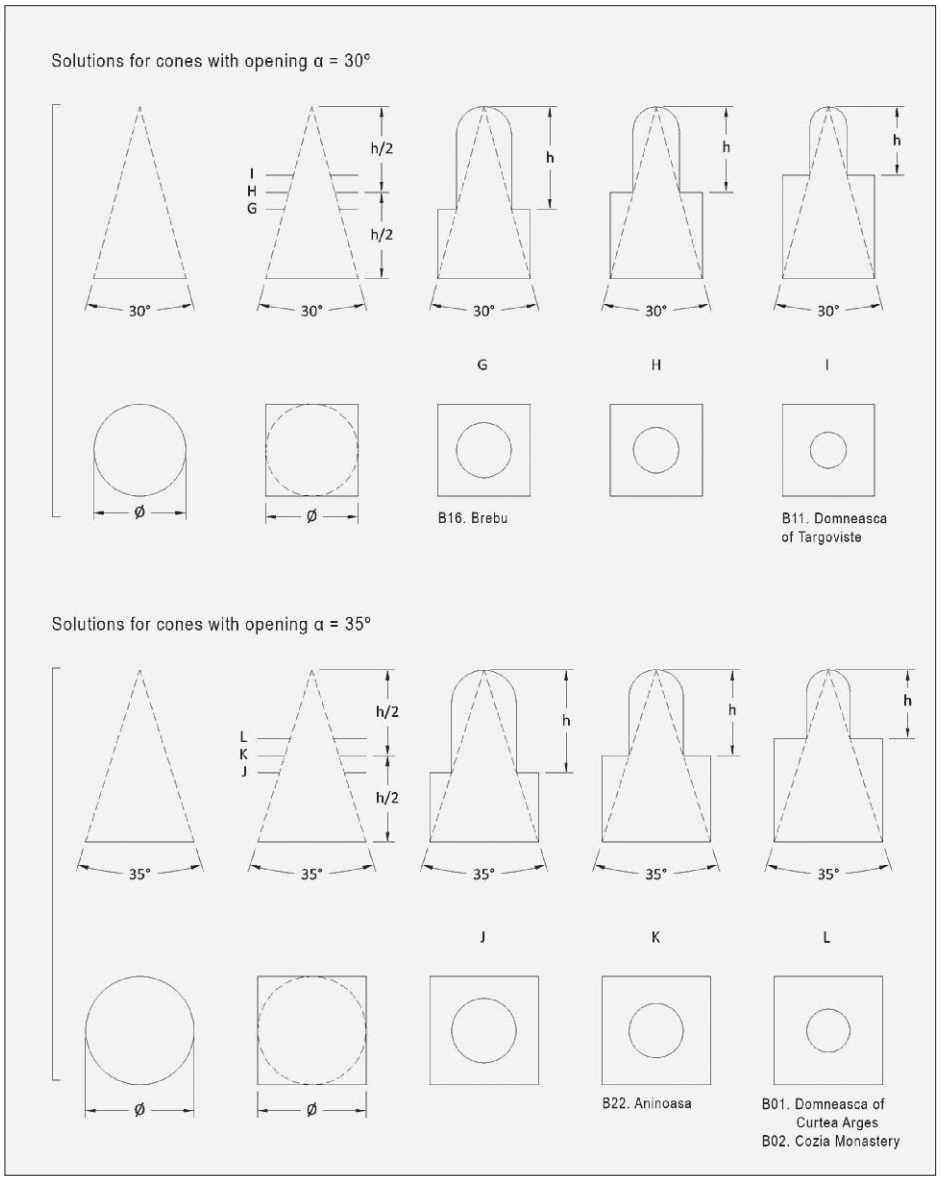


Fig. 10 Some examples are shown for different openings at 30° and 35°, combined with different variants of dome height

The Alternative Classification

Thus, the Perception Coefficient *(PC)* is the addition of contrast *(Ct)* and slenderness *(Sd)*. The churches that perform best in the application of the Perception Coefficient *(PC)* and have smaller dimensions are B06-Bolnita of Cozia with 5.28, B15-Dintrunlemn with 5.26, and B13-Arnota with 4.53 (Table II). From these results, it is reasonable to infer that smaller churches tend to exhibit better proportions.

However, the classification presents two large churches, B05-Monastery of Curtea de Arges and B25-All Saints of Ramnicu Valcea, in the fourth and fifth places, respectively. These two churches have a small narthex and a slender lantern tower. Yet, they should have been excluded from the list since they did not fulfil the first condition: that the nave's cone is equivalent to the plan's dimensions.

Conversely, the least well-performing churches are those with a large narthex and a relatively low and wide lantern tower. This includes the cases with an inscribed Greek cross plan: B01-Domneasca of Curtea de Arges, B11-Domneasca of Targoviste, B15-Brebu, and B22-Aninoasa.

In numerical classifications, extreme values are often not the most representative due to polarization. Excluding these values, more

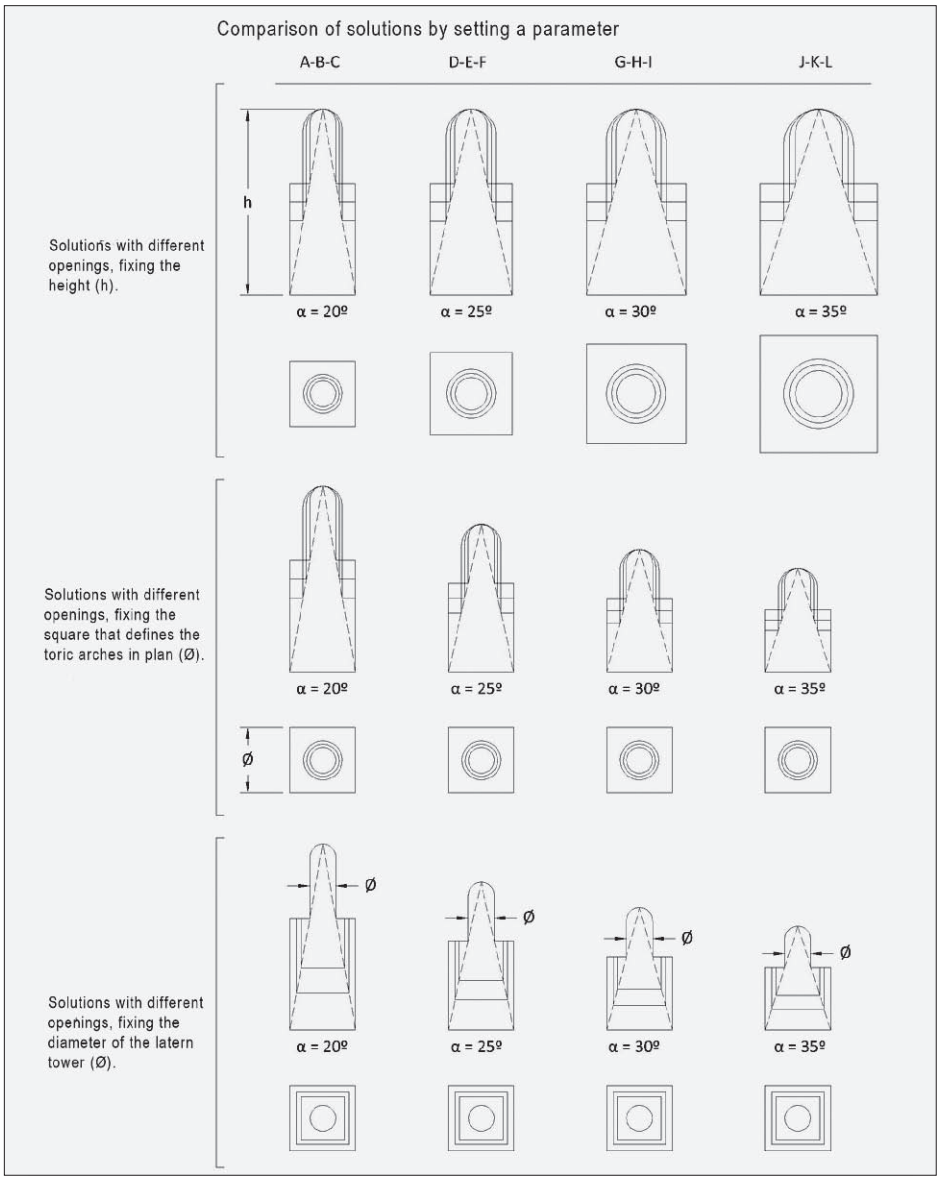


Fig. 11 Comparative tables with different solutions when a specific value is fixed

intermediate values are observed, corresponding to churches that maintain moderate and balanced proportions in terms of contrast and slenderness. For instance, this is evident in the case of B21-Govora and B26-Surpatele.

The B21-Govora church is as an example where the dimensions of the square nave closely align with the average of the churches examined, classifying it as an average-sized church. It has also been noted that the height of the lantern tower is close to the mean of the study. After calculating the Perception Coefficient *(PC)*, it can be observed that B21 is consistently well-classified in an area of intermediate values.

The church B21-Govora features a trefoil plan with a single lantern tower, avoiding excessive lanterns illuminating the narthex. It also boasts a characteristic porch supported by stone piers and arches, with a frescoed wall contrasting the facade's whiteness. The horizontal impost runs throughout the entire structure without any vertical breaks, suggesting it is an original rather than a later addition.

The B21-Govora church has a smaller-scaled narthex and a massive wall towards the nave. Notably, the narthex has a harmoniously proportioned plan. The nave is covered with a classic succession of arcs and vaults. The lantern tower lacks reductive elements, confirm-

ing its diameter as the length of the separation between piers.

In summary, everything about the Govora monastery church places it as one of the paradigmatic examples of Orthodox architecture in Wallachia. It is a church that maintains the most characteristic patterns and ideal proportions for the symbolism of its parts and can be seen as the materialization of a canon.

The example is not conclusive, since the division does not always occur in the middle height. The diversity of variants of the isosceles triangle inscribed in the longitudinal section gives a great diversity of possible solutions.

The low angle visual *(Lav)* is the edge of the triangle that passes through three points (zenith, keystone of the arc, and limit of the nave) and can take any inclination depending on the opening of the nave's cone. If a parameterization is performed of these concepts 2 unknowns appear: aperture angle *(a)* and height of the dome *(h)*, from the arc key to the zenith.

The opening angles of the cone of the nave oscillate between 17° of B15-Dintrunlemn and the 35.7° of B22-Aninoasa. Depending on the opening of the cone *(a)* and the height of the dome *(h)*, very different proportions can be obtained for the volume of the nave.

Next, some examples are shown for different openings at 20°, 25°, 30° and 35°, in combination with different variants of the dome height. In the table, each of the 18 churches is assigned to the combination that belongs to it (Figs. 9 and 10).

In the final part, a comparison table is shown (Fig. 11) with different solutions when a specific value is fixed. This information is used to determine that, with same interior height, different sizes of the square floor plan can be obtained, and vice versa, different heights with the same floor plan. The position of toric arches becomes critical to the configuration of the entire nave. It can be concluded that the same dome diameter gives rise to multiple proportions and dimensions of the floor plan.

All are valid solutions that confirm the established pattern and, in this particular case, contradict the common belief that associates a large dome to a large-sized church.

Conclusion

The emotions and impressions felt by a believer upon entering a church can be compared to the feelings a citizen might experience when entering a public building, museum, or a hotel. Today, these sensations can be precisely measured through facial or body analysis techniques, coupled with emotion measurement sensors, as in "Exploringthe Potential of Artificial Intelligence as a Tool for Architectural Design: A Perception Study Using Gaudí's Works" (Zhang, Fort and Giménez-Mateu, 2023). Another aspect that could be considered is the analysis of light intensity in space as one of the perceptual elements of architecture. In this sense, another line of future research would be that of Professor Iakovos Potamianos, who focuses his teaching and research on issues related to the phenomenological perception of space (Jabi and Potamianos, 2016). In contrast, this text proposes measurement and classification solutions grounded in logical geometric relationships of spaces, offering a systematic approach when applied to various examples of churches.

In this case study, two key aspects are assessed. Firstly, the perception of contrast is examined, which involves the transition from a narrow space with a limited view to a spacious area with extended views. This shift – and as we have previously mentioned it may constitute a line of future research – can evoke emotions that startle and heighten the senses, as stated by Rudolf Arnheim in his work "Art and Visual Perception: A Psychology of the Creative Eye" (Arnheim and Balseiro, 2002).

Secondly, the study explores the architectural quality derived from slender proportions within enclosed spaces, characterized by a narrow base and considerable height. This slender design imparts a sense of architectural excellence, linking greater slenderness to a display of intricate construction and a clear demonstration of the author's mastery. Both of these added values, contrast, and slenderness, are objectively measurable from a geometric standpoint and contribute significantly to the classification of buildings. This becomes especially relevant when dealing with morphologically similar structures, such as the churches in Wallachia.

Finally, the cone opening angle *(a),* and the height of the dome from the keystone to the zenith *(h),* has allowed us to classify these churches, and verify optimal compliance with architectural requirements.

The article demonstrates that, based on measurable and objective variables, buildings can be systematically organized, shedding light on which ones leave a greater or lesser impression on the visitor. These parameters can be adapted to novel architectural endeavours across diverse fields, fostering the creation of more immersive and emotionally resonant architectural experiences.

In essence, this research pioneers a vision for the future of architecture, emphasizing a design philosophy where the configuration of spaces goes beyond mere functionality, aiming to create emotionally memorable and meaningful architectural structures.

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Sources of illustrations

Figs. 1, 5, 10, 11a,b,c	Provenance, authors
Fig. 2	Ghika-Budesti, 1936
Figs. 3, 4, 7-9	Giménez-Mateu, 2016
Fig. 6	Ousterhout, 1999: 81 (original from N.K. Moutsopoulos)

Authors' biographies and contributions

Fco.-Javier González-Pérez's research program focuses on heritage intervention related to parametric design (HBIM).
Omar-Fabrisio Avellaneda-López's research program is focused on the exploration, design, and optimization of lightweight, modular, and transformable architecture using parametric design.
Marilena Christodoulou's research program is focused on parametric design process and its applications in architecture, landscape and industrial design.
Luis Giménez-Mateu, Ph.D., is a specialist in the study of complex geometries and constructive systems applied to design using parametric systems.

Conceptualization: Giménez-Mateu, L. and González-Pérez, F.J.; methodology: Giménez-Mateu, L.; software: Avellaneda-López, O.F.; validation: González-Pérez, F.J., Avellaneda-López, O.F. and Christodoulou, M.; formal analysis: Christodoulou, M.; investigation: González-Pérez, F.J. and Giménez-Mateu, L.; resources: Avellaneda-López, O.F. and Christodoulou, M.; data curation: González-Pérez, F.J.; writing – original draft preparation: González-Pérez, F.J.; writing – review and editing: González-Pérez, F.J., Avellaneda-López, O.F., Christodoulou, M. and Giménez-Mateu, L.; visualization: Christodoulou, M.; supervision: Giménez-Mateu, L.; project administration: González-Pérez, F.J.; funding acquisition: González-Pérez, F.J.

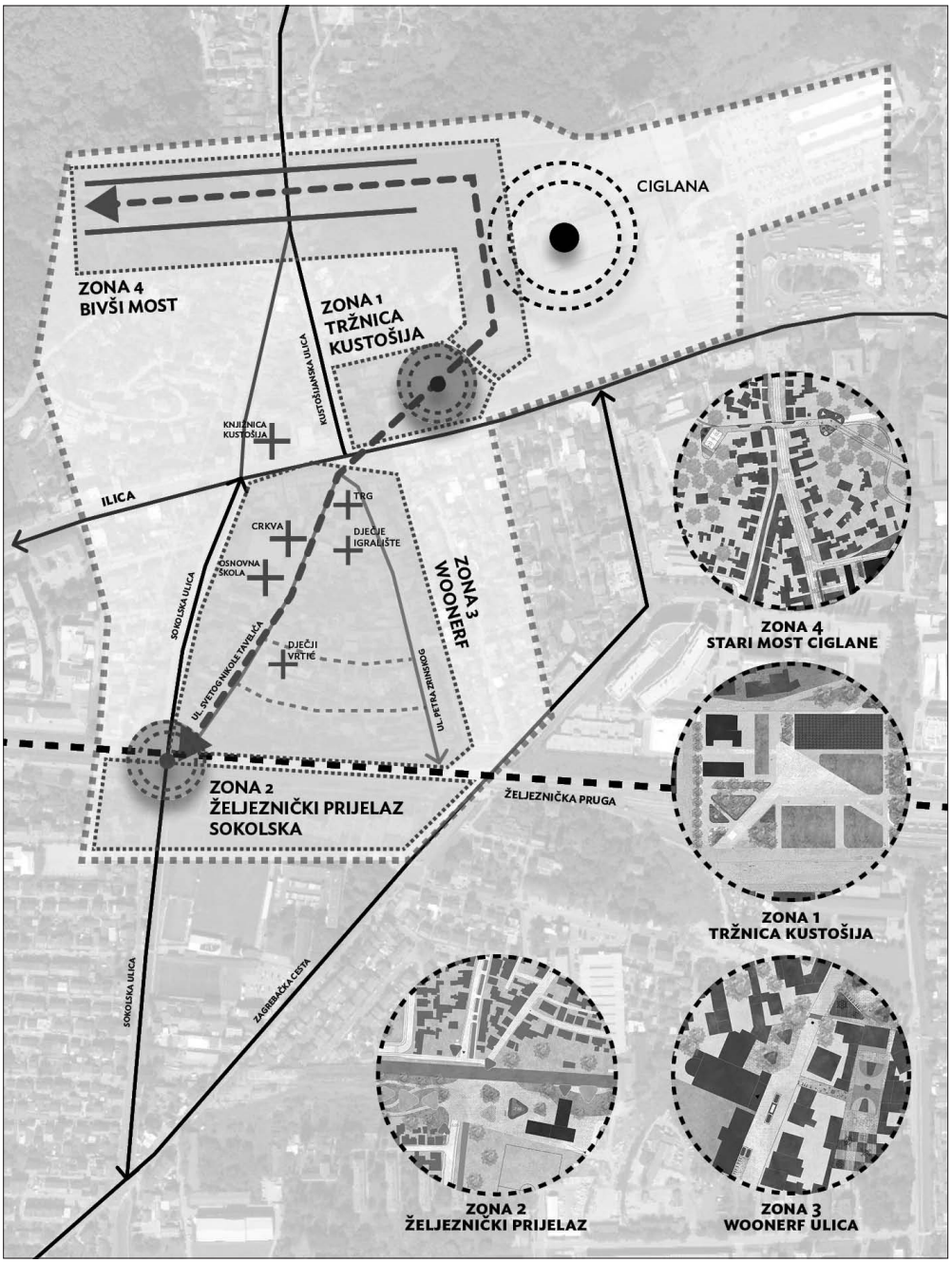

Fig. 1 An example of interdisciplinary education in regular courses for students at the University of Zagreb Faculty of Architecture and the Faculty of Humanities and Social Sciences, Department of Sociology. All three levels of urban planning were used (planning, architecture, and design), along with the citizens' participation, and deployed during the semester.

Iva Kostešić[1], Tihomir Jukić[2]

[1] University of Zagreb Faculty of Architecture, School of Design, Frankopanska 12, 10000 Zagreb, Croatia
https://orcid.org/0000-0002-1481-7762

[2] University of Zagreb Faculty of Architecture, Fra Andrije Kačića Miošića 26, 10000 Zagreb, Croatia
https://orcid.org/0009-0006-1636-8434

ikostesic@arhitekt.unizg.hr
tjukic@arhitekt.unizg.hr

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Institutionalized Interdisciplinary Approaches in Architectural and Design Education

Bauhaus
Delft approach
interdisciplinarity
Ulm model
University of Zagreb Faculty of Architecture

This paper investigates the multifaceted realm of interdisciplinarity in architectural education, examining historical and contemporary perspectives from institutions such as the Bauhaus, the Ulm School of Design, TU Delft, and the University of Zagreb Faculty of Architecture. Acknowledging the challenges posed by complex urban issues, the study underscores the imperative for interdisciplinary approaches in addressing economic, social, and ecological crises. By tracing the evolution of the concept, the paper distinguishes between disciplinary and interdisciplinary approaches, exploring key definitions of the concept. The paper concludes by highlighting ongoing efforts in educational institutions, reflected in various courses, workshops, and summer schools. Despite the limitations inherent in examining a handful of examples, the findings offer valuable guidance for educational institutions aspiring to embrace or enhance interdisciplinary approaches in architectural education. The insights draw attention to the importance of holistic, collaborative models in preparing future architects to navigate the complexities of our urban environments.

INTRODUCTION[1]

Interdisciplinarity as an approach is often used when it comes to dealing with complex problems in the urban environment, those that cannot be resolved from the position and methods of one discipline. In the contemporary context of economic, social, and ecologic crises and distress, interdisciplinarity is seen as a means to give a response to these problems.

Doubts about the sustainability of a system that strictly separates artistic and scientific fields in general, or visual communication design and industrial design, architecture and urban design specifically, were expressed already in the middle of the 20th century through the activities of the Ulm school, and again in the late 1990s. Victor Margolin points us to this problem by stating that, "under the influence of technology, management strategies, social forces and new intellectual currents", the division that defines different forms of practice as graphic design, industrial design, architecture or urban planning seems inadequate, even ineffective (Margolin, 2012: 459-460).

If we accept that any urban environment is a complex space within which the unification of diverse processes, structures and functions that transcend academic and disciplinary boundaries occurs, then the approach to research, planning and design should necessarily be interdisciplinary. Even more so if we strive for environments and living spaces that are sustainable from social, economic and environmental point of view (Verloo and Bertolini, 2020).

THE CONCEPT OF INTERDISCIPLINARITY

In order to try to clarify the issue of the concept of interdisciplinarity, one often first starts from the concept of disciplinary, in order to distinguish between these two terms as precisely as possible. Scientific disciplines are formalized by their institutionalization, i.e. the establishment of scientific associations and educational institutions. This formalization is often a consequence of the development of individual disciplines, the need for distinction between individual disciplines and a precise description of their field and method of action. A discipline is defined as "a scientific field that investigates a specific field and possesses accumulated knowledge that is organized and expressed through theories, concepts and assumptions using specific terminology and technical language" (Menken and Keestra, 2016: 27). After individual disciplines have become institutionalized and thus achieved their own legitimacy and independence through the process of divergence, i.e. the establishment of mutual differences (in theoretical approaches, methodology or the field of research), there is a need for convergence and the search for similarities, places of overlap and common interests, i.e. interdisciplinarity in order to address complex problems in a real environment (Fig. 2).

Interdisciplinarity is most often defined as a means of solving problems and answering questions that cannot be satisfactorily addressed by applying one-sided methods or approaches (Klein, 1990: 96). Huutoniemi et al. (2010) state that interdisciplinarity can best be understood as "a set of different ways of bridging and confronting prevailing disciplinary approaches" (Huutoniemi, et al., 2010: 80), while Bruce et al. (2004) and Menken and Keestra (2016) see integration as key to interdisciplinarity. Thus, Bruce et al. (2004) state that interdisciplinary research, as opposed to multidisciplinary, approaches the problem from different disciplinary perspectives, whereby "the contributions of these disciplines are integrated in order to achieve a holistic or systemic outcome" (Bruce, et al., 2004: 459). Menken and Keestra (2016) conclude that interdisciplinary research is a type of research in which relevant concepts, theories and/or methodologies from other disciplines are integrated (Menken and Keestra, 2016). Often, the term is used in a much broader sense, as defined by Huutoniemi (2010), and implies "a type of

integrative research activities that combine more than one discipline, area or set of knowledge" (Huutoniemi, 2010: 309).

On the other hand, a **multidisciplinary** approach, in relation to an interdisciplinary approach, basically assumes the inclusion of more than one discipline, means their comparison, and such an approach is described as additive, not integrative (Klein, 1990: 56; Menken and Keestra, 2016: 32).

Transdisciplinarity occurs when scientists collaborate with non-academic stakeholders and denotes knowledge from outside academia that is integrated with academia (Menken and Keestra, 2016). Klein describes such an approach as a non-disciplinary, a-disciplinary, meta-disciplinary, supra-disciplinary, omni-disciplinary approach that "denotes the connection of all aspects of reality, going beyond the dynamics of dialectical synthesis to encompass the total dynamism of reality as a whole" (Klein, 1990: 66).

Among the mentioned types of "multidisciplinary" approaches, when it comes to design disciplines that are inherently "multidisciplinary", the most common term which is associated is multidisciplinarity, interdisciplinarity or transdisciplinarity, depending on the degree of integration of individual disciplines. Recent literature even mentions the term "alterplinary", coined from the terms "alternative" and "discipline", which is most often associated with design. The term is used in attempts to describe the contemporary state of design practice where the boundaries of traditional design disciplines are regularly crossed (Rodgers and Bremner, 2019: 176).

As Petrişor (2013) states, planning and architecture are essentially multidisciplinary, interdisciplinary, and transdisciplinary because they deal with the human habitat, which is seen as a complex system and such a system can only be managed with a holistic approach (Petrişor, 2013: 44, 48). A similar position is taken by other authors, for example Hussain and Said (2015), and Lyle (1999).

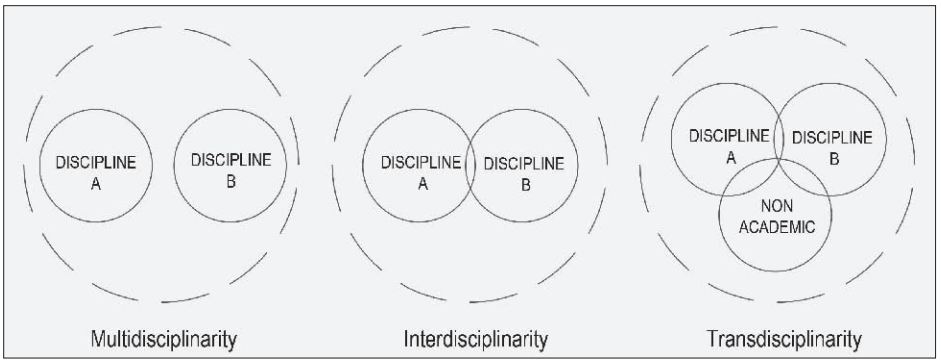

Fig. 2 Diagrams showing the difference between multidisciplinary, interdisciplinarity and transdisciplinary

Historic Attempts in Interdisciplinary Design Education

Although some forms of partial interdisciplinary education preceded it (as part of the "Art and Craft Movement"), historically speaking, the most important examples of interdisciplinary approach in the education of designers, even after their closing, are the Bauhaus school and the Ulm School of Design, which tried to realize an interdisciplinary curriculum through the synthesis of art, craft and later industry, that is, the synthesis of science and art (Lindinger, 1991; Spitz, 2002; Oswald, 2013; Boradkar, 2017). At these educational institutions, education was unconventional insofar as it did not follow the strict specialization that was carried out at academies and polytechnics (Fig. 3).

The Bauhaus Interdisciplinary Experience

The Bauhaus School[2] was formed in 1919 by the integration of the Academy of Fine Arts and van de Velde's School of Arts and Crafts[3] (Bayer, Gropius and Gropius, 1938: 18; Whitford, 2012). Although the school was closed relatively soon after its establishment, what was achieved during its fifteen years of operation makes it one of the most important institutions for education in design and architecture. The Bauhaus operated from 1919 to 1933

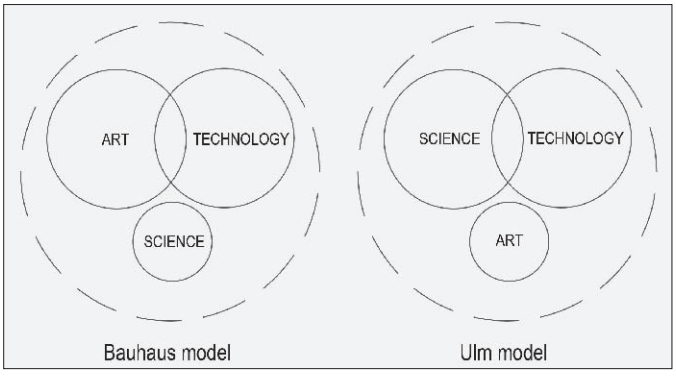

Fig. 3 Bauhaus and Ulm model of interdisciplinary education

1 The paper was written based on detailed research carried out as part of preparations for the doctoral dissertation "Interdisciplinary Design Models in Urban Planning, Architecture and Product Design for Organized Housing Programs" under the supervision of Prof. Ph.D. Tihomir Jukic at the Doctoral Study in Architecture and Urbanism at the University of Zagreb Faculty of Architecture in Zagreb.

2 Originally: *Staatliches Bauhaus Weimar*, after moving to Dessau: Bauhaus Dessau, *Hochschule für Gestaltung*.

3 The foundation contract was signed on April 1, 1919, between Walter Gropius and the local authorities. With this contract, Gropius became the director of the Weimar Academy, and on April 12, he united the Academy with the School of Arts and Crafts.

in three locations[4] and under three directors[5] (Naylor, 1985; Wingler, 1978; Bačić, 2018) who directed the school's program from the synthesis of art to the "unity of art and technology" (Naylor, 1985: 127; Findeli, 2001: 6). The materialization of this unity, as well as the synthesis of art under the primacy of architecture, is precisely the Gropius building in Dessau.

The cultural, political, and social climate of interwar Germany was, in part, quite unfavourable regarding the formation of the school itself. Namely, Germany was an extremely divided society, as witnessed and interpreted by Alexander Dorner (Dorner, 1938: 11-12), and this division manifested itself through two currents of thought, which we can conceptually label here as "traditional" and "avant-garde". The traditional circle included all those who did not understand that the world, as it existed before the First World War, simply does not exist anymore – in the first place, these are the supporters of the old art academies. On the other hand, there were groups and individuals who tried to find a new way of living and creating, contrary to the traditional one in which there was a clear distinction between "high" and applied art. Gropius will thus describe the "academy" as a "tool of the spirit of the past" that isolated the artist from the community by separating him from the world of production – industry and crafts (Gropius, 1938: 23). The Bauhaus tried to provide a new educational framework that dealt with a different way and method of learning in arts and crafts, and later design and architecture.

In the first phase, the aspiration of Walter Gropius, the founder and first director of the school was to abolish the hierarchy in art, through the synthesis of craftsmen and artists, which is explicitly clear from the goals of the Bauhaus set in the school's manifesto and program published in 1919 (Gropius, 2012). Later, Gropius described the Bauhaus idea as "work on integration and coordination, encompassing, not exclusivity", because, as he states, "the art of building is contingent upon the co-ordinated teamwork of a band of active collaborators whose co-operation symbolizes the co-operative organism of what we call society" (Gropius, 1955: 7).

If we return to the manifesto, the concept of creating a "great structure", a "unified work of art", has its roots in the medieval idea of *Gesamtkunstwerk*, which is most vividly represented by the Gothic cathedral. Therefore, it is not surprising that it was the "cathedral of socialism", published alongside the Bauhaus manifesto and program, that served as a metaphor for the unification of craft and art under the primacy of architecture. This early phase of the Bauhaus, which calls for the unification of art, is not *de facto* the first example of such an effort in Germany. The "fusion model" of high and applied art was also sought to be accomplished at the Debschitz school (1902-1914), where the basic idea was that there was no specialization, and students were encouraged to participate in all activities[6] (Naylor, 1985: 20). The school was unique in that it did not follow the educational norm of dividing the curriculum into specific courses but offered interdisciplinary education through a preliminary course by combining all disciplines, focusing on three interconnected areas: design, model making and representation techniques (Ziegert, 1986: 34-35).

The model of connecting art and design that was established at the Debschitz school influenced schools throughout Germany, the most famous of which is the Bauhaus. This model is most obviously manifested precisely in the formation of the Bauhaus, but also through the method of education that includes a preliminary course *(Vorlehre/ Vorkurs),* a workshop type of teaching and two mentors – a master of craft (*Lehrmeister* or *Werkmeister*) and an artist, master of form (*Formmeister;* Lerner, 2005: 215). Thus, an effort was made to unite the theoretical concepts of the academies *(Formlehre)* with the practical knowledge that was learned at the arts and crafts schools (*Werklehre;* Bayer, Gropius and Gropius, 1938: 24-25).

Education at the Bauhaus was divided into three stages: 1. preliminary course (six months / one year), 2. workshop teaching – craftsmanship and instruction in theory (three years) and 3. architecture, with the culmination point in the creation of a new correlation of all processes of creation (Gropius, 1938: 30). The preliminary course was created by the Swiss painter Johannes Itten and offered simultaneous teaching in practice and theory (Bayer, Gropius and Gropius, 1938; Dearstyne, 1986; Lerner, 2005). After the preliminary course, all those who satisfied its outcomes enrolled in the workshop according to their own affinities and creative potential. In the first phase of the school's operation, the workshop classes were organized so that the lessons were taught by two mentors – a master of craft and a master of form. Considering the division in education at the time, the synthesis of art and craft, according to Gropius, could not be realized without these two components, which will be redundant after the first generation of students completes their education and then return to the Bauhaus in the role

4 Weimar, 1919-1925; Dessau, 1925-1932; Berlin, 1932-1933.

5 Walter Gropius, 1919-1928; Hannes Meyer, 1928-1930; Ludwig Mies van der Rohe, 1930-1933.

6 Students participated in areas of activity of the school and creative disciplines that included carpentry, metal, textile and ceramic workshops, as well as sculpture, painting and drawing.

of teachers. With such coordinated teaching conducted by two mentors, a new generation of artists would be educated as masters of form and craft at the same time (Gropius, 1938: 26-27; Whitford, 2012: 156-157). The Department of Architecture was only established in 1927 after the school moved to Dessau in 1925. According to Gropius's texts, the study of architecture could only be accessed by those students who had completed a three-year schooling in workshop classes, and it represented a certain point of culmination of schooling at the Bauhaus (Gropius, 1938: 29). With Hannes Meyer as appointed head of the Department, the research conducted there focused more on scientific, objective and systematic examination of various phenomena (e.g. sociological and biological) that influence design, and therefore students had to conduct research on urban typologies within projects and take into account numerous external factors such as pedestrian movement, traffic, services, the relationship between the house and the road, noise problems, insulation and the like, and took courses in urban planning (Naylor, 1985; Whitford, 2012).

The "Ulm Model"

Another historic example of interdisciplinary education in the field of urban planning, architecture and design is the School of Design (*Hochschule für Gestaltung*, hereinafter: HfG) in the German city of Ulm, located south of Stuttgart. The HfG (1953-1968) is known as the spiritual successor of the Bauhaus and as one of the most influential design schools of the post-war period. It was within the HfG that a design methodology based on scientific objectivity and interdisciplinarity was developed, and would form the basis of the so-called "Ulm model" (Lindinger, 1991). The basic idea of the Ulm school was to create an institutional model that would enable the humanization of everyday life, especially in the domain of "design viewed as a discipline that can advance the process of civilization" (Meurer, 1993, cited in Vukić, 2003: 71). The school's first dean, Bauhaus educated, Swiss architect and designer, Max Bill sought to connect different levels of design and planning for the human environment through education in: 1. architecture and urban planning (built environment), 2. industrial design (material environment) and 3. visual communications (symbolic environment) (Vukić and Kristofić, 2013). As the school matured and developed, there were significant attempts to establish a stronger connection between design, science and technology that will be indispensable for formulating the Ulm model. The role of the designer was no longer understood as an artist whose mission lies in self-expression, but his goal was to shape the environment, in an effort he shares with experts of various profiles – scientists, technicians, research departments, and even sales representatives. This goal and work are described as more responsible insofar as the activities do not focus on individual objects of material culture, but on shaping the environment in a socially responsible way (Lindinger, 1991). The curriculum thus included not only design courses, but also various courses in natural, technical, and social sciences.

The study at the HfG lasted four years. In the first year, all students attended the preliminary course which was taught by teachers from all departments until 1961 (Takayasu, 2017). The purpose of the course was to prepare students for teamwork through joint work in different disciplines (HfG Ulm, 1958). After the first year together, students choose to specialize in one of four departments: Product Design, Visual Communications, Industrialized Construction, and Information Department. In addition to the departments, HfG also established institutes for development and research that cooperated with industry and worked on projects for various clients (Lindinger, 1991).

Among numerous teachers and lecturers who worked at the Ulm school, Gui Bonsiepe, Tomás Maldonado, Otl Aicher and Claude Schnaidt were most accountable for the establishment of the methodology and science of design. In the last issue of Ulm magazine Bonsiepe predicts design science as a branch of future environmental science, emphasising that a designer cannot be a mere consumer of science, but must act in order to produce and accumulate design knowledge. Bonsiepe is critical of the previous application of other sciences in design and advocates a special branch of knowledge inherent to design as an independent discipline (Bonsiepe, 1968).

Contemporary Examples of Interdisciplinary Design Education

There are various examples in contemporary design education that advocate and conduct interdisciplinarity as a research and educational approach, so a global analysis is at this point and for the purpose of this paper inadequate. The paper will focus on two examples – Delft University of Technology (Tu Delft) and University of Zagreb Faculty of Architecture, so as to try and give a more detailed insight into specific contemporary educational praxis (Kostešić, 2024).

TU Delft – the Delft Approach to Urbanism

The Delft approach to urbanism stems from a broad definition of urbanism, which considers it inherently interdisciplinary. It addresses realistic sociocultural, ecological, and technological challenges that directly or indirectly influence urban spaces from the standpoint of spatial planning and design. Interdisciplinarity is achieved by combining three disciplines: 1. spatial planning, 2. urban design and 3. landscape architecture; whereby knowledge from individual disciplines is synthesized into a coherent whole at different scales. Such an approach to the study of urbanism, as implemented at the Department of Urbanism at the Faculty of Architecture and the Built Environment at the TU Delft, is linked to the specificity of Dutch geography and, consequently, the urbanist tradition. The idea of integrating different disciplines and standards at TU Delft appeared as early as at the beginning of the 20th century, emphasizing the importance of urbanism and spatial planning as an integral part of architectural education. The foundations for the establishment of the Department of Urbanism in the 1990s were laid after the Second World War. At TU Delft, urban space is viewed as a phenomenon occurring across various scales, interconnecting buildings, cities, and landscapes. Consequently, the approach to urban space involves the collaboration of diverse disciplines such as urban planning, urban design, landscape architecture, civil engineering, and landscape ecology (Nijhuis, Stolk, and Hoekstra, 2017: 96-98).

Interdisciplinary education and approach to urbanism is taught in two graduate studies offered within urbanism education: 1. Urbanism, 2. Landscape architecture. These programs are based on five principles:

P1. urban space as an object of multi-scale interdisciplinary research;
P2. acquiring theoretical understanding and applying theoretical knowledge;
P3. coping with unpredictability;
P4. multi-scale design with the help of visual thinking;
P5. exploring the relationship between design and research (Nijhuis, Stolk and Hoekstra, 2017: 99-100).

These principles are put into practice through teaching methods that combine passive and active learning approaches. Moreover, research and design classes concentrate on projects that address real problems and challenges of contemporary society. These efforts are reinforced by supplementary courses covering theory, methodology, and technology.

In the first year of teaching, the curriculum is divided into four parts. The initial three quarters emphasize thematic research and design conducted within studio teaching, expanded by complementary courses that implement all principles. Specifically, Principle 2 extends studio teachings to theory, methodology, and technology-related courses. Principles 1, 3,

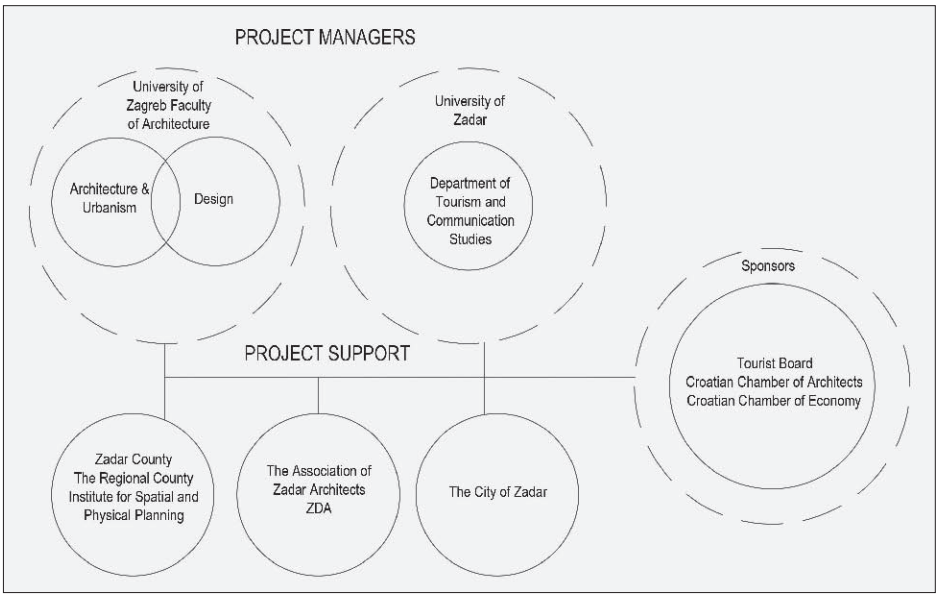

FIG. 4 „PUBLIC SPACES OF THE CITY OF ZADAR – TRADITION AND CONTEMPORARY NEEDS" – SCHEME OF COOPERATION

and 4 are realized through studio classes focused on projects covering diverse topics, scales, and theoretical approaches. Principle 2 and 5 are implemented through two mentors who ensure and guide the interaction between complementary courses and studio classes (Nijhuis, Stolk and Hoekstra, 2017: 101).

UNIVERSITY OF ZAGREB FACULTY OF ARCHITECTURE

The University of Zagreb Faculty of Architecture has its roots in the Architecture Department of the Polytechnic founded in 1919, which grew into the University of Zagreb Faculty of Engineering in 1926. After the Second World War, the Faculty was divided into four independent faculties, and in 1962, the Faculty of Architecture was separated from the Faculty of Architecture, Civil Engineering and Geodesy (AGG) as an independent scientific and teaching higher education institution (*** 2015).

As early as at the time of the establishment of the Faculty of Engineering, the study of architecture was interdisciplinary – on the basis of technical sciences, but with an insistence on the "artistic spirit and aesthetic feeling", and the practice of permeating the technical and artistic fields continued with the establishment of AGG. Two years following the founding of the Faculty of Architecture, majors were implemented, with the initial two years of study being common to all students. By the third year, students had the option to select either architectural design or construction as their major. In the subsequent fourth year, students majoring in architectural design could opt between architecture or urban planning. Since 1979, an "integrated" approach to studying architecture and urbanism has been adopted, eliminating the need for majors. This integrated approach has continued from undergraduate to graduate levels following the introduction of the Bologna reform (Arhitektonski fakultet, 2022).

Following the guidelines and conclusions drawn from the seminar on industrial design education, hosted by the International Council of Societies of Industrial Design[7] (ICSID) in Bruges in 1964, the Faculty of Architecture established an interfaculty and interdisciplinary School of Design in 1989 (Vukić, 2008: 291). The conclusions of the seminar related to the specific topic of the relationship of industrial design studies to other faculties determined its crucial connection with technical schools, as opposed to art academies (*** 2012). Based on this conception the School of Design was established through the collaboration of eight institutions from different scientific and artistic areas.[8] While presently functioning as a department within the Faculty of Architecture under the domain of the arts, the School of Design maintains a significant emphasis on interdisciplinarity, particularly evident in its methodological and scientific approach to design, which integrates technical sciences, humanities, and social sciences (Kostešić and Vukić, 2020: 150).

An interdisciplinary approach to education and research at the Faculty of Architecture is also implemented through courses (elective and regular; Fig. 1), workshops and summer schools, especially at graduate and doctoral studies. Recent examples of interdisciplinary collaboration include workshops held as part of the "Transformation of the City" course from 2014 to 2018, as well as the interdisciplinary project "Public Spaces". This project involved collaboration between the Department of Urban Planning, Spatial Planning, and Landscape Architecture of the Faculty of Architecture and the Department of Sociology at the University of Zagreb Faculty of Humanities and Social Sciences. The aim was to revive the practice of cooperation between technical, social sciences, and humanities to foster the creation of humane and high-quality environments (Vukić, Jukić, and Čaldarović, 2019). At the Faculty of Architecture, urban planning is conceived in a manner akin to the approach at TU Delft, emphasizing its interdisciplinary nature, blending elements of architecture, spatial planning, urban design, landscape architecture, and design. This approach places significant importance on social sciences, particularly sociolo-

7 Today the World Design Organization.

8 Academy of Fine Arts, Faculty of Architecture, Faculty of Economics, Faculty of Mechanical Engineering and Naval Architecture, the Faculty of Humanities and Social Sciences, Faculty of Forestry, Faculty of Technology, and the Higher School of Graphics.

gy, as a fundamental element for creating purposeful and meaningful environments.

In addition to the regular courses offered in the university's graduate study in architecture and urbanism, an interdisciplinary approach to research, planning and design is also implemented into elective courses (e.g. "Transition of public space") and summer schools. Notably, the architectural and urban planning summer school in Zadar, held annually since 2016, serves as a prime example of interdisciplinary collaboration. The first summer school focused on an "Encounter with the garden city", exploring the relationship between the urban centre and its rural hinterland, the Ravni Kotari region. Subsequent editions explored the potential of public space through the topic "Public spaces of the City of Zadar – tradition and contemporary needs" (Fig. 4), while the summer school in 2018, "Zadar – the city and islands", focused on the dynamics between the city and its surrounding islands. The summer school was organized in cooperation with the Association of Zadar Architects, University of Zadar and University of Zagreb with the aim of organizing existing and planning new content that would encourage the economic, ecological and social sustainability of island areas. The strength of the summer school lies both in the interdisciplinary and transdisciplinary approach, actively involving the local community in all stages. Students from different fields of social, humanistic, and technical sciences and the arts reflected on topics aimed at contributing to local community development (Jukić, 2017, 2019; *** 2018a; *** 2018b; Jukić and Perkov, 2023; Fig. 5). Over the years, interdisciplinary teaching has gradually been introduced in some other courses of the Faculty of Architecture, especially in studio-based instruction and elective courses of the Undergraduate and Graduate Studies.

At the university's post-graduate doctoral scientific study in Architecture and Urbanism, cooperation between different disciplines continues to be nurtured and encouraged, especially through research and the method of an intensive seminar. These seminars feature participation from educators with diverse academic background within Croatian universities, as well as from foreign institutions. It is important to mention that interdisciplinary education is gradually being introduced to other faculties in Croatia in the field of architecture, urban planning, and civil engineering, specifically at the University of Split Faculty of Civil Engineering, Architecture and Geodesy and Josip Juraj Strossmayer University of Osijek Faculty of Civil Engineering and Architecture.

Conclusion

The paper explores diverse perspectives on interdisciplinarity in architectural education, drawing insights from institutions such as the Bauhaus, HfG, and TU Delft, as well as the University of Zagreb Faculty of Architecture. The Bauhaus is highlighted for its multifaceted approach, incorporating a preliminary course, workshop teaching, and a general synthesis of art, all centred around the primacy of architecture. HfG, on the other hand, achieves interdisciplinarity through the formation of the notion of design science and the Ulm model, aiming to integrate various fields of science and art into environmental science for the improvement of the human environment. TU Delft sees interdisciplinarity as intrinsic to urbanism, particularly realized in parallel planning and design within spatial planning, urban design, and landscape architecture. Meanwhile, the University of Zagreb Faculty of Architecture has a rich history rooted in the Architecture Department of the Polytechnic, evolving into an independent institution in 1962. Over the years, the faculty has embraced an interdisciplinary approach to architectural education, emphasizing the fusion of technical, artistic, and humanistic elements. The establishment of the School of Design (1989) in accordance with international design education guidelines further exemplifies this commitment to interdisciplinarity. Ongoing efforts are evident in various elective courses, workshops, and summer schools, fostering collaboration not only within the Faculty of Architecture but also across different scientific and artistic domains. Although limited to a handful of examples, the insights drawn from these institutions can serve as valuable guidance for other educational institutions aspiring to adopt or enhance both interdisciplinary and transdisciplinary approaches in architectural education.

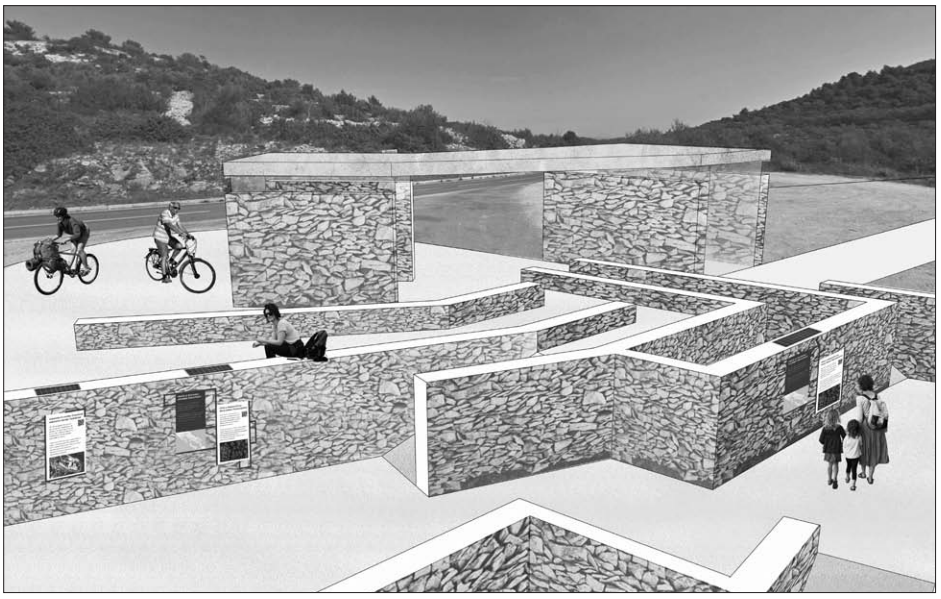

Fig. 5 Interdisciplinary project „Telašćica Nature Park Info Point". Students: Karla Kocijan (University of Zagreb Faculty of Architecture School of Desing), Mateja Rogulj (University of Zagreb Faculty of Architecture), Lana Kyra Athis Mišurac (University of Zadar, Department of History and Department of Sociology).

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Illustration sources

Fig. 1 Courtesy of Danijela Koški, Mia Šolaja, Iva Žužul, 2022/2023
Fig. 2 Authors, 2024
Fig. 3 Authors 2024, adapted from: Findeli, 2001
Fig. 4 Authors, 2024
Fig. 5 Jukić, 2019

Authors' biographies and contributions

Iva Kostešić, Ph.D., Assistant. She publishes scientific papers with research interests that include the combined fields of humanities and technical sciences, particularly the science of art and history and theory of architecture.

Tihomir Jukić, Ph.D., Professor Emeritus. He teaches courses related to the theory of urbanism and the city's transformation. He has won six first awards in architectural and urban planning competitions. He teaches at the doctoral program of Architecture and Urbanism.

Conceptualization: T.J. and I.K.; methodology: T.J. and I.K.; formal analysis: T.J. and I.K.; investigation: T.J. and I.K.; resources: T.J. and I.K.; data curation: T.J. and I.K.; writing – original draft preparation: T.J. and I.K.; writing – review and editing: T.J. and I.K.; visualization: T.J. and I.K.; supervision: T.J. Both authors have read and agreed to the published version of the manuscript.

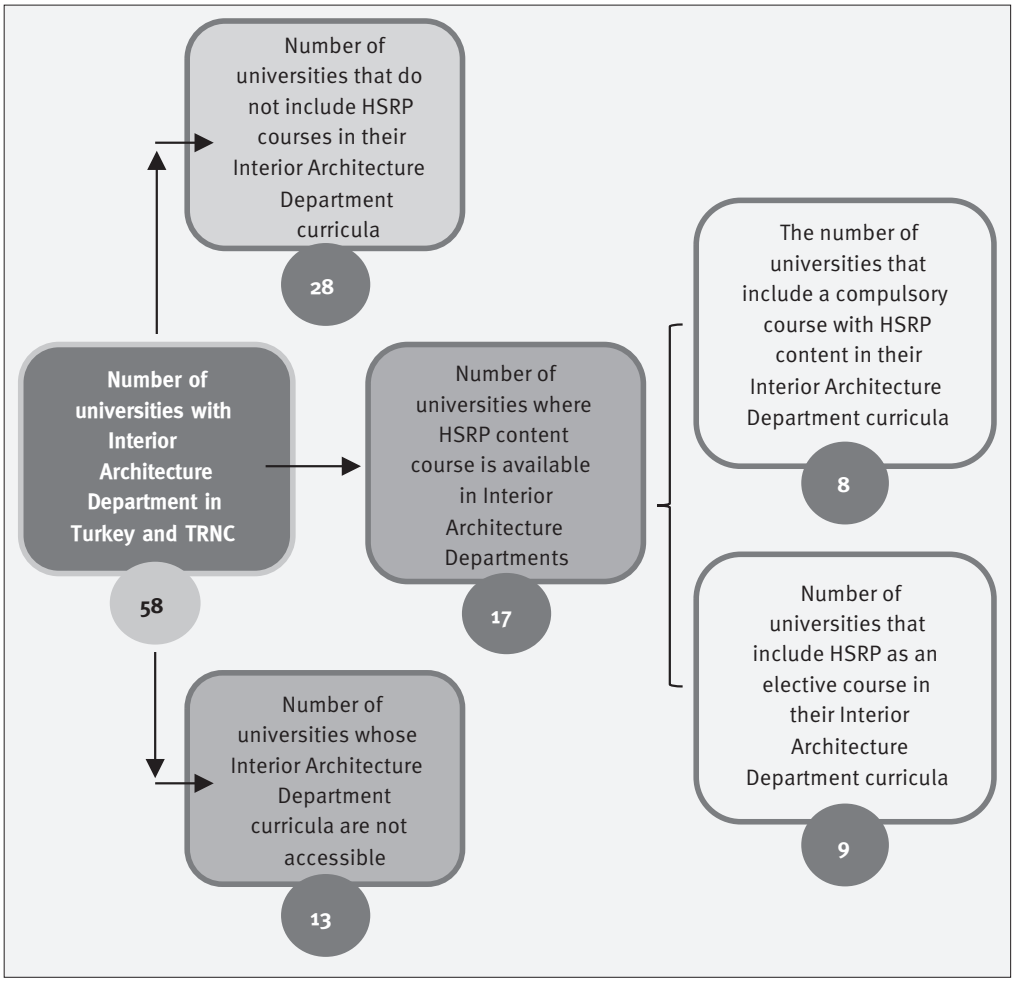

Fig. 1 The number of universities in Turkey and the TRNC that have an Interior Architecture department and offer courses on HSRP content

Beren Aygenç[1], Çimen Özburak[2]

[1] Near East University, Faculty of Architecture, Department of Interior Architecture, Nicosia, Turkish Republic of Northern Cyprus
https://orcid.org/0000-0001-8337-1808

[2] Near East University, Faculty of Architecture, Department of Architecture, Nicosia, Turkish Republic of Northern Cyprus
https://orcid.org/0000-0002-8661-4403

berenaygenc@gmail.com
cimen.ozburak@neu.edu.tr

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The Role and Significance of Human-Space Relationship and Psychology in Interior Architecture and Architectural Education

A Proposed Training Model

ARCHITECTURAL EDUCATION
ENVIRONMENTAL PSYCHOLOGY
HUMAN-ENVIRONMENT RELATIONSHIP
HUMAN-SPACE RELATIONSHIP

Each geographic location has its own unique architectural language and characteristics. Therefore, it is important to acknowledge that architectural design cannot be universally suitable for every geography. To be able to think, calculate, evaluate and analyse all these and more at every scale is possible with 'human-space relationship and psychology' (HSRP). For this reason, HSRP seems to be a lerning necessity for architecture students, especially interior architecture departments, in undergraduate education processes. The study started by determining the position of architecture and interior architecture education and HSRP in undergraduate education. Based on the findings obtained and analysed, an education model on HSRP was developed and applied to interior architecture and architecture undergraduate students in three different academic terms. The HSRP education model combined theoretical subjects and activities, and the students' cognitive levels were measured at the beginning and end of the academic term. Quantitative data demonstrated that the developed education model made the subject more comprehensible to the students compared to a purely theoretical approach. This emphasised the importance and necessity of the course.

Introduction: Architecture and Interior Architecture Education

The craft of architecture has progressed through a master-apprentice relationship and traditional methods. During the Renaissance period, it became a discipline and gained popularity through training in European fine arts academies in the 17th century. The establishment of architecture schools in America during the 19th century was influenced by the Royal Academy of Art and Beaux-Arts schools in England at the end of the 18th century (Wilton-Ely, 2000; Draper, 2000; Roth, 2007: 159-164). Degree architects, who receive architectural education within certain curricula, plans, and rules, became widespread. As a result, the Royal Institute of British Architects was established in 1834, and the American Institute of Architects was established in 1857. This led to the acceptance of architecture as a profession in modern society (Sadri and Zeybekoğlu Sadri, 2013). The number of interior architecture departments in Turkey remained relatively stable until the 1990s, but experienced a rapid increase thereafter, primarily within foundation universities (Adıgüzel, 2011: 39). In the 21st century, architecture, interior architecture, and landscape architecture have become an integrated structure, despite their distinct education processes. Together, they form a large-scale cluster that includes different disciplines. It is important to note that architecture cannot be considered independent from interior architecture, environmental design, and landscape. Although architecture, interior architecture, and landscape architecture are distinct fields, they are all part of the broader architectural discipline. Therefore, they can be collectively referred to as architectural disciplines. There are also many parallels in terms of content between architecture and interior design departments at universities, although they share common and similar courses. However, while the curricula of interior architecture and architecture departments show similarities, they are generally planned independently from each other (Eriş and Ağan, 2020: 425). The common thread that runs through all architectural disciplines is design. Architectural disciplines must consider scientific realities such as physics, mathematics, and geography to create sustainable designs. Competence in one discipline does not guarantee the ability to create sustainable design. Sustainability should not be limited to theoretical or material-structural relationships. Designs must also consider human use. The existence of a structure requires a challenging process. Therefore, every design must be subject to correct mathematical and physical calculations, be suitable for the geography in which it will be located, have structure-material compatibility and be in tune with the needs of the people it will serve.

The field of interior architecture aims to create designed environments that maximize efficiency for their users. Interiors are the physical spaces closest to humans, so it is crucial for interior architects to ensure that their designs are fully integrated with the user (Aygenç, 2020). The relationship between humans and their physical environment is revealed through the effects of space on human psychology (Göka, 2001). Interiors, which are most in contact with people in daily life, are shaped by the subjective and psychological processes and experiences of life and are shaped by the different identities that people attribute to the space with their transformation into consciousness and memories (Solak, 2017: 14). Individuals expect their physical, social, and psychological needs to be met in the spaces where they spend most of their lives. To meet these needs, designers should create appropriate interior spaces and predict their variability in advance for possible situations (Aygenç, Özburak and Uzunoğlu, 2020). To achieve this, it is essential to understand the relationship between humans and their environment, including psychology. When considering this subject and the items it depends on within its scope, design should be in harmony with the user. For this reason, the relationship between humans and space, as well as psychology, should be at the centre of every design that starts from scratch or undergoes restoration.

This approach shall ensure that design is sustainable in every sense. Human beings constantly adapt to their physical environment and modify it accordingly. However, these modifications can create new effects and lead to a new process of adaptation. Therefore, the relationship between humans and their environment is an infinite circle of internal dynamics (Bozdayı, 2004: 20). A design that fails to connect with the people of the region it belongs to, even if it is made with the latest technology and the best materials, will not be socially sustainable. It is possible to look at the perception of space, which is the subject of the human-space relationship, at different scales such as the urban scale. From this point of view, urban perception focuses on the process of reading and understanding the city by the user, similar to what people experience in the interior (Lynch, 2010: 51-87). The significance of interior architecture in undergraduate education is evident from these characteristics. As architectural historians have noted, the places where people reside reflect their social and cultural values and serve as formal indicators of the existence of individuals and societies, rather than being mere physical shelters. This holds true for all periods and countries. When humans create physical environments, they also create symbolic formations that express their value systems. This spatial process is a psychological result of human needs to adapt to the world (Aygenç, 2020). Therefore, the course name chosen for the study is 'Human-Space Relationship and Psychology' (HSRP).

Aim, Scope and Methodology of the Study

The aim of the study is to reveal that it is necessary to include a course on human-space relationship and psychology in the undergraduate education programmes of architectural design fields. With this aim in mind, answers to the following questions have been offered:

Human-space relationship and psychology field;

1. How important is it for interior architecture and architectural disciplines?

2. Which subjects should it cover?

3. What should be its place in the undergraduate education process?

4. How should it be included in undergraduate education with a more efficient and understandable model?

In order to explain the importance of human-space relationship and psychology in undergraduate education in architectural disciplines, especially in the field of interior architecture, the current situation of the subject in the universities of Turkey (TC) and the Turkish Republic of Northern Cyprus (TRNC) was investigated; based on this, an educational model was developed and implemented in the Faculty of Architecture of Near East University in three different academic periods.

The study exhibits qualitative research characteristics in terms of subject content and type. Both qualitative and quantitative analyses were conducted. The qualitative analyses were obtained by collecting theoretical data from literature reviews and internet research, while the applications were carried out with undergraduate students from the Department of Interior Architecture and Architecture at the Faculty of Architecture, Near East University. The course prepared according to the HSRP model was offered as a faculty elective course to undergraduate students who had completed their first year. The HSRC education model was implemented over three academic semesters for Interior Architecture and Architecture students who chose the course. A total of 27 students completed the applications based on their preferences. One limitation of the study is the number of students to whom the education model was applied. This is because the HSRP model is an elective course in the curriculum of Near East University Faculty of Architecture Undergraduate Education, and was selected based on student preferences. To collect data, a questionnaire was administered to the students with the report obtained from the Near East University Scientific Research Ethics Committee. To measure the cognition levels of the students, questionnaires were administered at the beginning and end of each semester in which the elective HSRP course was offered. Data was collected six times using questionnaires, as the proposed education model was applied in three different academic semesters. Thus, quantitative values were revealed as a result of questionnaire applications. With this structure, the study has progressed as a field study consisting of surveys, observations and evaluations, and a training model on human-space relationship and psychology has been created, implemented, tested and finalised.

Methods and Data: Interior Architecture Education and HSRP Model

Interior architecture is a professional field that deals with designing functional and aesthetically pleasing spaces to meet the needs of individuals. It was first recognised as a profession in the 1950s (Saraf, 2013). In 1970, the FIDER (Foundation of Interior Design Accreditation) and later the CIDA (Council for Interior

Table I Universities and courses that include HSRP in their compulsory or elective curricula

No	University Name	Compulsory	Elective	Course name
1.	Ihsan Doğramacı Bilkent University	+		Human and Environment
2.	Cankaya University	+		Environmental Psychology
3.	Beykent University	+		Environment Psychology
4.	Baskent University	+		Human and Environment interaction Human, Environment and Space
5.	Atılım University	+		Environment Psychology
6.	Okan University	+		Psychology of Space
7.	TOBB Economy and Technology University	+		Environment Psychology
8.	Hacettepe University	+		Environment Psychology
9.	İzmir Economy University		+	Environment-Behavior Studies
10.	Istanbul Arel University		+	Human and Environment Relationships
11.	Toros University		+	Environment Psychology
12.	Fatih Sultan Mehmet University		+	Perception and Psychology of Space Environment and Behavior Relationships
13.	Altınbas University		+	Human, Environment and Space
14.	Nuh Naci Yazgan University		+	Human Space Relationship
15.	Karadeniz Tecnical University		+	Human Space Relationship Environment Psychology
16.	İstanbul Tecnical University		+	Environmental Psychology
17.	Konya Food and Agriculture University		+	Environmental Psychology

Design Accreditation) accreditation councils were established in the United States to determine the standards for the interior architecture profession and education. Similarly, in 1992, the ECIA (European Council of Interior Architects) was established in Europe. In Turkey, the first interior architecture education program began in 1925 at Sanay-i Nefise Mektebi (now Mimar Sinan Fine Arts University). Subsequently, Marmara University was founded in 1957, followed by Hacettepe University in 1985. Interior architecture departments were also established in foundation universities around the same time, bringing the total number of universities offering this program to 105 today. Currently, 59 of these universities are active in education, while the rest do not provide education. In Turkey today, the Bologna process has led to the implementation of the Turkey Higher Education Qualifications Framework. This framework requires the establishment of common educational standards to prevent disparities in education within the same field. The distribution of interior design departments in Turkey according to their establishment years is as follows: 4 universities before 1990, 14 universities between 1990-1999, 18 universities between 2000-2010, and 23 universities between 2010-2015 (Sevinç, Çakır and Ilal, 2015). Currently, the number of interior design departments in Turkey and Northern Cyprus has reached 58 (Fig. 1). As with all academic fields, there is a common path for interior design departments, but the faculties, courses, or course contents to which the departments are affiliated may differ. Although they may be under different faculty names or have different courses, the goal of all departments that provide interior design education is undoubtedly the same: to train qualified, competent, and open-minded interior designers.

The study was conducted based on Turkey and the Turkish Republic of Northern Cyprus (TRNC), with data collection taking place in the TRNC. Interior design departments and universities in Turkey already include human-space relations and psychology in their curricula. The subject may be listed under different names in different universities. Since the relationship between humans and space is the subject of environmental psychology, it is mostly found under that name in various universities (Table I). Although the subject may be referred to by different names, their definitions reveal their content and meaning. This study examines the relationship between humans, the environment, and space, also known as environmental psychology or the psychology of human-space interaction. On the one hand, environmental psychology aims to establish itself as an applied psychological discipline, while on the other hand, it aims to understand psychological processes in the real world by establishing an internal relationship with psychology (Bonaiuto and Bonnes, 2000). Another definition of environmental psychology is the examination of the mutual relationships between the physical environment and human behavior (Gifford, 2007). Bell, Fisher and Baum (1996) attributed the emergence and rapid development of environmental psychology to urban and natural environmental problems. Göregenli (2010) identifies three separate disciplines as the background of human-environment relationship and psychology: psychological, geographical, and architectural backgrounds.

HSRP (Human-Space Relationship and Psychology) Education Model Proposal

Table I shows that courses related to human-space relationships and psychology, which are offered under different names in universities are generally theoretical. However, as interior architecture involves both design and application, this study proposes an education model that includes theoretical explanations and practical activities for the HSRP course. The comprehension of the subject and the reinforcement of its activities are believed to require theoretical knowledge. Figure 2 shows the plan of the study and the

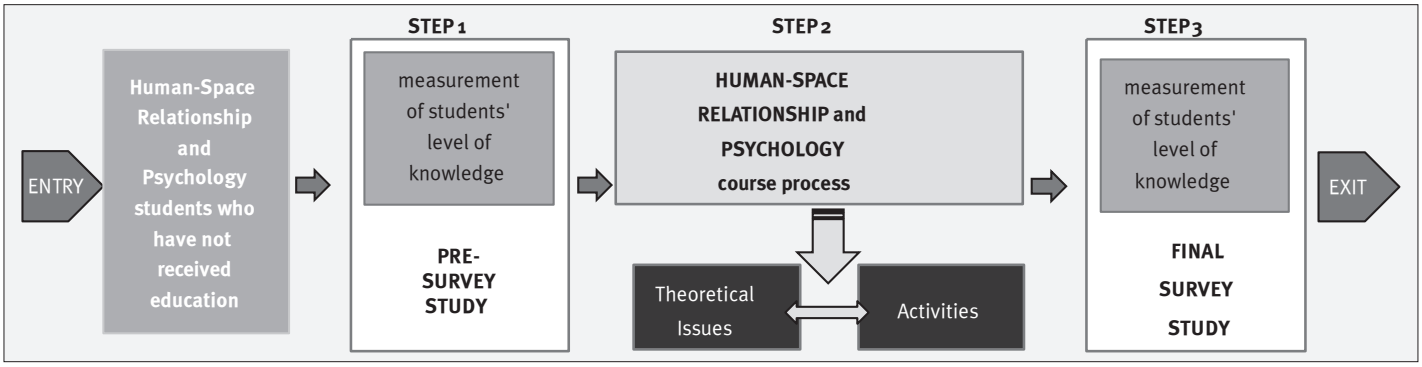


Fig. 2 HSRP training model outline and diagram of the path followed in the study

outline of the educational model developed for the HSRP course.

In order to support the theoretical topics (Fig. 3), activities were included in the scope of the course for all three semesters of the implementation. These activities were developed as the programme progressed. Each implementation of the HSRP educational model was delivered over a 14-week academic semester. The learning outcomes of the course are defined as follows. At the end of this course student should:

– Be able to discuss the basic issues relating to the human environment.

– Relate human behaviour, cognition and perception to the environment-space relationship.

– Be able to use the psychological effects of the human-space relationship as data for design.

– Understand the social and physical elements of the environment.

– Understand the importance of developing a human, social and environmental design approach.

– Be able to explain and discuss related concepts/theories.

– Critically analyse real-life applications under physical, social and economic constraints within a framework of aesthetic values and user needs.

– Synthesise different information and ideas and interpret the results.

– Be able to make preparation(s) for presentation.

– Evaluate own work according to given criteria.

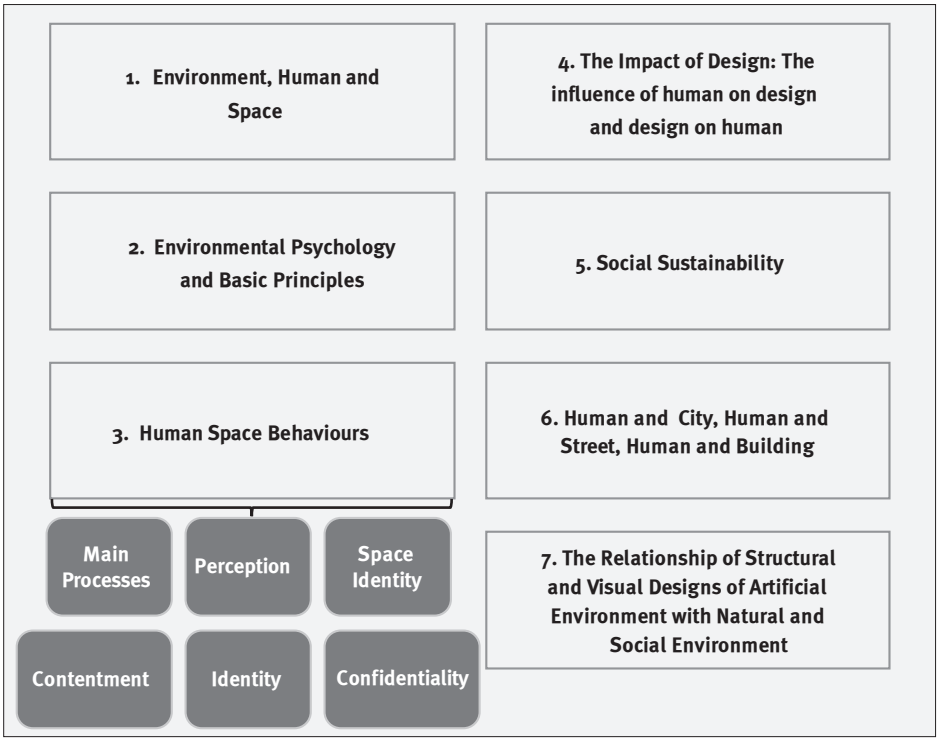
– Be able to evaluate the work of his/her friends according to the given criteria.

– Have the ability to research and critique.

– Have the ability to communicate effectively with the user according to the knowledge acquired and to design the space in accordance with the user.

All courses were included in the curriculum as 3 hours per week, 3 credits and 3 ECTS (European Credit Transfer System). In all implementations, theoretical subjects can be expressed as 30% and activities as 70%. However, although the theoretical issue is expressed at a lower rate here, it constitutes the basis. It has been possible to support this foundation with activity projects and even to transfer new theoretical knowledge through them. Figure 4 shows the final state of the relationship between activity and theoretical subjects during the 14-week course period as the course progressed. The relationship between activity and subject and the programme shown in Fig. 4 was met by the students in 'Implementation 3'. At the end of the course, students' final

Fig. 3 Theoretical topics of the HSRP education model



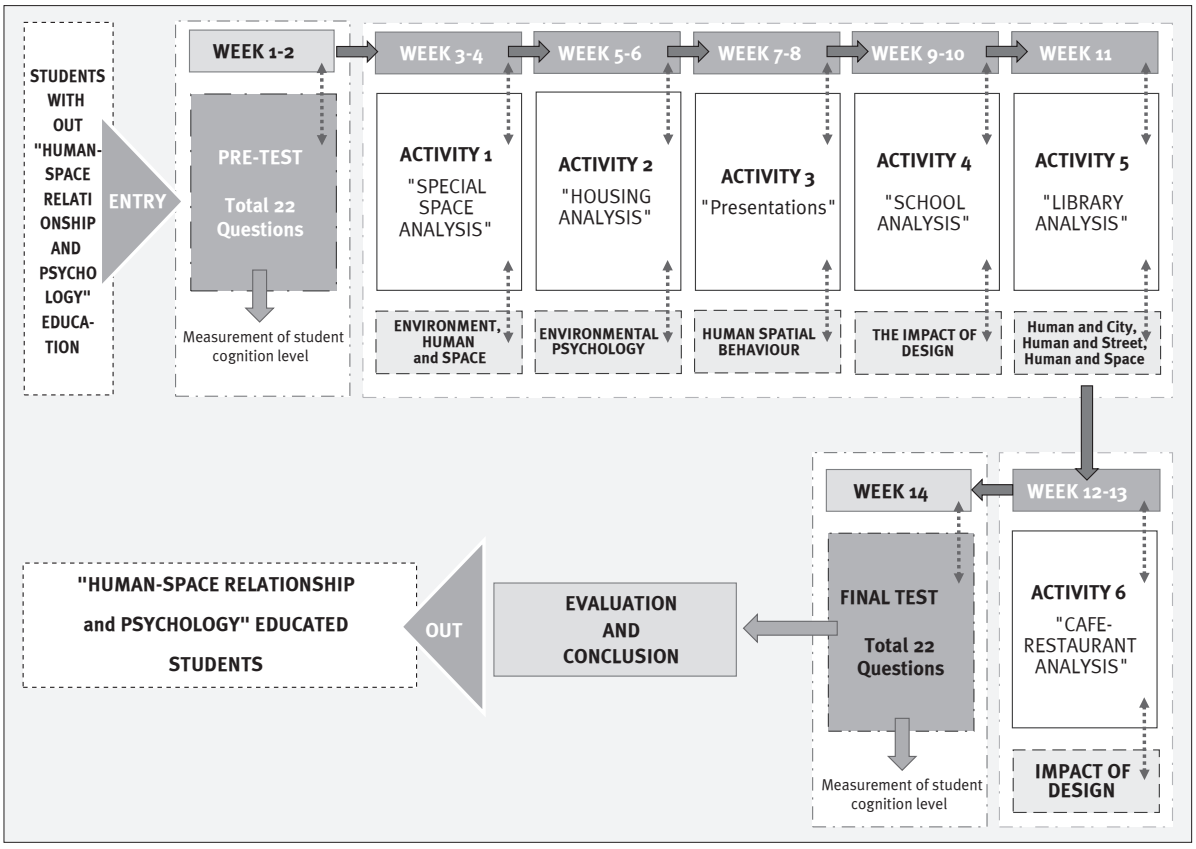


FIG. 4 THE RELATIONSHIP BETWEEN THE THEORETICAL TOPICS AND ACTIVITIES OF HSRP EDUCATIONAL MODEL 'IMPLEMENTATION 3'

grades were determined by averaging these 6 activity project submissions. The students carried out and completed the activity projects individually. In 'Implementation 3', only 'Activity 3' was purely theoretical. In this activity students were given different topics to research within the course topics and were asked to make presentations. For each of the other activities, a list of criteria was created, the students were first asked to make their own analyses, and then they were given the list of criteria and asked to complete their analyses and activity projects (Figs. 5 and 6). In this way, students could clearly see what they were missing and what they needed to pay attention to. List of criteria for space analyses under the headings of form, material, colour, texture and light were combined with the information from the theoretical topics (Fig. 3) within the framework of the course topic (Figs. 5 and 6). It is intended that activities always be subject to change, while the theoretical topics within the course subject remain the same. This is because the implementations are the key point for understanding the topics and revising them according to the current period will make them more understandable.

The activities shown above progress from small to large scale (Fig. 4). In addition, for each activity, the places that students come into contact with in their daily lives were selected (Tables II and III). In this way, the activities helped the students to analyse the places they frequently come into contact with in the context of the discipline they are studying. Below are the tables with the details of 'Activity 1' and 'Activity 6' (Tables II and III). These two activities were chosen and detailed because they express the smallest and the largest scale to be analysed during the course.

In Fig. 5 students gave percentages for the list of activity criteria. This is because in this activity the students examined and analysed their own private spaces. In 'Activity 2' the scale is slightly larger and includes the analysis of their homes. Again, the students combined the list of criteria with the percentages of the spaces they used. The purpose of this activity can be expressed as follows:

– To transform abstract ideas about the living spaces contacted into concrete components and to be able to express their reasons.

– Each student informs the others about the human-space relationship for their own dwelling and contributes to the interactive functioning of the classroom.

– Evaluate the concepts of perception, spatial identity, satisfaction, belonging and privacy through different housing examples.

In 'Activity 3', in order to reinforce the theoretical issues, the following topics, which will contribute to the scope of the course subject, were assigned to the students and they were given the opportunity to make presentations:

– Colours: Meaning, use, application characteristics. Including sample designs and analysis according to design principles.

– Human-Space-Distance: What is distance? What is proxemics? Intimate space, personal space, social space and public space research and examples.

– Kevin Lynch: Who is he? What has he researched and proposed?

– Edward Hall: Who is he? What has he researched and proposed?

– Environmental Stress: What is stress and what causes it? What are environmental stressors?

– Social Withdrawal: What is it and what are the possible causes?

– Low Housing Quality: What is it and what are the possible causes?

These topics were distributed according to the number of students who chose the course to include different research. In 'Activity 4' and 'Activity 5' the students were asked to analyse their own faculties and the university library. These two activities aimed to reveal the differences and similarities in individual expectations and perceptions of the use of faculty and library spaces. In the last activity, 'Activity 6', a common place was identified and analysed that is most frequently visited in the geography in which they live (Table III and Fig. 6). Since 'Activity 4-5-6' refers to the places in a particular community, the criteria for this activity were determined accordingly and analysed with a Likert scale. In addition, added to the list of criteria a certain number of people was determined for the 'user contentment rate' (at least 20 users) and according to this number, the contact between the user and the students was ensured (Fig. 6).

According to the education model presented in Fig. 2, the course has been implemented for a total of three semesters: two in the Department of Interior Architecture and one in the Department of Architecture at the Faculty of Architecture of Near East University. Table IV and Fig. 7 demonstrate an increase in architecture students' awareness of the subject. Uzunoğlu and Özer (2014) also noted a direct relationship between architecture, human-space relationship, and psychology. The subject enables students to understand this relationship, as well as to comprehend and evaluate the connection between architectural problems and perception methodology.

Table II 'Implementation 3-Activity 1' information

ACTIVITY 1	
Title of the Activity	**"Special Space Analysis"**
Description of the Activity	* Each student will analyse the room in his or her dormitory where he or she lives. * Design and presentation of the layout designs using A3 size horizontal paper. * The sheets will include the layout plan of the house, the room plan, photographs of the room, materials and analyses in the context of the human-space relationship.
Purpose of the Activity and Acquisition	* Since each student lives in a different type of housing and in different types of spaces, their spatial characteristics and their relationships between people and spaces are also quite different from one another. For this reason, the aim is for students to develop an awareness of the different spaces with which they come into contact. * The aim is for each student to consciously examine the spaces with which they are in contact for most of their lives.
Related Course Topics	Human-Space Relationship Human-Space Psychology User Contentment User Identity Perception of Space

Table III 'Implementation 3 - Activity 6' information

ACTIVITY 6	
Title of the Activity	**"Cafe-Restaurant Analysis"**
Description of the Activity	* Analysing the café/restaurant space selected by the students from Nicosia Walled City within the scope of human-space relationship. * Visiting and experiencing the place, taking photographs and analysing them within the scope of the criteria list. * Making and presenting the layout designs by using A3 size paper horizontally. * Layout plan, architectural space plan, photographs, materials and analyses of the cafe/restaurant within the scope of human-space relationship.
Purpose of the Activity and Acquisition	* To reveal the differences and similarities of each student's cafe-restaurant usage-expectation perception, * It is aimed to show that the contentment rates of people who experience the same place may be different or similar. * The reason for choosing a place in Nicosia Walled City as a location is that it is located in the common geography where the students' university is located, it is a place that every student knows and experiences, and it reflects the urban texture.
Related Course Topics	Human-Space Relationship Human-Space Psychology User Contentment User-Confidentiality Relationship Perception of Space Space Identity

According to Uzunoğlu and Özer (2014), these characteristics have been shown to result in learning gains for students. They are able to view their environment not only through the eyes of an architect or interior designer, but also through the lens of psychology, which they can then apply to their space designs. The field of human-space relationship and psychology offers insights into the impact of built and natural environments on mental and physical comfort. It provides guidance on how to improve the design of spaces in a supportive manner (Devlin, 2018).

The years and periods in which the implementations were carried out are given below:

– Implementation 1: 2021-2022 Spring Academic Semester Interior Architecture Department elective course (6 students);

– Implementation 2: 2022-2023 Autumn Academic Semester Department of Interior Architecture elective course (8 students);

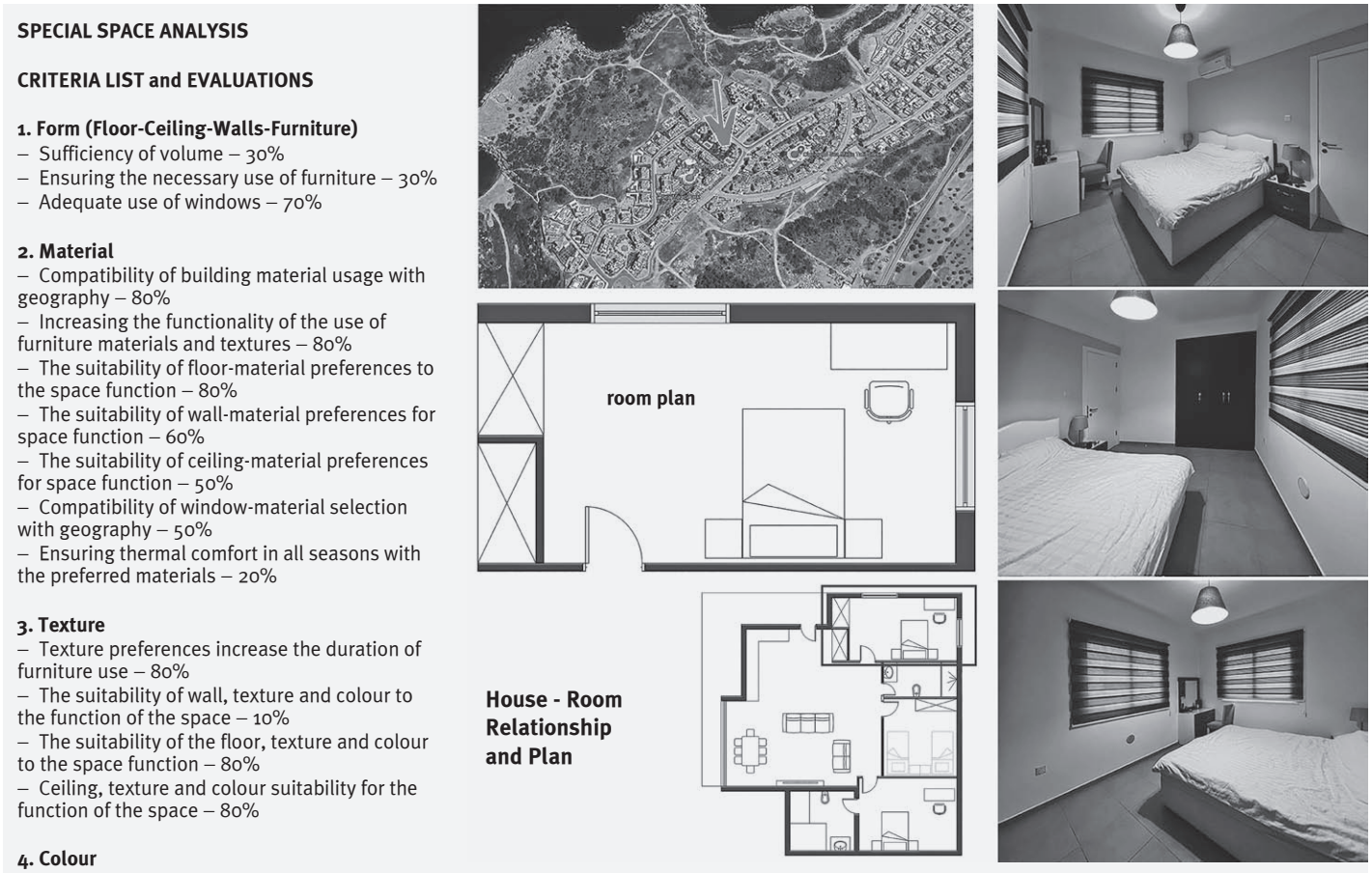


FIG. 5 'IMPLEMENTATION 3 – ACTIVITY 1' STUDENT-1 PROJECT EXAMPLE

– Implementation 3: 2022-2023 Spring Academic Semester Department of Architecture elective course (13 students).

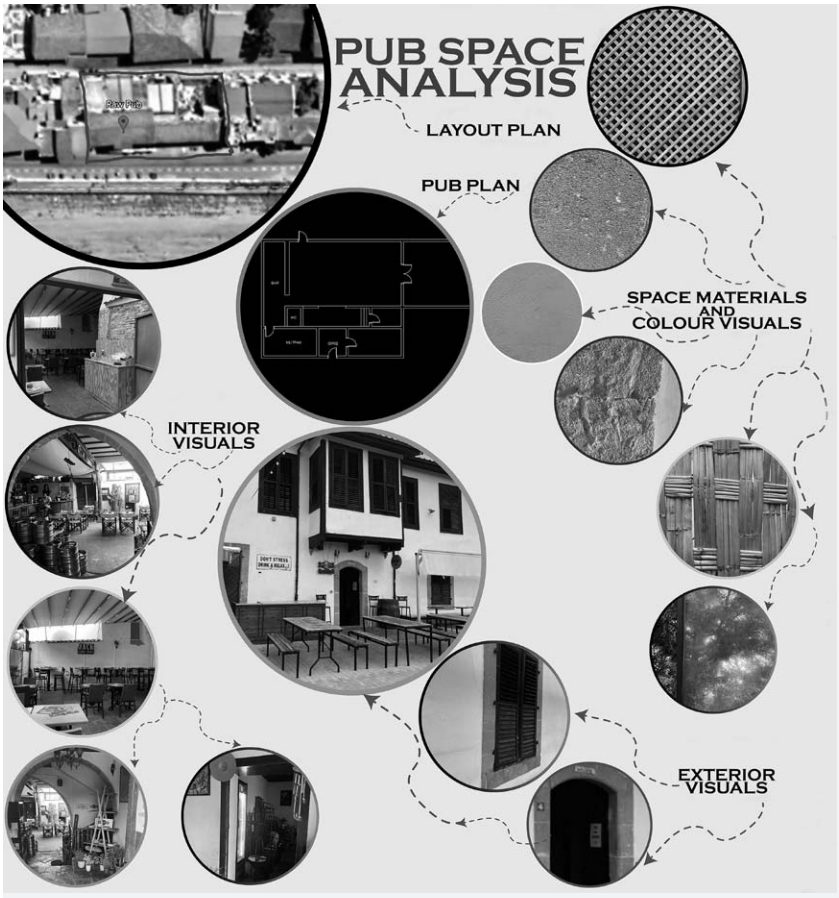
The developed education model was applied to a total of 27 students through 'implementations 1, 2, and 3'. The course was offered as an elective and was available to both interior architecture and architecture students who had completed their first year. The requirement for students to have completed their first year before taking the course is because it is expected that the subject matter can be comprehended at that point. The HSRP education model was applied in a total of 3 different academic semesters, and as the implementations progressed, both the number of students increased and the proposed education model was developed.

DATA ANALYSIS, FINDINGS AND RESULTS

To measure students' cognitive levels, we administered the same questionnaire at the beginning and end of the HSRP courses. The purpose of the questionnaire was to evaluate the effectiveness of the course using scientific methods. The results revealed the progress made by the students at the end of the course. The questionnaire consisted of 22 evaluations related to environment-space-human relations.

Table IV contain 22 sentences related to environment-space-human relations. These sentences were answered by the students according to a 5-point Likert scale as Strongly Agree (1), Agree (2), Neither Agree nor Disagree (3), Disagree (4), Strongly Disagree (5) (1 = highest, 5 = lowest). Table IV contains evaluation sections that express the difference between the pre-test and post-test, as well as the post-test status of the students. To enhance the clarity of the differences between pre-test and post-test student awareness levels, we evaluated and presented the answers given for each HSRP training model application under three main headings (unconscious, undecided, and conscious) in Fig. 7. The percentage values for pre-test and post-test are provided for each heading. Thus, the students' answers in the HSRP education model implementations are presented in detail in Table IV and with general percentages in Fig. 7.

Table IV shows an increase in students' awareness of human-space relationship and psychology. The education model developed



CRITERIA LIST and EVALUATIONS
Strongly Agree (1), Agree (2), Neither Agree nor Disagree (3), Disagree (4), Strongly Disagree (5) (1 = highest, 5 = lowest)

1. Form (Floor-Ceiling-Walls-Furniture)
– Furniture choices were made in accordance with the function of the space – (4)
– Furniture choices were made suitable for the users of the space – (4)
– Furniture is positioned functionally – (3)
– Necessary and sufficient areas are provided for users – (2)
– Circulation areas are sufficient for both users and staff – (5)
– Toilet areas are positioned correctly in the space – (5)
– Kitchen area is positioned correctly in the space – (5)
– The bar area is positioned correctly in the space – (2)

2. Material
– The use of materials is compatible with geography – (4)
– Furniture-material selection was made according to the function of the space – (4)
– Floor-material preferences are suitable for the function of the space – (5)
– Wall-material preferences are suitable for space function – (5)
– Ceiling-material preferences are suitable for the space function – (4)

3. Texture
– Texture preferences were made in accordance with the function of the space – (4)
– Furniture texture preferences have a positive effect on usage – (5)
– Wall, texture and colour are suitable for the function of the space – (4)
– Floor, texture and colour are suitable for the function of the space – (4)
– Ceiling, texture and colour are suitable for the function of the space – (4)

4. Colour
– The use of colour has a positive effect on the atmosphere of the space – (3)
– Floor-colour selection was made in accordance with the function and identity of the space – (4)
– Ceiling-colour selection was made in accordance with the function and identity of the space – (4)
– Wall-colour selection was made in accordance with the function and identity of the space – (4)
– Furniture-colour selection was made in accordance with the function and identity of the space – (4)

5. Light (Natural Light-Lighting)
– The use of natural light is sufficient – (2)
– Areas with natural light are comfortable for users – (3)
– The use of lighting elements is sufficient – (2)
– Lighting element placement locations are preferred correctly – (3)

6. Space Identity
– Design decisions were made in accordance with the space identity – (3)
– The location of the space is harmonious according to the space identity – (2)
– Furniture preferences are appropriate according to the space identity – (3)

7. User contentment
– Space contentment rate for 27 users: 80%

Fig. 6 'Implementation 3 – Activity 6' Student-2 project example

through the implementation of the course in three different academic periods is detailed. Theoretical subjects are commonly shared among universities that offer the course in the interior architecture department. The education model developed for this study features theoretical subjects that are similar in content to those found in other universities. However, the HSRP education model places particular emphasis on student participation in activities. Figure 7 demonstrates the differences in student awareness levels between the pre-test and post-test of the implementations. At the conclusion of each application, the students' level of consciousness increased. This increase can be attributed, in part, to the activities implemented during the lessons.

Discussion and Conclusion

The activities in the developed HSRP education model take place at a crucial point. Unlike other universities' lectures on the same subject, this model covers not only theory but also practical applications, making it more compre-

Table IV Environment-human-space evaluations of students taking HSRP Education Model Implementation 1-2-3

Evaluations related to Environment-Space-Human Relations		Implementation 1-2-3				
No	Explanation	PRE-TEST		FINAL TEST		EVALUATION
		%	Reply	%	Reply	
1	I know the concept of "Environmental Psychology".	9 22 52 17	(1) (2) (3) (4)	65 35	(1) (2)	In the final test, all of the students demonstrated knowledge of the concept of "Environmental Psychology".
2	I can associate the concept of "Environmental Psychology" with the field of interior architecture.	5 37 53 5	(1) (2) (3) (4)	70 25 5	(1) (2) (3)	In the final test, the rate of students associating the concept of "Environmental Psychology" with the field of interior architecture increased.
3	I know how the space-human relationship is shaped.	20 45 30 5	(1) (2) (3) (4)	68 32	(1) (2)	In the final test, all of the students were able to understand how the space-human relationship was shaped.
4	I can define the concept of "environment".	24 54 14 8	(1) (2) (3) (4)	62 36 2	(1) (2) (3)	In the final test, the level of students' ability to define the concept of "Environment" increased.
5	Every interior is an environmental formation.	45 30 25	(1) (2) (3)	64 36	(1) (2)	In the final test, all of the students were aware that every interior space is an environmental formation.
6	Human-environment relationship is effective in space design.	50 25 25	(1) (2) (3)	77 23	(1) (2)	In the final test, all of the students are aware that human-environment relationship is effective in space design.
7	Having a strong understanding of the relationship between humans and the environment is essential for success in design studio courses.	45 37 18	(1) (2) (3)	64 36	(1) (2)	In the final test, all of the students realised that having a good command of the human-environment relationship contributed to the design studio courses.
8	Having a strong understanding of the relationship between humans and the environment can positively impact communication skills after graduation.	52 30 13 5	(1) (2) (3) (4)	80 20	(1) (2)	In the final test, all of the students were aware that having a good command of human-environment relations has a positive effect on user communication after graduation.
9	I understand spatial perception well.	5 25 48 22	(1) (2) (3) (4)	48 48 4	(1) (2) (3)	In the post-test, 96% of the students had knowledge about space perception.
10	I can define the concept of spatial identity.	5 32 20 32 11	(1) (2) (3) (4) (5)	65 35	(1) (2)	In the final test, all of the students were able to define the concept of 'spatial identity'.
11	The user of a place cannot affect its identity.	7 10 26 37 20	(1) (2) (3) (4) (5)	55 37 8	(3) (4) (5)	In the final test, the students' level of awareness about 'the user of a place can affect the identity of the place' increased. Both option (3) and (4) are considered correct for this explanation. Because 'the user of a place affecting the identity of the place' may not be observed in every situation.
12	The identity of place influences the behaviour of its users.	7 53 30 5 5	(1) (2) (3) (4) (5)	82 18	(1) (2)	In the final test, all of the students were aware that the identity of a place affects the behaviour of its users.

hensible for students. The course activities are tailored to the university's geography. It is important to note that the suggested activities for this course may not be applicable to all universities. The course on human-space relationship and psychology should include activities related to the environmental characteristics of the relevant department at the university. This is because students' perception and experience of space are influenced by their relationship with their living environment (Junot, Paquet and Fenouillet, 2018). During the course, the theoretical topics were reinforced by discussing the relationship between the subject and the design examples known in the world with the students.

As mentioned in the introduction, the course was implemented not only in the Department

Evaluations related to Environment-Space-Human Relations		Implementation 1-2-3				
No	Explanation	PRE-TEST		FINAL TEST		EVALUATION
		%	Reply	%	Reply	
13	I recognise the importance of spatial satisfaction in interior design.	37 58 5	(1) (2) (4)	78 22	(1) (2)	In the final test, all of the students were aware of the importance of spatial satisfaction in interior architecture and their level of awareness about it increased.
14	I can define the concept of belonging to place.	9 27 44 9 11	(1) (2) (3) (4) (5)	67 33	(1) (2)	In the final test, all of the students were able to define the concept of belonging to the place.
15	The person who is dissatisfied with the use of space may feel belonging to the same space.	12 20 50 8 10	(1) (2) (3) (4) (5)	41 37 17 5	(1) (2) (3) (5)	In the final test, 95% of the students were aware that a person who is dissatisfied with the use of space can feel belonging to the same space.
16	The higher the satisfaction rate, the higher the belonging rate.	38 34 28	(1) (2) (3)	60 40	(1) (2)	In the final test, all of the students realised that the higher the satisfaction rate, the higher the belonging rate.
17	I can explain the concept of privacy in spatial dimension.	5 36 48 11	(1) (2) (3) (4)	44 56	(1) (2)	In the final test, all of the students were able to explain the concept of privacy in spatial dimension.
18	Each person may have a different perception of privacy.	40 28 32	(1) (2) (3)	32 33 35	(1) (2) (3)	In the final test, the students' level of awareness that each person's perception of privacy is different increased. For this explanation, choices (1), (2) and (3) are considered correct. Because although the existence of privacy is certain for every person, privacy is not shaped in the same way for every person.
19	I recognise the general architectural structure of the place where I grew up and/or live.	55 33 12	(1) (2) (3)	70 30	(1) (2)	In the final test, the students' level of awareness of the general architectural structure of the place where they grew up and/or lived increased.
20	I recognise how and to what extent the place where I live influences my cultural perception.	27 50 23	(1) (2) (3)	60 40	(1) (2)	In the final test, the students' awareness of how and to what extent the place where they live affects their cultural perceptions increased.
21	Every person's perception of space is different.	45 40 10 5	(1) (2) (3) (4)	24 12 64	(1) (2) (3)	In the final test, the students' level of awareness that each person's perception of space is different increased. Both option (2) and option (3) are considered correct for this explanation. Because every person's perception of space can be different, as well as similar or even the same situations.
22	Every person expects the same performance from the same type of venue, even if they come from different cultures.	25 41 20 14	(2) (3) (4) (5)	5 30 60 5	(1) (2) (3) (5)	In the final test, students' level of awareness increased for Statement 22. Because even if every person comes from different cultures, they can expect the same performance from the same type of space, but they may also have different expectations. Based on this, it is more accurate to answer 'Neither Agree nor Disagree (3)' for this statement.

of Interior Architecture but also in the Department of Architecture, reflecting the interconnectedness of architectural disciplines. According to Göregenli (2010) and Bechtel and Churchman (2002), the fields of sociology, anthropology, architecture, urbanism, ecology, and all design fields are considered part of the human-space relationship and psychology. It is evident that undergraduate architecture students can comprehend the subject of the relationship between humans and space, as well as its psychological implications.

When architects prioritise concerns such as form, function, aesthetics, and economy, they may neglect human psychology to some extent, which can lead to disconnects in the interaction between humans and space. To eliminate this rupture, it is necessary to

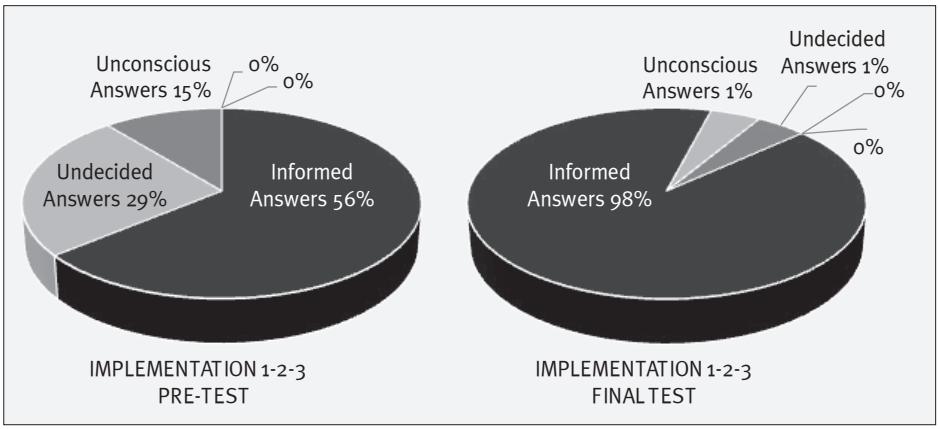


Fig. 7 Pre-test and final test general values of HSRP Education Model Implementation 1-2-3

adopt and assimilate the human-space relationship and psychology, and use it to create adequate spaces. Understanding the critical role of human psychology in architecture is essential. Architects will inevitably adopt a psychological perspective that guides their designs, resulting in a built environment better suited to human needs (Mert, 2019). Regardless of their discipline, architects, interior designers, and landscape architects should consider the relationship between humans and space, as well as psychology. Mastering this field can meet the needs of targeted users and expand the scope of design, creating more comfortable spaces (Kopec, 2006).

The aim of this course, titled 'Human-Space Relationship and Psychology', is to establish the relationship between architecture, interior design, and psychology through interesting and engaging activities that encourage active participation from students. The course avoids simply loading information through the teaching method. In addition, a student-centered education program has been developed encouraging continuous learning and analysis. It is anticipated that students who have taken or will take the course on the same subject will contribute to the development of their skills by gaining knowledge through perception and experience, thus filling an important gap (Uzunoğlu and Özer, 2014).

The relationship between humans and space, as well as psychology, is a crucial issue for all architectural disciplines. During the study process, undergraduate students tend to focus more on the technical aspects of design, but it is important to remember that design is ultimately created to meet human needs. Although it is acknowledged that design should prioritize people, there are still architectural designs that fail to integrate with the user. In other words, designs that do not meet the user's needs and expectations at the time of their creation may arise. To avoid this situation, it is important to have a good understanding of the relationship between humans and space, as well as psychology. The quantitative data in this study clearly shows that designer candidates' level of awareness increases with the perception and comprehension of the human-space relationship and psychology education model.

Therefore, it is necessary for faculties of architecture in universities to make courses on human-environment relations and psychology mandatory in undergraduate education. The study is based on the fact that every architectural discipline is shaped on the basis of design. Course contents are not limited to theoretical subjects; they are made more efficient for students by being supported with design and analysis examples. In the implemented education model, theoretical topics remain the same, but activities can be rearranged and improved according to time and geography. It may be necessary to change the content of the activities while keeping their structure the same for the program to be more effective and useful. Based on these considerations, students who take the same course with the same education model will produce designs that can be fully integrated with the user and sustainable in the social field.

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Authors' biographies and contributions

Beren Aygenç received her B.Int.Arch. in Interior Architecture and Environmental Design from TOBB ETU (2016). Earned her M.Int.Arch. degree in Interior Architecture from the NEU (2020) and she is currently a Ph.D. student. The major research interests include human-space relationships and environmental psychology.

Çimen Özburak received her B.Arch. degree in Architecture from NEU (2003). She completed her master's (2014) and Ph.D. degrees (2018) in Architecture at the NEU. Currently, she works as an Assist. Prof. (2019) at the NEU. The major study field is sustainable spaces and architecture for preschool pupils.

Conceptualization: B.A. and C.O.; methodology: B.A. and C.O.; validation: C.O.; formal analysis: B.A.; investigation: B.A.; data curation: B.A. and C.O.; writing – original draft preparation: B.A.; writing – review and editing: B.A.; visualization: B.A.; supervision: C.O.; project administration: B.A. and C.O. (There was no situation that needed to be financed in the study). Both authors have read and agreed to the published version of the manuscript.

Fig. 1 Zagreb, panorama of the Lower Town

Zrinka Babić Vujić[1], Sanja Gašparović[2]

[1] University of Zagreb Faculty of Architecture, Fra Andrije Kačića Miošića 26, 10000 Zagreb, Croatia
https://orcid.org/0009-0003-9760-0159

[2] University of Zagreb Faculty of Architecture, Fra Andrije Kačića Miošića 26, 10000 Zagreb, Croatia
https://orcid.org/0000-0001-5267-7126

zrinka.vujic@gmail.com
sgaspar@arhitekt.hr

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Spatial Planning Prerequisites for the Development of Affordable Housing in the Center of the City of Zagreb

AFFORDABLE HOUSING
DENSITY BONUS
INCLUSIONARY ZONING
PLANNING PROVISIONS

This paper analyzes the concept of affordable housing and urban planning instruments that incentivize its development, especially in city centers. Considering the shortage of affordable housing in Zagreb, the research aims to identify contemporary urban planning practices that focus on the social function of housing and the role that local urban and housing policies have in ensuring access to it. By comparing the strategic documents for the housing development of the cities of Lyon and Barcelona and models of their implementation in the local urban plans for the areas of city centers and contact brownfield areas, the provisions incentivizing the development of the affordable housing *(right of pre-emption, category of subsidized housing, inclusionary zoning, density bonus, and protection of residential use)* are singled out. In the context of urban renewal of the historic center of Zagreb and of brownfield redevelopment in the contact zone of the city center, inclusion of the aforementioned provisions in local urban plans is examined, demonstrating the potential that such instrument has for the development of affordable housing in the city center.

Introduction

The importance of housing as a fundamental right and basic human need, but also as a structural element of urban development, is recognized and included in the goals of sustainable development of cities defined by several UN and European documents.[1] In addition to environmental requirements, a sustainable and responsible approach to housing implies housing affordability and social inclusion (Rosenfield, 2015: 99). Considering the concept of the "right to the city" in the context of social sustainability, and specifically "the right to the use of the centre, a privileged place, instead of being dispersed and stuck into ghettos" (Lefebvre, 1996: 34), the article[2] examines the role of urban planning in the development of affordable housing in city centers, often most exposed to gentrification processes. Spatial injustices manifest through the processes of gentrification and ghettoization (Dlabac et al., 2019: 4), while housing and planning policies of social mixing and housing affordability guide urban development towards the goals of a just city (Fainstein, 2010; EC, 2020).

The paper investigates the connection between the strategic local housing policy framework and the planning provisions integrated into implementation plans at the local level, as well as their implementation models. Planning provisions of inclusionary zoning and density bonuses have been applied in the USA since the 1970s with the aim of expanding the affordable housing stock and equal spatial distribution of such units (Calavita, Mallach, 2010; Mellon Fox, Rosenfeld Davis, 1976; Johnston et al., 1990). In European cities, due to reduced public investment in social housing and growing housing unaffordability, there are also changes in relation to the traditional public provision of social housing.[3] New planning models that include social goals and incentivize the development of affordable housing stock are being developed (Marom, Carmon, 2015; Granath Hanson, 2019; Alves, 2022; Debrunner, Hartmann, 2020).

A comprehensive analysis of the planning and development of affordable housing has not been carried out either in Zagreb or at the national level. Affordable housing was analyzed within the framework of the programme of state-subsidized housing construction (Bobovec, Mlinar, 2013), and also from an economic (Vizek, 2009) and sociological aspect (Bežovan, Pandžić, 2020; Svirčić Gotovac, Zlatar, 2015). An insight into the consequences of the lack of housing policies in the area of Zagreb before and after the privatization of the housing stock in the 1990s indicates spatial stratification and an increase in housing unaffordability (Marčetić, 2020). Negative trends in the area such as depopulation, *touristification* (Jukić et al., 2021), "transitional gentrification" and "elitization of the city center" (Svirčić Gotovac, 2010) are evident in Zagreb city center, Lower Town.

Integral urban renewal of the protected historical core of the city of Zagreb Lower Town is a priority of the city's strategic and urban planning after years of neglect and decay, and especially after the earthquakes[4] in 2020 (Gašparović et al., 2021). In this context, while new spatial plans for Zagreb are also being adopted, the paper examines the implementation of planning measures that incentivize the development of affordable housing as a service of public interest.

The conducted research aims to determine contemporary practices of urban planning that focus on the social function of housing in accordance with assumed international obligations, and the role of local authorities ensuring access to appropriate and affordable housing through social, urban, and housing policies. The objective is to identify appropriate planning measures for the development of affordable housing in Zagreb, focusing especially on historical center exposed to numerous transformational processes and pressures.

The research consists of three parts: i. Synthesis of measures for spatial planning of affordable housing in European context; ii. De-

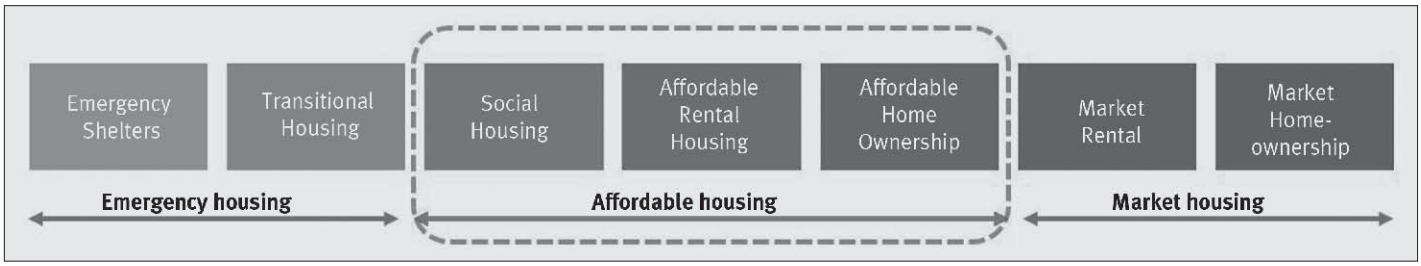


Fig. 2 Within the range of housing options, *housing continuum*, affordable housing is located between emergency housing and market housing

termination of strategic and planning provisions for the development of affordable housing in central areas of cities referent to Zagreb; iii. Spatial and quantitative verification (simulation) of implementing established planning provisions for the development of affordable housing in center of Zagreb and in brownfield area of Block Badel.

Using the examples of Lyon and Barcelona, planning provisions incentivizing development of affordable housing which are incorporated into municipal spatial plans in order to implement the city's housing policies goals, have been considered and compared. The selection of mentioned cities for comparison with Zagreb is based on: similarity of planning systems, similarity of trends and challenges taking place in the city center (housing prices and housing costs increase, pressure of tourism, negative demographic trends such as low growth or decrease in population), and most important, selected cities have, in recent decades, introduced strategic and planning measures to incentivize the development of affordable housing.

Research was conducted using quantitative and qualitative comparative analyses methods by synthesizing bibliographic, cartographic, and planning materials. Data on affordable housing were collected on the basis of spatial planning documents of two levels (strategic and implementation) and their implementation over a period of last two decades was considered.

The findings should serve to define the starting points of establishing planning measures for affordable housing in Zagreb. Although conducted and tested in the case study zone of Block Badel, the research can serve as a methodological approach for the planning of other similar urban areas of Zagreb or other cities.

Recommendations for the Development of Affordable Housing in Cities in Europe

Considering the diversity of the housing systems of European countries, the European Commission defines housing affordability as the ratio of household income to housing costs, and an indicator of affordability is when no more than 30% of household income goes for housing costs (Rosenfeld, 2017: 10). According to the Housing Partnership of the Urban Agenda for the EU, affordable housing is any subsidized or otherwise supported housing including social housing, affordable rental housing and affordable home ownership (Fig. 2).

For the spatial planning of the development of affordable housing in cities, the Action Plan of the Housing Partnership (Urban Agenda for EU, 2018) recommends planning obligations, i.e. the inclusion of private investments in the development of affordable housing as a condition for issuing permits, and the use of different models to capture land value uplift.[5] Minimizing land costs is one of the basic elements for the development of affordable housing (McKinsey Global Institute, 2014: 49). The costs of construction of affordable housing units are reduced by allocating municipal land, by provisions of inclusionary zoning that mandate that part of the project be affordable, or by incentive zoning and density bonuses in exchange for affordable housing units. The Action plan also

1 Such as: UN Agenda for Sustainable Development 2030 (2015); UN Geneva Charter on Sustainable. Housing (2015); New urban agenda from Quito (2016); Leipzig Charter on Sustainable European Cities (2007); Urban Agenda for the EU (2016); New Charter from Leipzig (2020), New European Bauhaus initiative (2023).

2 The research is based on the final thesis of the postgraduate specialist study Architecture and Urbanism; Spatial planning, Faculty of Architecture, Babic Vujic, Z. (2023) *Planning and development of affordable housing in the city center*; mentor: prof. Gašparović, S., Ph.D.

3 After the Second World War social housing had a major role in housing provision, for example Operation Million carried out by the French government between 1947-1958.

4 The earthquake in the wider Zagreb area 22. 3. 2020. M = 5.5 degrees on the Richter scale and another near the town of Petrinja 29. 12. 2020. M = 6.4 degrees.

5 Land value capture is a policy approach that enables communities to recover and reinvest land value increases that result from public investment and government actions (OECD, 2022).

TABLE I SYNTHESIS OF MEASURES FOR SPATIAL PLANNING OF AFFORDABLE HOUSING

Level of measure	Type of measure	Description of the measure
Measures of strategic land management:	establishment of community land trusts and land funds	securing land for the development of affordable housing
	use of vacant land and properties	establishment of a register of empty land, taxes, incentives for reconstruction
	leasing models for municipal land	lease of city land instead of sale
Planning measures:	Right of pre-emption	acquisition of land and property by local authorities to increase the public housing stock
	category of subsidized housing	earmarking of plot or zone for affordable housing
	inclusionary zoning	determining the share of affordable housing units in housing projects
	density bonus	enabling the construction of a larger area in exchange for the realization of affordable housing units
	protection of residential use	preventing speculation on the housing market due to the pressure of tourism in cities
Measures for urban renewal:	integrated approaches to the neighbourhood revitalization	participatory approach, reconstruction measures combined with measures that prevent the capitalization of subsidies

Source: The Housing Partnership Action Plan (Urban Agenda for EU, 2018) and Managing Gentrification (Council of Europe, 2020); Processing: Authors

refers to the establishment of land and housing funds, community land trusts, as well as to the model of long-term lease of municipal land instead of its sale.

The aforementioned instruments of spatial planning are aimed at housing policies that support the heterogeneous structure of the population and prevent socio-spatial segregation. Unequal availability of housing for different social groups creates divisions in urban societies and encourages gentrification processes, which is particularly pronounced in city centers. The planning system can have a direct impact on socio-urban stratification of cities (Arbaci, 2007: 404), and urban planning is one of the key elements for ensuring space for affordable housing in "vibrant and socially mixed neighbourhoods, avoiding speculative land policy" (EC, 2020).

The study Managing Gentrification (Council of Europe, 2020) summarizes the policies and measures that ensure affordable housing in city centers, affirming the right to housing and confronting gentrification processes. Table I summarizes these measures, followed by the comparative analysis of the application of selected planning measures in centers of European cities of Lyon and Barcelona.

COMPARATIVE ANALYSIS OF STRATEGIC AND PLANNING PROVISIONS FOR THE DEVELOPMENT OF AFFORDABLE HOUSING IN THE CITIES OF LYON AND BARCELONA

In order to establish useful correlations with Zagreb, cities that have recently placed affordable housing development front and center of their housing and urban policies were selected for research. Lyon represents an example of a top-down model where affordable housing development is a result of implementation of national guidelines and policies, while Barcelona represents a bottom-up approach. Bearing in mind the diversity of housing systems and the level of economic development, the goals of each city's housing policies set in strategic documents were reviewed, and their implementation in municipal spatial plans was investigated.

LYON

Lyon is the third largest city in France with 522,228 inhabitants and an area of 47.9 km^2. Local housing policies in France are closely related to the national housing system, which sets different standards for social housing.[6] The main turning point for the development of affordable housing was the adoption of the Law on Solidarity and Urban Renewal[7] in 2001, which introduced that cities and municipalities must provide a share of at least 20% of social housing in their areas.[8] Local urban development plans (*Plan Local d'Urbanisme*, PLU) introduce the so-called Sectors of social mix (*Secteurs de mixité social*), in which housing categories are developed in accordance with specific needs.

Based on national legislation, the housing policy of Lyon, originally defined by the Local Housing Program (*Programme Local de l'Habitat*, PLH), is integrated into the Local Urban Development and Housing Plan (*Plan Local d'Urbanisme et de l'habitat*, PLU-H) as the Orientation and Action Program for Housing (*Le Programs d'Orientations et d'Actions pour l'habitat*). Integration enabled the connection of housing policies with spatial organization, and precise tools for housing development in accordance with set goals have been incorporated into the urban plan.

The plan designates the entire central area of the city as a Sector of social mix and in all housing projects, depending on residential floor area, a mandatory share and type of subsidized housing is determined (Fig. 3).

In one of the oldest parts of the center of Lyon, the 2nd arrondissement, in addition to the earmarking of plots for the implementation of the affordable housing programs, the minimum shares of residential area allocated to subsidized housing in all the housing projects were also determined, reserved for different models of affordable housing, as shown in Table II.

The Lyon Confluence, brownfield redevelopment project in the 2nd arrondissement is be-

ing developed as a Concerted Development Zone (*ZAC – Zone d'aménagement concerté*) in two phases:

– ZAC1 *Lyon- Confluence* covers 41 ha, between 2003 and 2018, about 1,900 apartments were built, of which 20% are social (PLUS and PLAI) and 15% for middle-income households (PLS).

– ZAC2 *Lyon- Confluence* includes 35 ha planned for construction from 2010 to 2025. The mandatory share of social housing has been increased, and since 2022, 35% of social housing (PLUS and PLAI), 5% of housing for middle-income households (PLS) and 20% of affordable home ownership (BRS) is planned (Grand Lyon, 2022.b). It should be emphasized that even in the prestigious newly built buildings in the Lyon Confuence area[9] a share of apartments is allocated to social housing service providers showing the orientation of the city authorities towards balanced social and spatial distribution of affordable housing (Zwicky, 2021: 236).

Barcelona

Barcelona is the second largest city in Spain, an area of 102.15 km², with about 1.6 million inhabitants. It is the city with the highest rental prices and housing costs in Spain, faced with immigration, aging population, rising housing prices and great pressure from tourism (Ajuntament de Barcelona, 2016: 17).

By analyzing housing in the city prior to the creation of the Plan for the Right to Housing in Barcelona 2016-2025 (*Pla pel Dret a l'Habitatge de Barcelona 2016-2025)* it was found that the main gentrification processes take place in the city center due to three factors: growing profit from renting apartments, pressure from tourism and the city's rent legislation that does not provide protection. In order to fight against the gentrification and speculative development the city used participatory approach to formulate housing policies directed towards developing public housing stock, mobilizing vacant housing, incentivizing renovation projects, co-housing and a range of leasing types (Ajuntament de Barcelona, 2016: 33-34).

The implementation of strategic measures from the Plan for the Right to Housing was made possible by amendments to the General Metropolitan Plan (PGM) made in 2018. In addition to the provision declaring the entire city a pre-emption right area for the benefit of the city authorities and earmarking of municipal plots for public housing development and cooperative housing models, the Amendment to the General Metropolitan Plan (Barcelona, 2018) stipulated a mandatory share of affordable housing of 30% of dwellings in new multi-apartment projects, renovations and additions above 600 m² of the intervention (Falagan, Colau, 2019: 138-140). The goal of the decision is to increase the public dwellings stock, especially in the central parts of the city, while encouraging the private sector to participate and share responsibility in ensuring the right to housing.

Table II Mandatory share of affordable housing in housing projects in the 2nd arrondissement

Program	Obligation threshold m²	Min. share of floor area allocated to subsidized housing	Subsidized housing category
New construction or change of use	800-1,500	30%	PLUS-PLAI
New construction or change of use	1,500-5,000	35%	PLUS-PLAI-PLS min. 30% PLAI max. 20% PLS
New construction or change of use	above 5,000	45%	35% PLUS-PLAI 10% PLS-PLI-BRS
New construction or conversion for student accommodation	above 800	35%	PLUS-PLAI-PLS

Source: Grand Lyon (2022); REGULATION C.3.1 – Prescriptions d'urbanisme

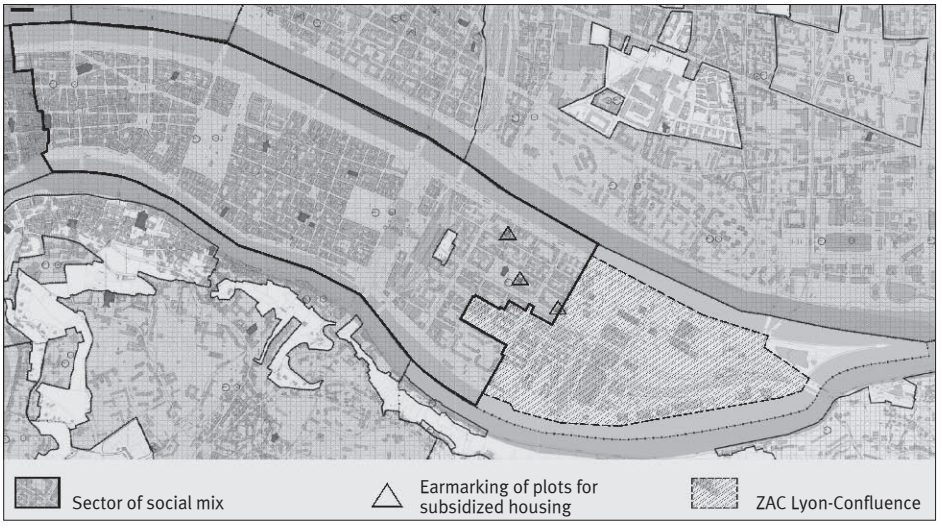


Fig. 3 Lyon, extract from the Local Urban Development and Housing Plan (PLU-H) for the 2nd arrondissement. Cartographic representation: Housing with a marked sector of social mix and plots for subsidized housing.

6 – PLAI (*prêt locatif aidé d'intégration)*, standard for the most vulnerable groups;

– PLUS (*prêt locatif à usage social*), the most widespread standard type for middle-income households;

– PLS (*prêt locatif social*), standard for middle-income households up to 30% above PLUS;

– PLI (*prêt locatif intermédiaire*), for households with incomes higher than PLS, but too low for private rentals;

– BRS (*Bail Real Solidaire*), a model of affordable homeownership

7 *Loi Solidarité et Renouvellement Urbain*, SRU

8 In 2013, the share of social housing was increased to 25%, to be achieved by 2025.

9 An example is the residential tower Ycone by architect Jean Nouvel, realized in 2019, in which 30% of the apartments are for affordable housing. Available at: http://www.jeannouvel.com/projets/ycone/

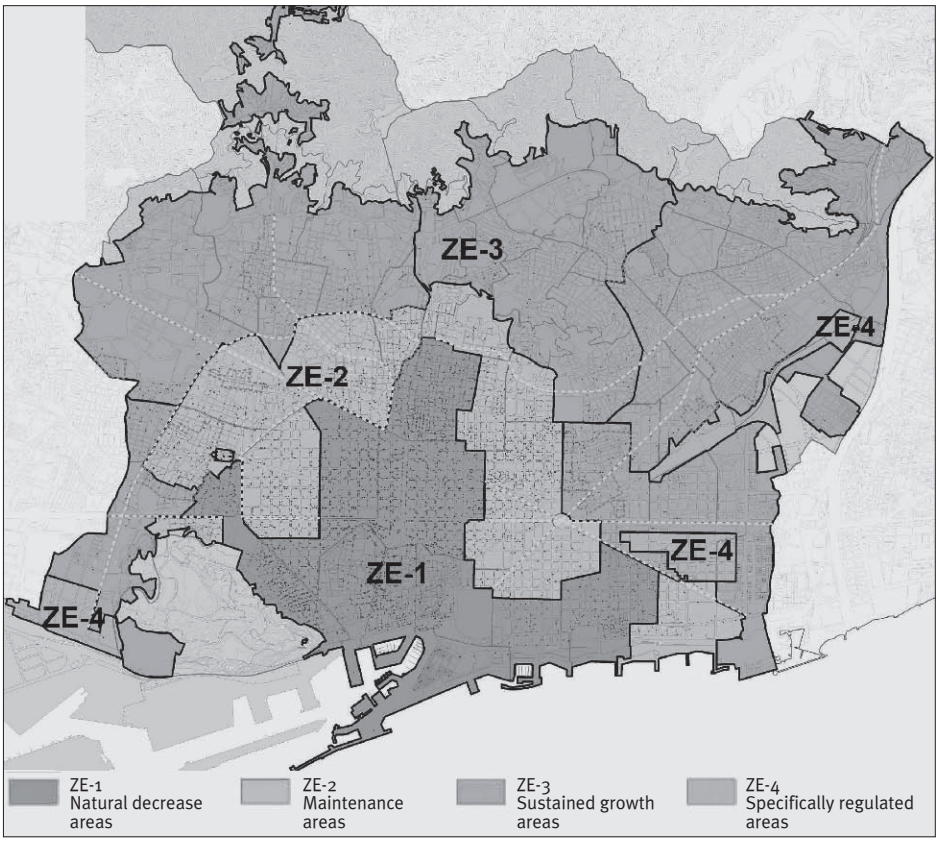


Fig. 4 Barcelona, zones of PEUAT

With the aim of regulating sustainable tourism in the city while preserving the right to housing, the Special Urban Development Plan for Tourist Accommodation was adopted (*Plan Especial Urbanístic d'Allotjaments Turístics*, PEUAT). The plan prevents the change of residential purpose and limits the tourist use of apartments marking the central zones of the city ZE-1 as areas of natural decrease in tourist capacities (Fig. 4).

As an example of the application of the density bonus, the modifications of the general plan for the Poblenou area, a former industrial zone in the contact area of the city center, are singled out. In 2000, *Plan 22@ BCN Activity,* was adopted for the area, transforming 198.26 ha of the industrial zone into a district of mixed-use economic activities. By plan modifications, the floor-space index for the zone is raised by 50%. Such an increase brings advantages for private investors, but also benefits for the public interest, as 10% of the floor area is planned for affordable housing.

After 20 years of the implementation of the plan, in order to harmonize the planning regulations with the current socio-economic situation, in 2022 the 'Specific modification of the Metropolitan General Plan for a more sustainable and inclusive 22@ (MPGM 22@2022) were adopted, enabling the construction of additional dwellings, of which 82 % were to be in the affordable social housing system (Menéndez, 2022; Fig. 5).

To summarize, a comparative analysis of Barcelona and Lyon's strategic housing development documents demonstrates their common goal of increasing the affordable housing stock. While the housing policies of Lyon are guided by the principles of social mix, in Barcelona the housing policies emphasize the right to housing and the fight against gentrification and property speculation.

These strategic guidelines (Table III) are implemented in the urban plans that regulate housing in the areas of city centers and contact brownfield areas. It can be determined that both cities use the following planning provisions (Table IV):

– the right of pre-emption for the development of affordable housing,

– category of subsidized housing,

– inclusionary zoning.

Planning provisions additionally implemented in Barcelona are:

– protection of residential use (implemented by a sectoral plan for tourist accommodation),

– density bonus (related to redevelopment of the former industrial district).

The Possibility of Implementing Established Planning Provisions for the Development of Affordable Housing in the Central Parts of the City of Zagreb

Comprehensive strategic goals of the housing policy have not been defined in Zagreb, nor at the national level. The development of the public housing program in Zagreb has only been set in principle in the city's strategic document Development Plan of the City of Zagreb.[10] Public housing programs are one of the topics of the city projects of the General Urban Plan of the City of Zagreb (Article 101) with tentatively determined locations for their development. Those programs have the potential to contribute to increasing the affordability of housing in Zagreb, however, due to the small scope of implementation and the planned peripheral locations, they do not have a significant impact on housing in the city center (Fig. 6).

10 Within the framework of goal 11. *Improvement of the management system of city property and the entire area of the City,* by measure *Effective management of city property, with further development of the public housing program* (*** 2023a).

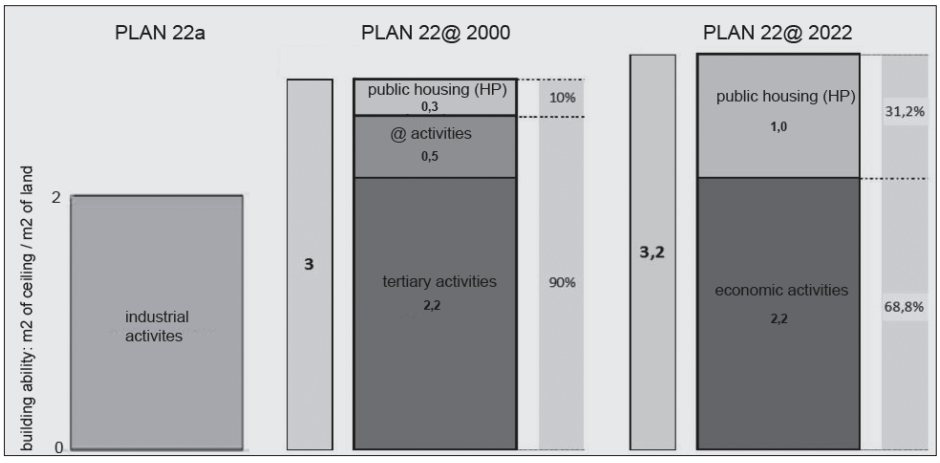


Fig. 5 Barcelona, increase in the floor-space index by modifications of the plans MPGM22@2000 and MPGM22@2022, which ultimately results in the share of 31.2% of affordable public housing in mixed-use projects

Table III Overview of the strategic guidelines for housing development in Lyon and Barcelona

	LYON	BARCELONA
Strategic document	Orientation and Action Program for Housing *Le Programs d'Orientations et d'Actions pour l'habitat*	Plan for the Right to Housing in Barcelona 2016-2025 *Pla pel Dret a l'Habitatge de Barcelona 2016-2025*
Strategic Guidelines	A. Promotion of the construction of housing in significant quantities, with the guarantee of joint distribution of construction	A. Preventing and addressing the housing emergency and residential exclusion
	B. Developing the offer of affordable dwellings according to the principle of social mix	B. Ensuring the proper use of housing
	C. Improving the quality of the housing stock and the living environment	C. Expanding the affordable housing stock
	D. Guarantee access to housing in all life stages	D. Maintaining, renovating, and improving of the current housing stock
	E. Organizing local governance of housing policy	

Table IV Overview of planning provisions of Lyon and Barcelona implemented based on strategic guidelines

		LYON	BARCELONA
name of the plan		PLU-H; *Plan Local d'Urbanisme et de l'habitat*	MPGM; *Modificació del Plan General Metropolità*
scale of the plan		1:5000	1:5000
Plan provisions			
1.	right of pre-emption	the entire area of the city	the entire area of the city
2.	category of subsidized housing	reserved land for residential programs *(emplacements réservés – ER)*	earmarked plots intended for affordable housing *(HD/7)*
3.	inclusionary zoning	established zones of social mix with shares of affordable housing units, – in the city center 30-45% of the residential area for residential projects above 800 m². – in the brownfield zone ZAC Confluence shares 35-60 %	share of 30% for residential projects above 600 m² (in some central districts for all residential projects above 400 m²)
4.	density bonus	-	in the brownfield zone Poblenou floor-space index has been increased by 60% compared to the original plan, and 31.2% of the area is intended for affordable housing.
5.	protection of residential use	-	Special Urban Development Plan for Tourist Accommodation *Pla Especial Urbanístic d'Allotjaments Turístics*

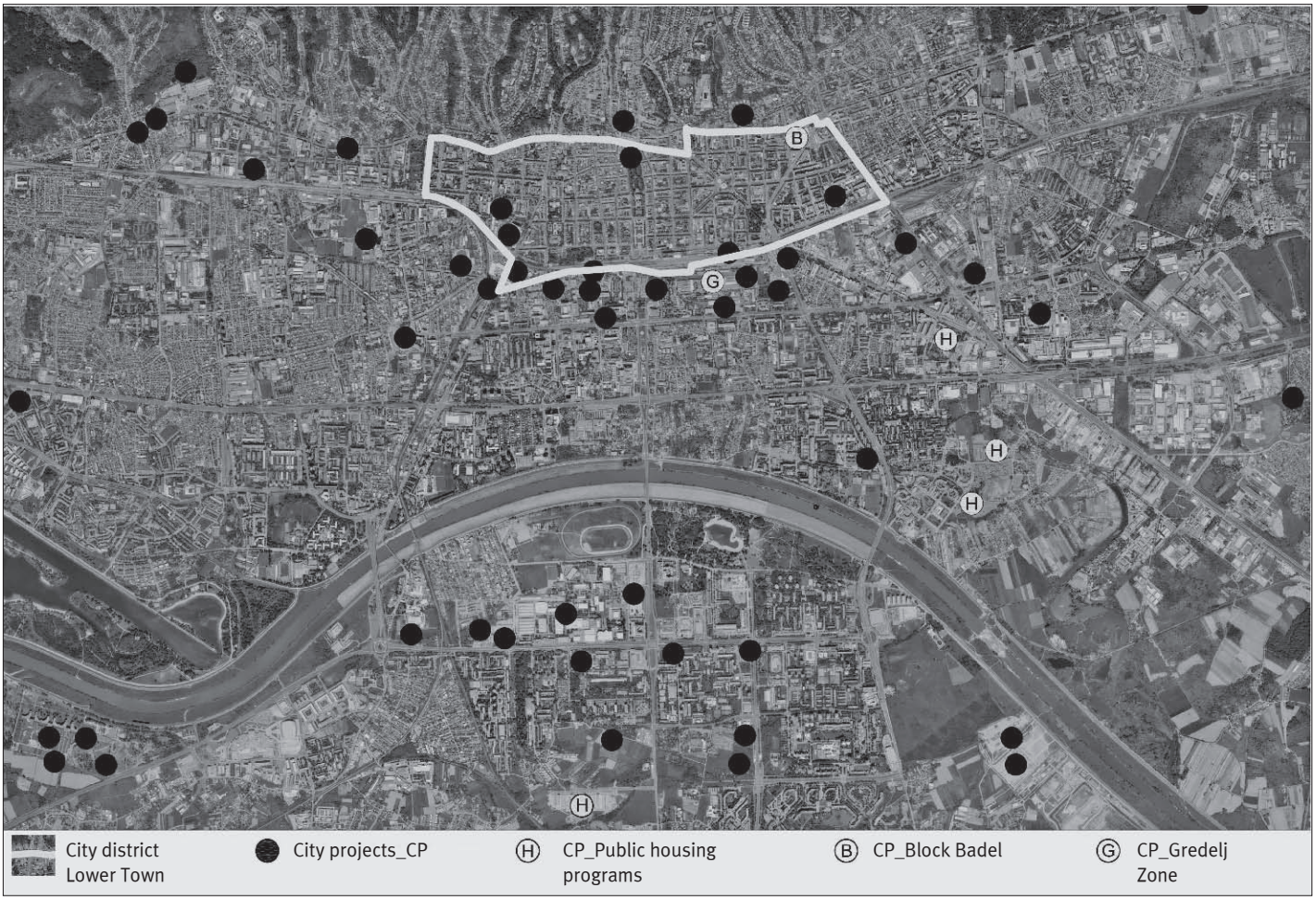


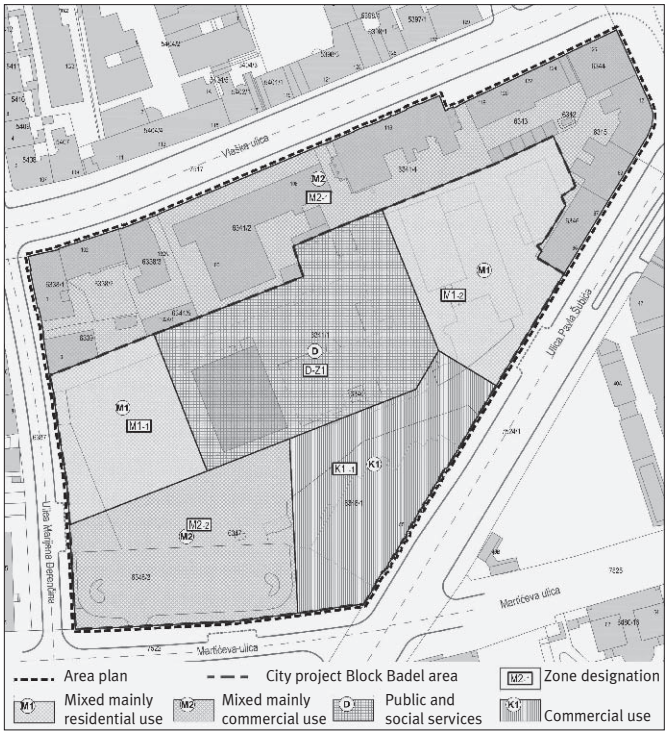
FIG. 6 PRESENTATION OF THE SPATIAL DISTRIBUTION OF CITY PROJECTS AND PUBLIC HOUSING PROGRAMS IN THE CITY OF ZAGREB

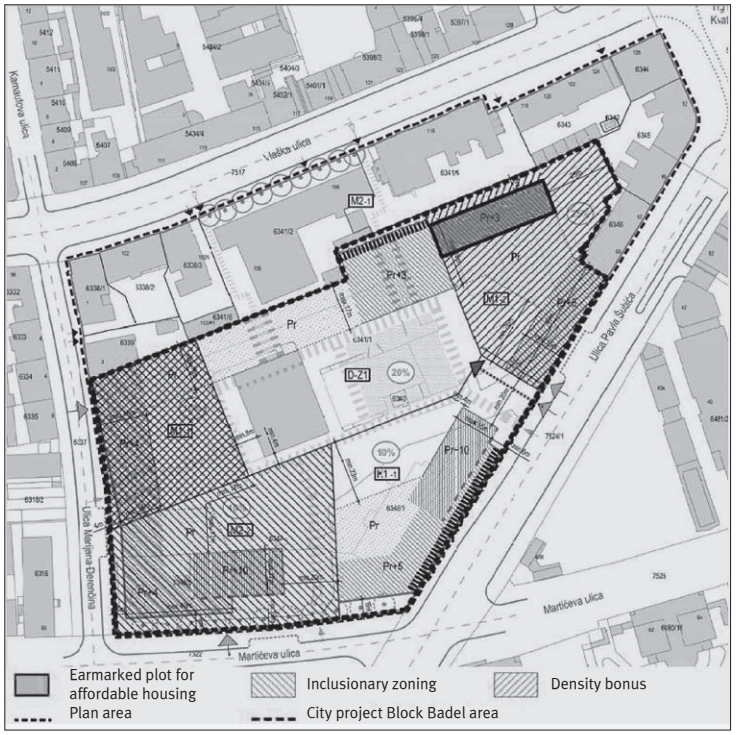
The census data show that the processes of depopulation, displacement of existing residents and weakening of the residential function are taking place in the city center, which has been particularly pronounced after the 2020 earthquakes. The decrease in the number of usable residential units and the increased demand for dwellings are the causes, among other things, of the increase in housing prices and the unaffordability of new residential units in the city center. Current affordable housing programs are small in scope, and located on the outskirts of the city. Including the development of affordable housing into programs of urban renewal of the city center and regeneration of brownfield areas in the contact area could strengthen the residential function of the city center and mitigate negative socio-demographic trends.

Since the General Urban Plan of the City of Zagreb does not contain planning provisions that encourage affordable housing development, the potential of the implementation of five planning provisions, determined by comparing Lyon and Barcelona, was discussed in the context of the central city areas: the historical center Lower Town and the brownfield area in the contact zone of the city center: Block Badel[11] currently in the process of preparation for urban renewal. The proposed provisions tested on the model of Block Badel could also be applied to other similar city-owned brownfield locations such as Gredelj.

a) Possibilities of implementing the provisions of right of pre-emption, category of subsidized housing, inclusionary zoning, density bonus, and protection of residential use in the area of Lower Town

The right of pre-emption for the city for the development of affordable housing is not in use, although it is legally possible.[12] Established in the Lower Town area, the instrument would prevent property speculation and ensure active participation of the city authorities in urban renewal processes, while increasing the fund of affordable housing units. For properties in public ownership, the planning category of subsidized housing enables the development of affordable housing additionally adapted to the requirements of certain groups





(apartments for large households, for the elderly or for young people), as well as alternative models of housing (co- housing).

Given the marked inaccessibility of new residential construction in the city center, the significance of the introduction of the planning provisions of inclusionary zoning, is not so much about increasing the stock of affordable housing units, as it is about the preservation of social heterogeneity of the city center and inclusion of private investments in the development of affordable housing.

Applying the density bonus in the Lower Town is limited for individual interventions in view of the propositions of the system of protection of the historic urban complex. This provision has potential in the context of the complete renovation of city blocks, which is proposed for examination in detailed development plans for the Lower Town blocks, as well as to consider models of using such a provision as a driver of urban renewal and renovation of buildings.

Planning protection of residential use indirectly affects the affordability of housing. Regulation of business or tourist use of residential units in the center of the city is necessary for preserving the quality of housing, heterogeneous and vital city areas, and reducing displacement of existing residents.

b) simulation – quantitative analysis of the application of provisions on the example of Block Badel

The significance of the application of the mentioned planning provisions was examined and simulated in more detail on the example of the Urban Development Plan for Block Badel, the former complex of the Badel alcoholic beverages factory, an unfinished city block formed at the end of the 19th century. The plan covers an area of about 3 ha, while the area of the narrower scope, the Block Badel city project, is about 2 ha, mostly owned by the city. An area of high urban standard is planned, intended for business facilities and a significant part for residential use (Fig. 7).

The approximate gross floor area (GFA above ground) for the realization of the residential use provided for in the plan is 13,539 m², which represents 135 calculated housing units.

Individual and simultaneous introduction of the following planning provisions was analyzed:

– category of subsidized housing,

– mandatory share of affordable housing of 25% of the residential area,

Fig. 7 Zagreb, Block Badel, Cartographic representation: Land-use plan. New residential use is allowed in zones M1-1, M1-2 and M2-2.

Fig. 8 Zagreb, Block Badel, Presentation of the earmarked plot for evaluating planning measure of category of subsidized housing, and zones for inclusionary zoning and density bonus

11 In 2012, an international urban architectural competition was held for Block Badel renewal and based on the winning proposal the urban development plan was adopted in 2023, providing for the construction of a new public, residential, commercial and business purpose.

12 Based on Art. 177 of the Spatial Planning Act, Official Gazette 153/13 (Official Gazette 67/23)

TABLE V SIMULATION OF THE INDIVIDUAL APPLICATION OF PLANNING MEASURES FOR THE DEVELOPMENT OF AFFORDABLE HOUSING ON THE EXAMPLE OF BLOCK BADEL

planning measure	**zone of application of the measure**	**GFA for affordable housing** (m^2)	**calculated number of affordable apartments**
category of subsidized housing	M1-2	1 920	19
Building footprint area 600 m^2; storeys: GF+3			
inclusionary zoning	M1-1; M1-2; M2-2;	3 385	33
25% of the residential area within the project intended for affordable housing			
density bonus	M1-1; M1-2	2 562	25
25% increase in the floor-space index from 2.0 to 2.5 for the realization of affordable housing			

TABLE VI SIMULATION OF THE CUMULATIVE APPLICATION OF PLANNING MEASURES FOR THE DEVELOPMENT OF AFFORDABLE HOUSING ON THE EXAMPLE OF BLOCK BADEL

planning measure	**zone of application of the measure**	**GFA for affordable housing** (m^2)	**calculated number of affordable apartments**
category of subsidized housing	M1-2	1 920	19
inclusionary zoning	M1-1; M2-2	2 339	23
density bonus	M1-1; M1-2	2 562	25
affordable housing in total:		**6 821**	**67**
share of affordable housing in planned residential GFA:		**50.4%**	**49.6%**

– density bonus for the purpose of realization of housing units of affordable housing (Fig. 8).

Tables V and VI show the quantitative effect of the application of each individual and all three measures for the development of affordable housing, the cumulative application of which would realize 67 housing units of affordable housing, that is, about 50% of total planned dwellings.

City ownership of land facilitates the realization of affordable housing units, and the proposed shares of affordable housing units bring the project closer to the goals set by, for example, the city of Lyon in the implementation of brownfield redevelopment (*ZAC*). Exact parameters for each measure should be determined according to parameters of project sustainability. It is also to be expected that in the area of the Gredelj zone, a brownfield location in the contact zone of the city center and predominantly in public ownership, the application of planning provisions for the development of affordable housing will have an even greater impact considering its central location and the size of the zone of about 20 ha.

CONCLUSION

A comparative analysis of the cities of Lyon and Barcelona determined the implementation models of the local housing policy and demonstrated the importance of connecting strategic and spatial planning, necessary for the implementation of strategic housing policy goals. In Zagreb, as well as at the national level, these goals have not yet been defined and the connection between the existing strategic and planning documents is insufficient. For the purpose of the development of affordable housing in Zagreb in general and city center in particular it is essential to define clear housing policy goals and the means by which to achieve them in the city's housing strategy. Programs for the development of affordable housing in the city center should encompass demographic challenges, aging population and emigration, depopulation, substandard housing and demanding building renovations, gentrification, the problem of vacant or abandoned properties, tourism, and the increase in housing unaffordability.

Comparative analysis revealed five main planning provisions that encourage the development of affordable housing: right of pre-emption, category of subsidized housing, inclusionary zoning, density bonus and protection of residential use, and models of their application are presented on the examples of the cities of Barcelona and Lyon. The possibility of implementing these planning provisions into the urban plans of the city of Zagreb was examined for the area of the historic center Lower Town and the area of the Block

Badel city project for which possible impact has been quantified.

According to ownership, we can distinguish: i. provisions that rely on public ownership: the right of pre-emption and the planning category of subsidized housing; ii. provisions involving private investment in affordable housing development: inclusionary zoning and density bonuses.

Provisions involving private property are more challenging to implement since they have to negotiate both private and public interests. On the other hand, the inclusion of private investments in the development of affordable housing is important for socially oriented urban development and local authorities play a key role in the implementation of urban policies in the public interest.

The city's landownership in Block Badel allows for the construction of new housing units at a price below the market rate. That's why importance of defining the planning provisions that encourage the development of affordable housing was highlighted. Such provisions determine housing typologies, tenures, and models of affordable housing for different social groups, as opposed to the decision of their potential construction being left to the politicians or future investors. The same should be taken into account when programming residential use in other brownfield locations, especially city-owned, such as the Gredelj zone. The introduction of the aforementioned provisions into the city's urban plans adopted with the participation of the public, in accordance with expertly based and plan-defined goals, would ensure transparency, planning certainty and safety, as well as the inclusion of all parameters in the cost analyses that precede the project.

The impact and cumulative application of the provisions for the development of affordable housing in the central area of Zagreb should be further examined in all aspects (regulatory, environmental, urban, economic, infrastructural, etc.) while pilot projects could be used as testing ground for their application.

The development of affordable housing in cities is necessary because the housing market cannot provide adequate and accessible housing for the majority of residents. Both national and local governing bodies should designate housing, social and urban policies that ensure access to affordable housing in their areas and urban plans including planning provisions for the development of affordable housing are one of the tools for implementing these policies.

[Translated by Tea Raše]

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Illustration sources

Fig. 1 Authors

Fig. 2 Urban Agenda for EU, 2018

Fig. 3 Grand Lyon (2022), Processing: Authors

Fig. 4 Source: Barcelona (2021)

Fig. 5 Barcelona (2022)

Fig. 6 GUP of the City of Zagreb. Processing: Authors

Fig. 7 *** 2023b

Fig. 8 *** 2023b. Processing: Authors

Authors' biographies and contributions

Zrinka Babić Vujić is head of the Department for Strategic Decisions, Plans and City Projects in the City of Zagreb. Completed postgraduate specialist study Architecture and Urbanism, Spatial planning in 2023 at the Faculty of Architecture, University of Zagreb.

Sanja Gašparović, Ph.D., is a full professor and Head of the Department of Urban Planning, Spatial Planning and Landscape Architecture, University of Zagreb Faculty of Architecture. She teaches courses in urbanism and landscape planning.

Conceptualization: Z.B.V. and S.G.; methodology: Z.B.V. and S.G.; software: Z.B.V. and S.G.; validation: Z.B.V. and S.G.; formal analysis: Z.B.V.; investigation: Z.B.V.; resources: Z.B.V.; data curation: Z.B.V.; writing – original draft preparation: Z.B.V.; writing – review and editing: Z.B.V. and S.G.; visualization: Z.B.V.; supervision: S.G.; project administration: Z.B.V. and S.G.; funding acquisition: S.G. Both authors have read and agreed to the published version of the manuscript.

Fig. 1 “Fotokemika” Zagreb (above) and Samobor (below), photos from 1978 (left) and 2024 (right)

Klara Kranjčec[1], Tamara Zaninović[2], Bojana Bojanić Obad Šćitaroci[3]

[1] Srešov klanac 22, 10000 Zagreb, Croatia
https://orcid.org/0009-0003-2300-2893

[2] University of Zagreb Faculty of Architecture, Fra Andrije Kačića Miošića 26, 10000 Zagreb, Croatia
https://orcid.org/0000-0001-5461-791X

[3] Srebrnjak 9, 10000 Zagreb, Croatia
https://orcid.org/0000-0002-1957-6830

klara.kranjcec@gmail.com
tmaric@arhitekt.hr
bojanic.scitaroci@gmail.com

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Urban Comparison of Former "Fotokemika" Factory Complexes in Zagreb and Samobor

"Fotokemika" Samobor
"Fotokemika" Zagreb
industrial heritage
photographic material
urban peripheries
urban transformation

The urban fabric of cities is in constant flux. This paper is focused on two areas of former "Fotokemika" industrial complexes for production of photographic materials, located in Zagreb and Samobor. The complexes are analyzed based on previous studies, archive material and field research. The results compare their urban transformations in contemporary urban context with new uses. The aim is to detect urban, micro-urban and architectural characteristics in order to understand how they change through time within each city by comparing the initial contexts in the first half of the 20th century and contemporary situations followed in the period between 2020 and 2024.

Introduction

A photographic paper factory began production in Zagreb in 1947 as the first and only factory of its kind in southeast Europe. In 1951, a film factory opened in Samobor, a small town near Zagreb. Only a year later they merged into a single factory known as "Fotokemika". Built as part of Yugoslavia's Five-Year Plan (1947-1951)[1] "Fotokemika" played an important role in the history of Croatian industry and the development of photography as a widely available form of art.

Photographic material factory, Fotokemika was created by the merger of the Zagreb branch of the German company "Ozacel", founded in 1936 for the production of diazo paper (ozalid) for photocopying (diazotype), and the Zagreb company "Foto", founded in 1945 for the production of photographic paper and films. The factory manufactured photographic paper and chemicals for its processing, as well as other (mainly wooden) accessories and devices intended for the photographic process (tripods, retouching desks, picture presses, frames, boxes for negatives, etc.). Later they produced many then popular products such as X-ray film *Sanix*, dental X-ray film *Dentix*, photographic papers *Fokembrom*, *Fokemkontakt* and *Fokembromax*, highly sensitive amateur films *Efka 20* and *Efka 25* and black and white negative films *Efke KB* and *Efke R* (*** 2021).

Both Fotokemika complexes were built at the time of intensified construction activity, immediately after the Second World War. Reconstruction was imperative, and the new industrialization program of the country was taking on a major role in society. Post-war architecture emphasizes functionality, the focus is on the urban solution, and architecture is predetermined by the requirements of fast and economical construction. In the specific circumstances of the post-war period, the construction of basic industrial facilities was, at the time, one of the primary tasks in the state. The problems faced by industrial architecture at the very beginning were usually unfavorable locations and phased construction, which had a particularly unfavorable effect on the architectural design of the buildings. Only a few factories were built on free land and according to the unique project of one designer. Among the more successful achievements, we should single out "Jedinstvo", factory of processing equipment for the food and chemical industry (Milan Tomičić), electrical machinery factory "Rade Končar" (Stjepan Gomboš, Mladen Kauzlarić, Otto Werner i Vladimir Juranovic (Gomboš, 1950: 40), machine tool factory "Prvomajska" (Milan Tomičić), ceramics factory "Jugokeramika" (Ivo Vitić) and "Fotokemika" (Bruno Milić) in Zagreb (Domljan, 1969: 13).

The 1960s are considered the golden age of Fotokemika when the company's enviable reputation in the country and the world was created. A famous Croatian graphic designer and painter, Dušan Bekar, at the invitation of Josip Sudar, a well-known Croatian economist and at the time head of the propaganda department at "Fotokemika", developed a distinctive visual identity for the company.[2] In the 1980s, during a strong development of the photographic industry, Fotokemika established cooperation with the world's leading manufacturers, and exported its products worldwide (Matičevic, 1993: 6-8).

With the popularization of digital photography, from the end of the last century, the technology and techniques for analog photography were slowly disappearing, and with them the once important photography industry. The rapid process of digitization that we are witnessing represents the same shift in civilization as the industrial revolution did in its time (Ilić, 2016: 18).

Since the end of the 20th century, the development of the photochemical industry in Croatia stagnated. Parts of the factory complexes in Zagreb and Samobor were closed, the quality and quantity of products decreased, leading to a reduction in the market. From 1992 "Fotokemika'' continued to operate as a joint-stock company (*** 2021). In the early 2000s, the main headquarters of

the factory in Zagreb was sold. The production of films was continued under a new company name by a few workers in the factory complex in Samobor. The new company "Fotokemika-Nova d.o.o." went bankrupt in 2012 thus ending the 65-year long history of production of photographic materials and equipment in Croatia (*** 2021).

After the closing of both Fotokemika factory complexes, the premises in Zagreb and Samobor are occupied by various companies. From March 2023, The Faculty of Architecture University of Zagreb, temporarily moved into two buildings that are a part of the former Fotokemika complex in Zagreb, while the original faculty building in Kačićeva street is under reconstruction.

Methodology

The aim of this research is to observe and learn from the comparison of Fotokemika industrial complexes in Zagreb and Samobor within the context of their urban transformation processes. The study uses a combination of methods linking literature review with tabular and graphical comparison. Data tables, interpretative maps and photo collages are based on multiple field work in Zagreb and Samobor during the period of three years, from 2021 to 2024, and archive research of available Fotokemika documentation (Fig. 2).

In order to successfully define comparative levels of analysis this paper consults the methodology for the evaluation of industrial heritage proposed by Sonja Ifko (1999), outlined in *'Industrial Architectural Heritage – Scheme for a Methodology of Evaluation'*. The terminology used for comparative research in this paper correlates to Ifko's definitions (1999) and analytical approach and represents observed scales: urban, micro-urban and architectural.

The urban scale implies an analysis of the parameters regarding the positioning of an industrial complex in the city, analysis of its relationship to the surrounding environment and analysis of influences on the development of the environment which it has co-created. Micro-urban scale refers to the analysis of main characteristics of industrial complexes as complete wholes – in regard to their plot area. The values analyzed in those scales are defined through functional/morphological characteristics, planning/compositional design and semantics of complexes. Architectural scale refers to the characteristics of individual facilities in the complex. The main characteristics of industrial architecture are designated by function (functional analysis), construction (structural analysis) and aesthetic expression (stylistic analysis; Ifko, 1999: 123-151).

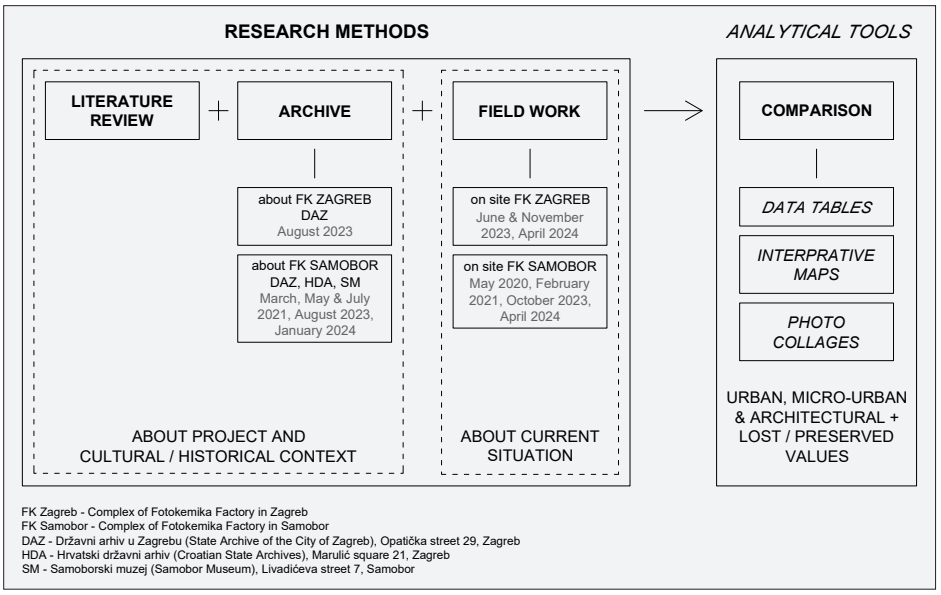

Fig. 2 Research framework

Therefore, the objective of the comparative analysis is focused on detecting urban, micro-urban and architectural characteristics of Fotokemika's complexes. The first research question is focused on the city-periphery analysis (in urban scale) by asking what were the initial positions of complexes in relation to the city center and its periphery and how that situation changed in the contemporary urban context. The second research question is focused on detecting changes in relation to built and unbuilt areas of factory plot (in micro-urban and architectural scale) by looking at what are lost, preserved and gained values in the urban transformation process of Fotokemika complexes in Zagreb and Samobor.

Literature Review

Fotokemika Zagreb and Samobor are sporadically mentioned in several books about industrial architecture in former Yugoslavia.

1 The five-year plan in Yugoslavia was modeled after similar plans in the Soviet Union. In April 1947, the National Assembly adopted the Law on the First Five-Year Plan for the Development of the National Economy of the Socialist Federal Republic of Yugoslavia. The aim of the plan was to speed up the post-war reconstruction and industrialization of the country (Arćabić, 2018: 10-20).

2 This creative duo designed the legendary series of ads for "Fotokemika" from the end of the 50s – posters like *Look forward to life – shoot!*, *Catch the Catch* and many others. Dušan Beker is responsible for an enviable amount of visuals – brochures, catalogs, prospectuses, leaflets, manuals, posters and calendars, but also the most important recognizable company logo and an unforgettable protective figure – a black and white silhouette of a man with a camera. He also created the logo and packaging of eFKe films. His packaging for Fotokemicolor paper was awarded the Yugoslav Oscar for packaging in 1973 (Hrabar Oremović, 2019).

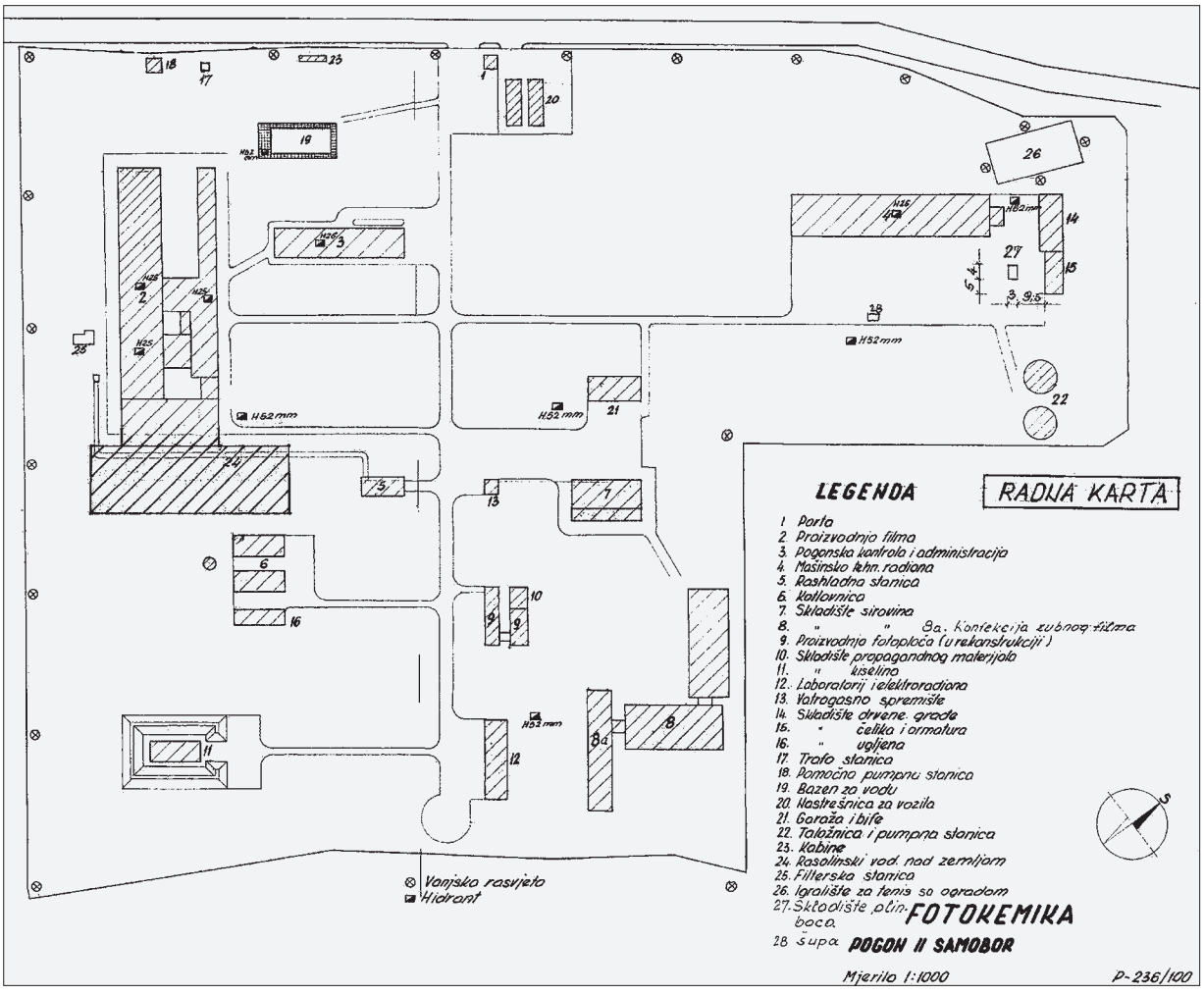

FIG. 3 FOTOKEMIKA IN SAMOBOR / DEFENSE PLAN / PLAN FOR FUNCTIONING IN WAR, 1989

Furthermore, Fotokemika Samobor is mentioned in monographs of the city of Samobor published through the second half of the 20th century in the context of the development of the city's economy (Šijan, 1971; Brunović 1972). Fotokemika is mentioned in several publications as a work of architect Bruno Milić[3], a former professor at the Faculty of Architecture at the University of Zagreb. Bruno Milić himself, in magazine *Arhitektura* (1951: 66-67) brought a concise description of Fotokemika Zagreb, its layout and the challenges encountered during the design process.[4]

From 1954 until the end of 1960s Fotokemika published (monthly) a factory magazine called *Fotokemika, magazine of the working collective of the company Fotokemika factory of films and photo paper*. Besides the attempt to republish the magazine in the mid-70s, *Fotokemika* was not published after the mentioned period. With the reorganization of the factory from the early 1990s to the year 1998, Fotokemika published the *Efke magazine of the joint stock company Fotokemika*, the successor of magazine *Fotokemika*. The issued magazines are important because they are the only written material in which information about all aspects of the factory, from business, propaganda, science to the social component, can be found.

Regarding Fotokemika's history, the complete concise overview was given in a catalog of the exhibition *Croatian photography from 1950 to today; Development of Fotokemika from 1947 to today* held in 1993 at the Gallery of City Zagreb forerunner of the Museum of Contemporary Art. The official chronology of establishment and development of the Fotokemika factory was published here for the first time.

Today, the majority of important documents, site plans (Fig. 3) and plans of individual buildings of Fotokemika factory complexes in Zagreb and Samobor are kept in the State Archive of the city of Zagreb.[5] Photographs and urban plans of Fotokemika factory complexes

are kept in the Croatian State Archives.[6] Samobor Museum preserves certain collected material about Fotokemika, mainly propaganda materials and important articles from newspapers that carried news about the construction and development of the Fotokemika factory complex in Samobor.

Fotokemika Samobor was the theme of and exhibition titled *Silvestar Kolbas: Fotokemika* (Fig. 4) held in the Technical museum Nikola Tesla in Zagreb (from December 19, 2020 to February 7, 2021) and gallery Prica in Samobor (from January 29 to February 28, 2021). The exhibition is a homage to Fotokemika Samobor[7] – an artistic and research project, which includes archival and field, in situ research of the factory in the manner of industrial archaeology. On Fotokemika's original films of different ages, formats, sensitivity and uses, Silvestar Kolbas[8] records the neglected and collapsed remains of the factory in Samobor and found remains of factory inventory (Tehnički muzej Nikola Tesla, 2020).

Fig. 4 Exhibition *Silvestar Kolbas: Fotokemika* in the Technical museum Nikola Tesla in Zagreb, 2021, © I. Buvinić

Fotokemika Samobor has been a subject of two master's thesis: *Former factory Fotokemika as a museum of photography* by Nevena Ilić and *Preservation and revitalization of industrial heritage on the example of Fotokemika factory* by Ana Telišman.

In 2016, Nevena Ilić obtained her master's degree in Management and Enhancement of Historic and Cultural Heritage at Institute of Research and Advanced Training at University of Évora in Portugal with a thesis examining the history of Fotokemika and its achievements in the field of science, technology, advertisement and design. The thesis deals with ''Fotokemikas influence on the development of analog photography on the territory of Croatia and creates criteria for the valorization of analog photography heritage" (Ilić, 2016: 18). It analyzes the position of Fotokemika in an intricate transmission process of photography medium, from analog to digital, and shows what this transmission process means on a local and global level. In her thesis Nevena Ilić proposes the conversion of Fotokemika Samobor into a museum of photography: "The research aim is to examine how museums, like an institution for protection and safeguarding of heritage... can give a solution in maintaining industrial heritage in a process of reusing former industrial buildings into museums" (Ilić, 2016: 18).

In 2018, Ana Telišman obtained her master's degree in Art History at Faculty of Humanities and Social Sciences at University of Zagreb with a thesis focused on the revitalization of the former Fotokemika factory in Samobor. Her study deals with the history of the development of industry and industrial architecture in the world and in Croatia and highlights the need for its protection. Ana Telišman pro-

3 Bruno Milić (1917-2008) is the author of the original project for Fotokemika Zagreb from 1947 (Karač, 2018: 30). Project was not fully realized according to his proposal (Milić, 1951: 66). Different authors of the Fotokemika complex in Samobor are listed in different available sources mentioned in this research. In the article entitled 'New era of our film industry' (December 16, 1952) from *Narodni list* (newspapers), it was stated that the author of the project for Fotokemika Samobor is engineer Zajec. According to project documentation for Fotokemika reviewed in the State Archives of the city of Zagreb, authors of the project are architect Novak S. and construction engineer Zajec V.

4 From 1946 to 1948, Bruno Milić worked very meticulously and successfully as an independent architect at the Architectural Design Institute on capital industrial architecture projects for which he was successively praised and awarded in 1946, 1947 and 1948. This period of his work was marked by projects and realizations of industrial complexes that would establish Milić as an excellent architectural designer (Fotokemika in Zagreb, 1947; Wood-Industry Combine Bosanka in Blažuj near Sarajevo, 1948-1951, etc.). Both can be considered pioneering works because, at the time, construction of larger modern industrial buildings had not yet been developed in Yugoslavia (Karač, 2018: 29-30).

5 Located in Opatička Street 29, Zagreb.

6 Located at Marko Marulić Square 21, Zagreb.

7 When describing the initial motive for photographing Fotokemika Samobor, Kolbas says: "There was something in that space that attracted me and made me return to it. I don't even fully understand the reasons that led me to it. During almost every visit, I discovered something new, some new detail, some new sight that I had not noticed before." ("*Nešto je bilo u tom prostoru što me privuklo i navelo da se u njega vraćam. Ni sam posve ne razumijem razloge koju su me naveli na to. Prilikom gotovo svakog posjeta otkrivao sam nešto novo, neki novi detalj ili neku novu vizuru koju do tad nisam uočio.*") (Kolbas, 2020: 5)

8 Croatian photographer, cinematographer, director and film teacher, born in 1956.

Table I Overview of literature and previous study with the focus on Fotokemika complexes (in chronological order)

Author	Title	Year	Type	Fotokemika Zagreb	Fotokemika Samobor	Historical overview of Fotokemika	Architectural and urban overview of Fotokemika	Events throughout Fotokemika's history
Bruno Milić	*Factory "Fotokemika" in Zagreb*	1951	professional article in a journal	+			+	
Matićević (ed.)	45 years of Fotokemika – chronology of foundation and development	1993	text in an exhibition catalog (Matićevic, 1993: 6-8)	+	+	+		
Group of authors	*Fotokemika, magazine of the working collective of the company Fotokemika factory of films and photo paper*	1954-1987	magazine	+	+			+
Group of authors	*Efke magazine of the joint stock company Fotokemika*	1987-1998	magazine	+	+			+
Nevena Ilić	*Former factory Fotokemika as a museum of photography*	2016	master thesis		+	+	+	
Ana Telišman	*Preservation and revitalization of industrial heritage on the example of Fotokemika factory*	2018	master thesis		+	+	+	
Silvestar Kolbas, Kosjenka Laszlo Klemar and Leonida Kovač	*Silvestar Kolbas: Fotokemika*	2020	exhibition catalog		+	+		

poses the conceptual project of the interpretation center – project for conversion of Fotokemika Samobor that "was intended to highlight the possibilities offered by former industrial plant spaces and to encourage active reflection on the potential of these spaces in society" (Telišman, 2018: 2).

Both theses observed only complexes in Samobor without a comparative urban approach and focused on architectural reuse proposals. In contrast, this research takes on a holistic approach observing and comparing complexes within all scales and spatial layers.

Apart from the aforementioned works, Fotokemika has not been a subject of research studies, therefore there is a lack of written literature (Table I). Scientific research of Fotokemika factory complexes based on its urban, micro-urban and architectural values is fragmented and deficient, which was a direct motive for this research.[9]

Urban Transformations

Fotokemika in Zagreb

Area of the former Fotokemika Zagreb is located in Croatia's capital, in the Maksimir city district at Hondlova street 2. The biggest and most populated Croatian city, its capital, Zagreb, is situated in the north of the country, along the Sava River, beneath the southern slopes of the mountain Medvednica. The main and largest square of Zagreb is Ban Josip Jelačić Square, a well-known meeting space and the main part of the pedestrian zone in the city center. Area of the former Fotokemika Zagreb is positioned 3.5 kilometers from the Ban Josip Jelačić Square (Fig. 5).

Fotokemika Zagreb was built in 1947 on an, until then empty, 2.3 hectare plot of land in the immediate vicinity of City Park Maksimir (Fig. 5). At the time it was built, as visible from Fig. 6, Fotokemika was situated on a plot bounded from the north by an empty green area that stretched along Maksimirska Street, from the east by Hondlova Street and the gardens of the Faculty of Forestry, from the south by a

9 From 2020 to 2021, Fotokemika Samobor was the subject of research by the first author, then a student at the Undergraduate and Graduate study at The Faculty of Architecture University of Zagreb. The research was conducted under the following titles as part of three different faculty courses: *Factory of photographic materials, Fotokemika, Samobor, 1952.* – in 2020, as part of the compulsory course *Building Heritage Protection and Restoration*, under mentorship of Alan Braun, Ph.D.; *Factory of photographic materials, Fotokemika, Samobor, 1952.* – in 2021, as part of the elective course *Industrial Archaeology*, under mentorship of prof. Zrinka Barišic Marenić, Ph.D.; *Factory Fotokemika, Samobor*, in 2021 as part of the elective course *Heritage Urbanism* (course is a result of HERU research project 2014-2018), under mentorship of academic Mladen Obad Šćitaroci, Ph.D. The history of the area where the former Fotokemika Zagreb is located, in the period before its construction, is partially covered in the research that is a part of Marin Duic's master thesis titled *Maksimir's Homestead – urban and architectural renovation and revitalization* at The Faculty of Architecture, University of Zagreb in 2019.

10 Croatian Academic Sports Club *(Hrvatski akademski sportski klub)*

11 In chapter *8.2. Consolidated urban areas* of the *General urban plan of the city of Zagreb from 2016 (Generalni urbanistički plan grada Zagreba 2016.)* in urban rule *2.8. Arrangement and urban renewal of mixed-use buildings.*

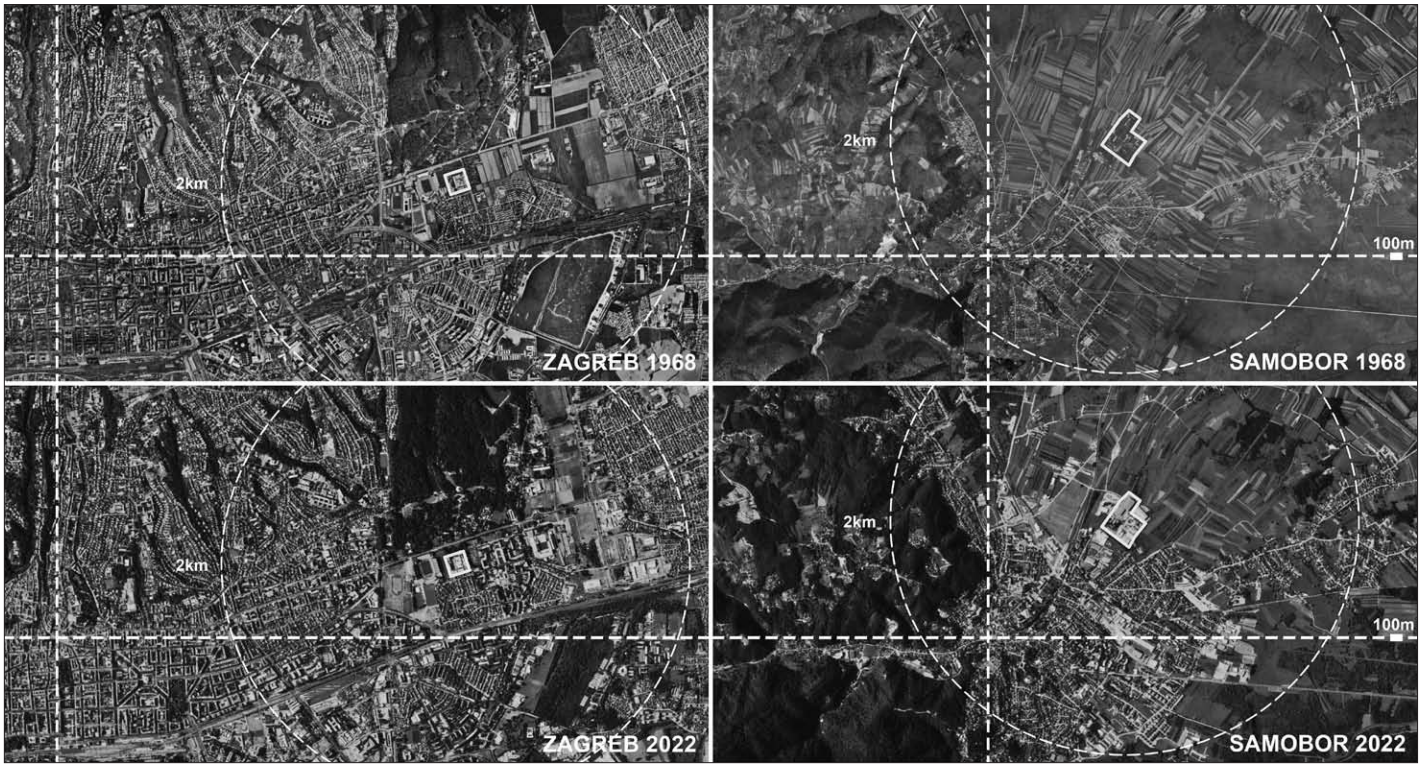

Fig. 5 Parallel preview of Fotokemika in Zagreb and Samobor on orthophoto maps from 1968 and 2022 with marked historical centers (Ban Josip Jelačić Square in Zagreb and King Tomislav Square in Samobor) and urban radius of 2 km

row of detached family houses that are part of a planned settlement known as the Railway colony, and from the west by an empty green area, an elementary school and the old wooden stadium of HAŠK[10] (where later, in 1954, the Maksimir stadium was built). In the middle of the 20th century, several other factories were operating within a radius of 2 kilometers (Fig. 5) – *Patria* liqueur factory at Maksimirska street 2, later *Badel* at Šubićeva street 55, *Lipa Mill* paper factory at Maksimirska street 10 and *Kraš* confectionery factory at Ravnice 48.

At present (2024), former Fotokemika Zagreb is located at the end of a linear stretch that we can recognize as the urban center of Maksimir city district, a high-density area with commercial and residential buildings. This is the area along the very busy Maksimirska Street that spans from Eugen Kvaternik Square to the entrance to Park Maksimir and the Maksimir Stadium. The area is very well connected by public transport lines, including bus and tram. It is located near two tram interchanges – Maksimir and Borongaj. The city railway is also very close, the Maksimir railway station is located 700 meters from the former Fotokemika Zagreb.

The general urban plan of Zagreb[11] in the area of the former Fotokemika complex envisages the urban renewal of the mixed-use space and the preservation of elements of the identity and memory of the settlement without additional information on which particular elements of identity and memory. The possible interventions include the renewal and completion of the urban matrix by building new buildings, interpolation, reconstruction and replacement of dilapidated buildings.

Fotokemika in Samobor

Area of the former Fotokemika Samobor is located at Nikola Šubić Zrinski Street 14-16, in a small town of Samobor situated approximately 25 kilometers from Zagreb. Samobor is part of the Zagreb metropolitan area. It is situated west of Zagreb, in the Sava River valley, between the slopes of Samobor Hills and Žumberak Mountains. Area of the former "Fotokemika" Samobor is positioned 1.5 kilometers from the city center – Samobor's main square, King Tomislav Square (Fig. 5).

Fotokemika Samobor was built in 1951 on a, until then empty, 9.9 hectare plot of land. At the time it was built, as visible from Fig. 7, Fotokemika was situated on a plot bounded from north, east and west by agricultural fields and from the south by *Chromos* paint and varnish factory. At a distance of 400 meters from the factory complex, there was a local narrow-gauge railway. Popularly called *Samoborček*, the train operated between 1901 and 1979 on the route between Zagreb

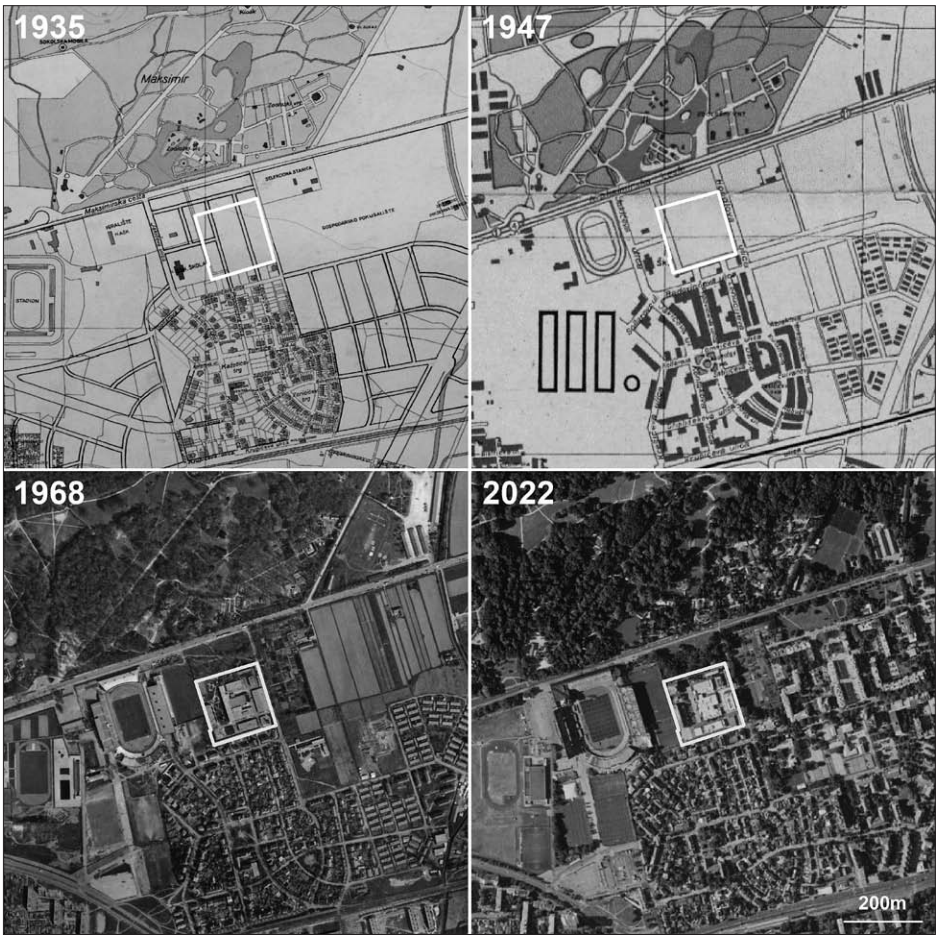

Fig. 6 Area of Fotokemika Zagreb before it was build: left up on the map from 1935; right up on the map from 1947; left down Fotokemika in Zagreb on orthophoto map from 1968 and right down former Fotokemika in Zagreb in 2022

and Samobor and later Bregana. In the middle of the 20th century, several other factories operated within a radius of 2 kilometers (Fig. 5), construction material factory S*amoborka* at Grada Wirges street 2, *Elektron*, the first Yugoslav factory of electrical household appliances (later *Kontakt*, currently *Končar*) at Bobovica 9, the aforementioned *Chromos* at Zagrebačka street 30 and others.

At present (2024), the former Fotokemika Samobor is situated right next to the county road (Zagreb-Bregana), near the Samobor bus station. It is 3 kilometers away from the entrance to the Ljubljana-Zagreb-Belgrade highway (international route sign E70) and is connected by traffic to the main streets of Samobor. It's a part of a bigger territory known as *Samobor business zone*[12] – production zone predetermined for small and medium-sized companies, for production and other types of business, with the condition that the mentioned facilities and activities do not endanger the environment.

The general urban plan of Samobor[13] in the area of the former Fotokemika complex envisages future urban transformation of the economic and production zone which means that the usage has not been changed significantly from factory purpose as in the Zagreb case. The Samobor urban transformation rules include construction of free-standing buildings up to 12 meters high and mandatory natural landscaped terrain of at least 20% of the building plot area.

Comparison and Discussion of Urban Transformation Processes

From the middle of the 20th century to its current status, the area of the former Fotokemika Zagreb and Samobor remained within its original borders. In Zagreb, the new or adapted construction remained within the dimensions of the original, and in some parts, the height was significantly increased. In the Samobor area, the built space was increased by the construction of new production plants and halls of various companies. Large areas of the former green outdoor space are now concrete surfaces intended for heavy vehicle traffic.

Areas of former Fotokemika Zagreb and Samobor have undergone significant changes regarding adaptation to contemporary spatial needs including new construction, additions and conversion of existing construction both during the factory time and especially afterwards. The comparison is focused on analyzing differences between the initial (project) state of Fotokemika complexes and their current resulting state in 2024 from multiple perspectives to detect urban, micro-urban and architectural values which were either preserved, lost or added in the process of urban transformation.

Urban Values – Environment Analysis (City – Periphery Relation)

Urbanization greatly affects the development of the city. Zagreb becomes a metropolis, the expansion of the built-up area and the number of inhabitants and its importance as an administrative and economic center increas-

12 http://localismarket.gdi.net/TourMap/content/doc/HR_ZGZUP_PodZone_hr/Izvod%20iz%20Elaborata%20-%20Samobor.pdf [Accessed: 26 November 2023]

13 In article 78 of the *General urban plan of the city of Samobor from 2007*.

14 Based on the unpublished text *Periphery – Locus Amoenus* by Prof. Bojana Bojanić Obad Šćitaroci, Ph.D. and Prof. Mladen Obad Šćitaroci, Ph.D., prepared for the Master thesis workshop in the academic year 2010/2011 at the Faculty of architecture University of Zagreb when the students assignment was under the topic of 'Periphery'.

15 "Since Maksimir [park] was far from the city at the time of its creation and until the middle of the 20th century, it became a favorite excursion spot for the people of Zagreb." (Duić, Obad Šćitaroci, 2020: 258)

es. The trend continues, but the industry within its perimeters shuts down. Outdated factories are abandoned and left to decay – for example 'City meat packing plant and cattle market' complex in Heinzelova street, Liqueur factory 'Badel' in Šubićeva street and 'Gredelj' railway vehicle factory complex. The 'Gredelj' factory complex located at Trnjanska road 1, 7-11c built in 1894 as the 'Main engine room of the Hungarian State Railways', is now a strategic urban regeneration city project although a significant part of the building structures protected as a cultural asset is dilapidated, partially collapsed (mainly interiors) or in a bad condition, and valuable fragments of the historical industrial plant (tools, machines, metal substructures, etc.) have been removed (Gradski ured za strategijsko planiranje i razvoj Grada Zagreba, Arhitektonski fakultet Sveučilišta u Zagrebu, 2015: 8-53).

Samobor is becoming a popular city to live in because of its proximity to Zagreb and good transport connections. The city is slowly expanding, but remains within its appropriate limits, so that the majority of economic and business contents remain outside the boundaries of its built area.

Periphery is the farthest border of a space, in this case the city. It represents a part of space in which changes in structure and purpose can be seen. It is more than the perimeter of a place, it is also, and above all, a threshold between different territorial realities. The periphery is a part of the city that we can observe through the historical traditional periphery and the contemporary development periphery.[14] Historical traditional periphery is a series of peripheral areas that, with the expansion of the city, become solid, centralized parts of the city recognizable through the difference in structure and content compared to the areas they surround. The contemporary periphery can be defined as an interaction of the peripheral part of the urban fabric and built spaces that want to penetrate the center from the outside (for example rural areas that are urbanized over time). Fotokemika Zagreb is located on a historical traditional periphery of Maksimir area in Zagreb. Fotokemika Samobor is located on the contemporary development periphery of the city of Samobor.

The periphery acts as a space of confrontation – as a space between. They are an unpredictable and often unwanted result of the center's growth. Peripheries are potential, generative spaces – sources of innovation and adaptation. The location of Fotokemika on the outskirts of the city of Zagreb and Samobor potentiates the constant change and transformation of the area.

Fig. 7 Parallel preview of former Fotokemika in Samobor on orthophoto maps from 1968 and 2022

At the time it was built (1947), Fotokemika Zagreb was located on the edge of the city – then a built and inhabited periphery of the city of Zagreb. Maksimir[15], the city district where former Fotokemika Zagreb is positioned, is currently a green urban district in the wider city center with numerous residential buildings and various sports, educational and business facilities. At the time it was built (1952), Fotokemika Samobor was far from the city area – then a vacant periphery of the city of Samobor. Currently, although the residential part of the city is rapidly growing, the area of former Fotokemika Samobor is still outside the wider urban area – urban fabric did not spread up to or around the industrial area where Fotokemika is located.

Locations for both Fotokemika complexes were not selected solely on the basis of utilitarian conditions. Adequate spaces were chosen so that factories can adapt to the structure of the environment, natural and built and even subordinate to it (Ifko, 1999: 148). Both complexes are surrounded by spacious green areas of different character – in Zagreb in close proximity to a large park, recreational and agricultural areas, and in Samobor in the middle of endless mostly uncultivated fields. Considering its former landscaping, each site was suitable in regard to ecological effects on the environment, which is questionable today. Both complexes shaped the environment in different ways, attracting different types of users over time that further influenced the character of development or deterioration of the site.

Micro-Urban Values – Landscaping and Spatial Arrangement Analysis

Fotokemika Zagreb and Samobor were built in the form of pavilion buildings around a cultivated park. Buildings form a closed complex

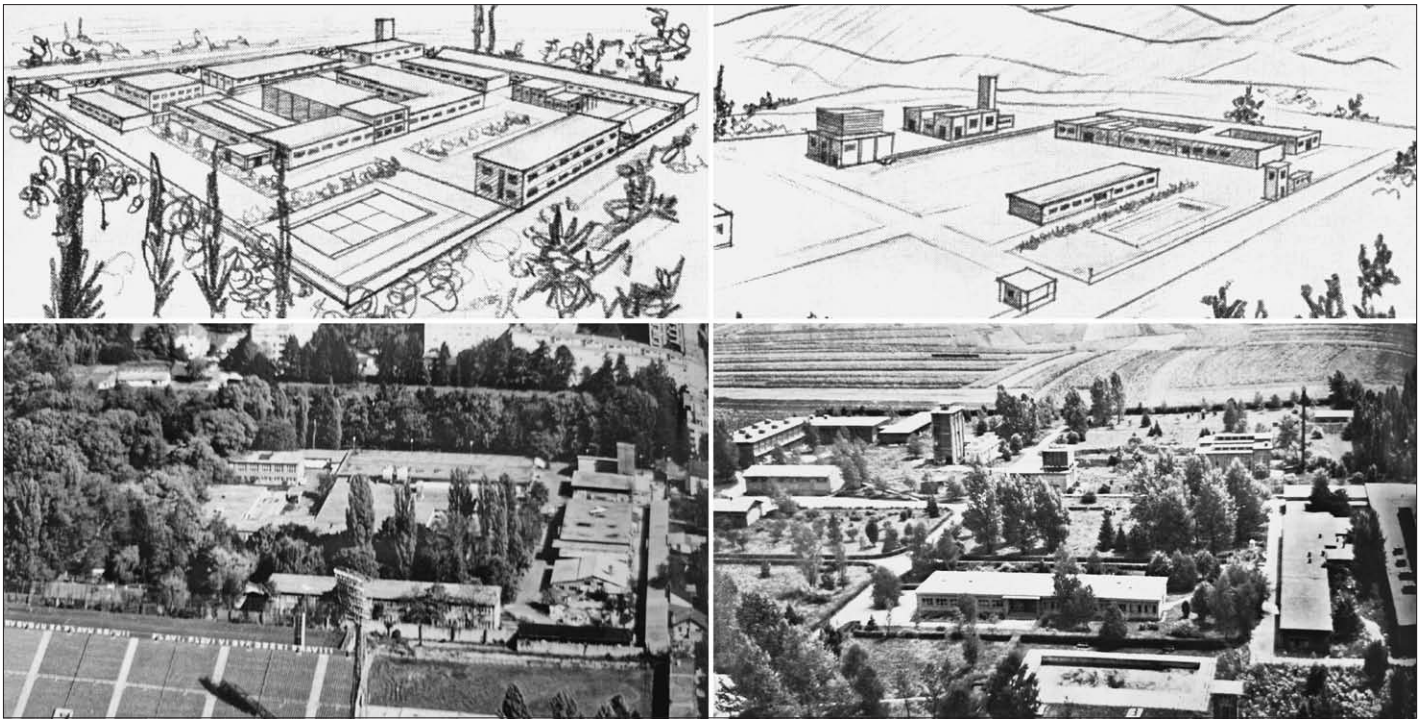

Fig. 8 Axonometric drawings (1962) and photos (1999 and 1972) of Fotokemika in Zagreb (left) and Samobor (right)

ensemble. The design and realization of landscaped areas had a corresponding importance and significance in the industrial architecture of the time (Fig. 8).[16] This was especially important in the chemical industry, as one of the most polluted, where such arranged spaces served workers for rest and the possibility of recreation (tennis court in the complex in Zagreb, volleyball court in both complexes and swimming pool in the complex in Samobor). Production process itself and the type of work in the factory (toxic fumes, humidity, darkness) are the main reasons why Fotokemika complexes are positioned on spacious plots with greenery around and between individual buildings.

In the exterior the rare, single-story pavilion construction has been reduced to basic forms (Fig. 9). The pavilions in Fotokemika Zagreb are only communicatively connected to each other by covered passages[17] (Milić, 1951: 66-67). Due to the larger open area of the plot, which resulted with larger distances between buildings, passages were not constructed in Fotokemika Samobor. At the time it was built, Fotokemika Zagreb had more built area and less total area of the plot, thus less area of landscaped green areas in relation to Fotokemika Samobor. The complex of Fotokemika Zagreb forms a whole with the landscaped environment in which it is located – public green areas, surrounding plantations, sports fields and Park Maksimir. Fotokemika Samobor is situated in a rural undeveloped environment of Samobor city periphery with no nearby public spaces. At the time it was built, the complex in Samobor thus formed a spacious landscaped public area inside itself contrasting vast agricultural fields surrounding it.

At present (2024), the original micro-urban values in terms of the relation between pavilions and open space of both complexes have changed significantly (Table III).

The change of purpose in the complex in Zagreb started in the early 2000s. The change from factory (production) to mixed-use (two residential and several office buildings) happened gradually. Once a single plot was now sub-parceled into several smaller plots. A new purpose has moved into buildings, the users are various and numerous: office spaces (A1 Hrvatska, MojPosao, Genos and others), medical facilities (Medilab, Medicom polyclinic Bonifarm, Avitum), university facilities (Faculty of Architecture), sport facility (CrossFit Maksimir). Until 2019, part of the former Fotokemika complex area were the Canon-Kodak Digital World photo and video center (used to be ground level building and is currently new 8 story high housing building with mixed ground level) and FujiFilm (temporary Faculty of Architecture in renovated building).[18] The once spacious and free area of the park has become a labyrinth with limited visual connections because of the newly introduced heights of the buildings. Moving through the former area of Fotokemika Zagreb is now complex and complicated – there

are numerous parking ramps, illogically positioned (multiple) fences with a small number of passages/entrances. Trees within the plot were demolished in great numbers. Green landscaped areas became paved or asphalted pedestrian and vehicular communication surfaces instead of possible shared space and linear circular plaza urban design much needed for the relocated college. The priority, in terms of contemporary standards, is the organization of a large number of parking spaces on the plot (Fig. 10). In the north the complex no longer forms a visual whole with landscaped public areas and Park Maksimir.

The resulting transformed state of Fotokemika Samobor has 20% less open space and 70% less landscaped green space. Landscaping is completely neglected, vegetation is destroyed or left to overgrow (Fig. 11). Area is divided into several parcels with different owners. Existing buildings are adapted to new use or demolished and replaced with larger industrial halls. The complex is now inhabited by production plants of various companies (Tehnoplast d.d., Intereuropa, Hvar d.o.o., Lim Samobor, Miltonia d.o.o.).[19]

Acquiring photo-documentation for the state of the outside complex took around 25 minutes for the complex of former Fotokemika Zagreb and around 45 minutes for the complex of former Fotokemika Samobor.[20] In both cases, the tour of the complex starts at the first entrance from the main road. Tours require careful searching for possible passages. It is not possible to tour whole complexes in one route. North-west part of the complex in Samobor is not open and accessible to the public.

Fig. 9 Parallel preview of Fotokemika in Zagreb and Samobor on orthophoto maps from 1968 and 2022

New buildings and production facilities implemented within the complex disrupt the original spatial concept established in the once harmonious whole. Due to the need for frequent vehicle traffic within the complex and large parking areas the complexes lost their valuable landscaping, and with it the feeling of pavilion construction.

Architectural Values

Fotokemika factory complexes in Zagreb and Samobor were designed according to design requirements for the chemical industry. The most important of these being separating individual working environments into special facilities. This achieves good insulation and prevents all negative mutual influences and transmission of noise and vibrations. Bilateral introduction of light and efficient ventilation of working spaces is enabled, the possibility of fire spreading is significantly reduced and upgrading or adapting existing construction is possible without stopping production for a long period of time (Damjanović, 1972: 43-47).

All buildings have a clear rectangular floor plan, more or less elongated, depending on the function of the rooms. Walls of pavilions were perforated with large openings of a simple rectangular shape. Roofs are flat. The design of the architecture was subordinated to the function. In short, the factory buildings were built according to the most modern

16 Other examples of industrial architecture with similar design characteristics include: 'City meat packing plant and cattle market complex' in Zagreb (1928-1931) by Walter Frese and 'Institute for the production of medicines' in Kalinovica (1939-1944) by Zoja Dumengjić.

17 Covered passages that connect individual pavilion buildings as a characteristic architectural element can be found in various public buildings in Zagreb, For example, public complexes with covered passages or similar elements (the elongated entrance porch, atrium connections): Ivan Zemljak, Primary school, Selska cesta 95, 1931.; Zvonimir Vrkljan, Faculty of Veterinary Medicine, Heinzelova street 55, 1935-1962; Zoja Dumengjić, Health Center Trnje (today Health Center Kruge), Kruge 44, 1954-1961.

18 Based on the Google Street View, photos from July 2019.

19 Based on the Google Street View, photos from July 2019.

20 Journalist Stjepan Kizvat, when describing the tour of Fotokemika complex in Samobor, says: "The area occupied by the Fotokemika factory is impressive, it took 2 hours to tour the whole complex. Outside, between the factory buildings, an orchard. Even now, in the middle of February, the gardener had work to do." (Kizivat, 1961: 5)

FIG. 10 FOTOKEMIKA ZAGREB ON HISTORICAL PHOTOS (ABOVE) IN THE SECOND HALF OF THE 20TH CENTURY AND ON CONTEMPORARY PHOTOS (BELOW) IN 2024

principles[21] of industrial construction at the time. The facilities were dominated by large, spacious rooms, full of light and clean air, inside which precise and modern machines were located (Milić, 1951: 66-67).

In both Fotokemika complexes some buildings were demolished and replaced, a few were added within the once harmonious ensembles and a large part was upgraded or adapted (Table II). New replacement buildings are taller and built within the same floor dimensions as existing ones. Some buildings in the area of the former Fotokemika Samobor are deteriorated and currently in unusable condition.

Visually, in the context of exterior architectural character, in both complexes, individual build-

TABLE II CURRENT USE OF BUILDINGS IN FORMER FOTOKEMIKA COMPLEXES IN ZAGREB AND SAMOBOR

	Fotokemika Zagreb	Fotokemika Samobor
abandoned (original)	0	6
demolished	6	11
adapted	8	4
newly built	4	6

21 Refers to the use of materials common in the period of extensive construction after the Second World War (ready-made reinforced concrete elements and solid brick filling) and characteristic design features (reduced facade design, large, rectangular openings and flat roofs).

FIG. 11 FOTOKEMIKA SAMOBOR ON HISTORICAL PHOTOS (ABOVE) IN THE SECOND HALF OF THE 20TH CENTURY AND ON CONTEMPORARY PHOTOS (BELOW) IN 2024

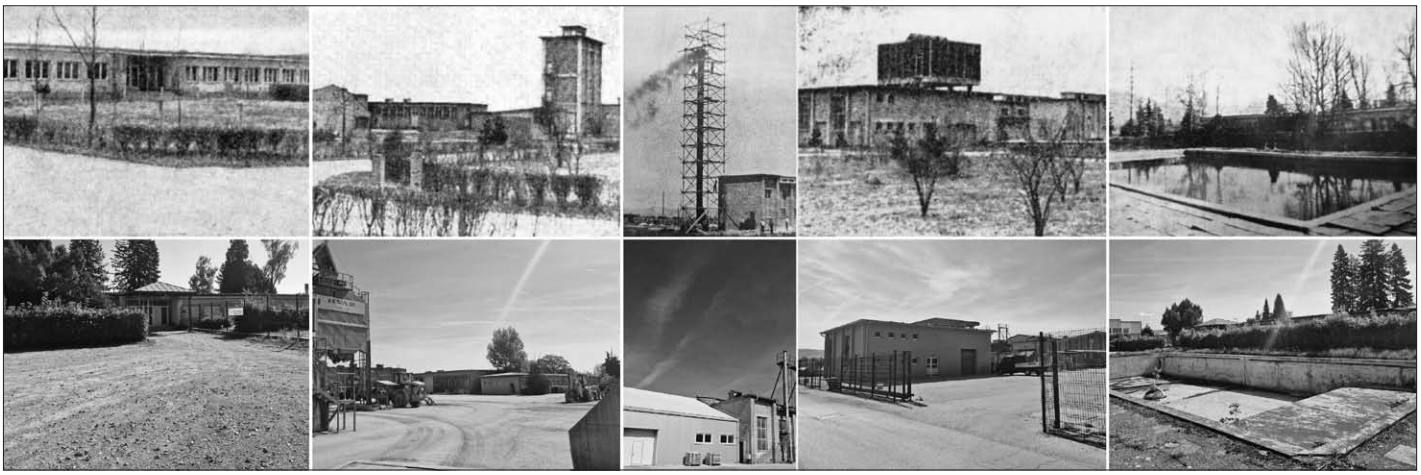

Table III Comparison of urban transformation processes between former Fotokemika complexes Zagreb and Samobor

Space-time context	Zagreb		Samobor		Research scale	Conclusion: transformation result and category of observed value*	
	established: 1947 closed: 2003		established: 1952 closed: 2012				
	20th c.	21st c.	20th c.	21st c.			
use of space	industry	mixed use (residential and business)	industry	economic-production purpose	urban and micro-urban	change of use affects the development of the environment; complex loses its unity	–
position in the city	urban periphery	wider center	periphery (disconnected)	periphery (urban edge)	urban	the significance of the space slightly changes as the city expands	+
total area of the complex	28 296 m²	28 296 m²	98 837 m²	98 837 m²	urban and micro-urban	size corresponds to the position in the city and character of the surroundings; size enables functional and safe production	/
number of cadastral parcels	1	11	1	9	micro-urban	creates visible boundaries within the complex	–
number of main entrances to the complex	1	2	1	2	urban and micro-urban	inappropriate location in the environment in the context of traffic connections; problems with navigating the space	–
number of buildings**	13	12	14	15	micro-urban and architectural	not a relevant indicator alone – tendency towards reducing open space with new buildings	/
built area	11 862 m²	12 029 m²	8 282 m²	29 796 m²	micro-urban and architectural		
percentage of built area	42 %	43 %	8 %	30 %			
percentage of open areas	58 %	57 %	92 %	70 %	micro-urban	reduction and loss of open, green and recreational areas is the most relevant lost value	–
percentage of green spaces	25 %	5 %	82 %	7 %	micro-urban		–
percentage of recreational areas	2 %	0 %	2 %	0 %	micro-urban		–
percentage of paved area	31 %	52 %	8 %	63 %	micro-urban	the complex is no longer perceived as pavilion form	–
percentage of parking area	2 %	20 %	⟨ 1 %	12 %	micro-urban	loss of green spaces	–
distance from the historic city center	3.5 km		1.5 km		urban	no changes	/
distance from the populated part of the city	0 m		200 m	100 m	urban	with development, the city expands towards the observed area	/

* recognised as: + positive outcome, – negative outcome, / neutral outcome
** more details in Table II and Fig. 9

ings no longer form a whole. The original, repurposed and new buildings are no longer coordinated with each other, they differ in the choice of facade finish, roof covering, type of windows and doors. The buildings have retained their flat roofs and, in part, the original uniform grid of openings on the facade.

Discussion of Lost and Preserved Values

Table III summarises the comparative analytical approach of this research through quantitative relations between former situations in the 20th century and contemporary situations in the 21st century as well as qualitatively by analyzing characteristics through positive (+), negative (–) and neutral (/) outcomes in the transformation processes. Negative outcomes directly point to lost values – mainly regarding the loss of valuable open and landscaped areas. In their current form it is questionable whether complexes have any preserved micro-urban and architectural values.

Conclusion

The focus of this research was to compare the two areas of former Fotokemika factory complexes located in Zagreb, Croatia's capital city, and in the town of Samobor, west of Zagreb. The available archive and literature data point out that this topic evoked interest of various disciplines from social to architectural fields as well as artists, but still without a systematic and holistic approach. This research is a step towards filling in the research gap of comparative overview and urban analysis within the historical and cultural context of the production of photo-materials in former Yugoslavia and contemporary Croatia.

The results show that in urban scale the closest surrounding of the Fotokemika complexes in Zagreb and Samobor did not change significantly in regard to city-periphery relation question. Both complexes are located northeast from the city center and on peripheral area. For the Zagreb complex it was built peripheral area near the Maksimir urban park while for the Samobor complex it was mostly unbuilt periphery, which is now starting to become urbanized.

The comparison of the transformative process during and after the Fotokemika factory informs on the urban, micro-urban and architectural values of the original projects of these complexes. In regard to the ratio of built and unbuilt area before and after urban transformation process, the tendency in both cases was in favor of more and higher building. The Fotokemika factories were situated in regard to their function and urban surroundings as a balanced architectural system within the human-scaled and useful open spaces designed as parks. After the transformation process this balance has been changed and disrupted, with most of the open spaces becoming parking lots. Both areas have been segregated into multiple plot areas and more owners which resulted in discontinuous open areas separated with fences. This loss of integration and unity of the complex areas is especially problematic in the case of Zagreb complex where the pedestrian connectivity is lost and the movement of the pedestrian is non-intuitive as it should be since its location is right across the historical urban park of Maksimir. In both complexes, the architecture has been changed to serve new purposes, transforming the pavilion typology into various building types. In Samobor, buildings are primarily halls while in Zagreb it is office buildings of various heights. The new buildings have emerged where the open common gathering areas used to be and in places of old ones.

In the context, the lost relations between urban, micro-urban and architectural values which were achieved in the original projects are now transformed to new function and architecture. These locations and historical complexes deserve rethinking their current urban and micro-urban values for better integration with its surroundings. In Zagreb, its surroundings are complex and diverse which means that connectivity needs to be higher to achieve integration between this highly mixed-used area. In Samobor, the peripheral moment is still present, therefore new concepts for organizing current industrial tendencies would be useful before the whole identity of what used to be Fotokemika is lost.

Both locations of former Fotokemika complexes should in future development include the memory of their origin. The history in the form of photographs in this part of the cities is an important element of how the world observes and remembers today in the forms of photographs.

The history of these spaces in the form of photographs shows important elements of the observed development about 70 years ago, which can be an instruction on how we should behave in the transformation of these spaces without forgetting all three layers of the project. The value and uniqueness of researching photographic material factories is in the way they enabled the creation of the history of cities through photographs, but at the same time the decay of these factories shows the transformation of the possibility of recording city history through digital photography.

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Illustration sources

Fig. 1 Collage by authors combined from photodocumentation (2024), historical photographs and archive materials – State archives in Zagreb, HR-DAZG-1233, Fotokemika d.d., box no. 35 (Marincel, 1978: 1 and Kauzlarić, 1978: 4-5)

Fig. 2 Diagram by authors (2024)

Fig. 3 State archives in Zagreb, HR-DAZG-1233, Fotokemika d.d., box no. 2

Fig. 4 Photo by Ivan Buvinić (Habjan, 2021)

Figs. 5, 7, 9 Collage by authors with orthophoto basemap available at: https://geoportal.dgu.hr/ [Accessed: 25 November 2023]

Fig. 6 Collage by authors with historical basemap available at: https://digitalna.nsk.hr/?pr=i&id=10385 and https://digitalna.nsk.hr/?pr=i&id=574135 [Accessed: 25 November 2023] and orthophoto basemap available at: https://geoportal.dgu.hr/ [Accessed: 25 November 2023]

Fig. 8 Collage by authors combined from axonometric drawings – Samobor Museum, Collection Ivica Sudnik, Fotokemika (*** 1962: 1) and historical photographs (*** 1999: 142; Brunović, 1972: 288)

Fig. 10 Collage by authors combined from photodocumentation (2024), historical photographs (Milić, 1951: 67) and archive materials – State archives in Zagreb, HR-DAZG-1233, Fotokemika d.d., box no. 35 (Kerin, 1978: 4, Doljak, 1957: 4-9)

Fig. 11 Collage by authors combined from photodocumentation (2024), historical photographs and archive materials – State archives in Zagreb, HR-DAZG-1233, Fotokemika d.d., box no. 35 (Kauzlarić, 1978: 4-5, Kauzlarić, 1995: 10) and Samobor Museum, Collection Ivica Sudnik, Fotokemika (Kizivat, 1961: 5)

Authors' biographies and contributions

Klara Kranjčec, M.Arch., guest assistant on urban planning workshops. Research topics: cultural heritage restoration projects, soundscape and industrial heritage.

Tamara Zaninović, Ph.D., assistant professor. Area of scientific interest: streetscape, space syntax, cultural heritage, landscape architecture and memorials.

Bojana Bojanić Obad Šćitaroci, Ph.D., full professor. Area of scientific interest: cultural heritage, landscape architecture, cultural landscape, space syntax. [www.scitaroci.hr]

Conceptualization: K.K. and T.Z.; methodology: K.K., T.Z. and B.B.O.S.; formal analysis: K.K.; investigation: K.K.; data curation: K.K. and T.Z.; writing – original draft preparation: K.K.; writing – review and editing: K.K. and T.Z.; visualization: K.K.; supervision: T.Z. and B.B.O.S. All authors have read and agreed to the published version of the manuscript.

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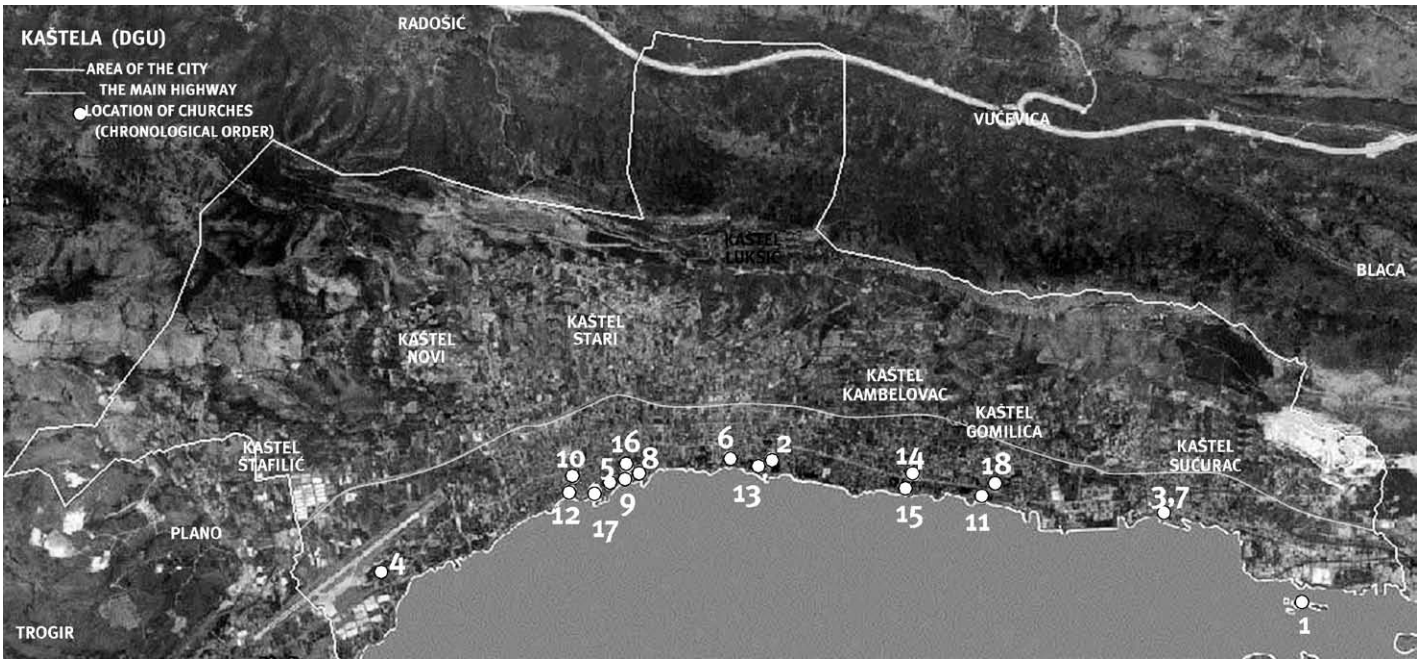

Fig. 1 The Kaštela area with charted modern age churches in the coastal area – chronological order

Table I Modern age churches in the Kaštela coastal area – chronological order

Map number	Site	Church	Year
1	Kaštel Sućurac-Barbarinac	St. Martin	First mentioned 1478
2	Kaštel Lukšić	Assumption of the Blessed Virgin Mary – old parish church	1530
3	Kaštel Sućurac	St. Luke	Between 1573-1603
4	Kaštel Štafilic	St. Bartholomew	First mentioned in visitation 1579
5	Kaštel Novi	St. Roch	1586
6	Kaštel Lukšić – Rušinac	St. John the Baptist	Mentioned in visitation 1590
7	Kaštel Sućurac	St. George	1691
8	Kaštel Stari	St. Joseph	1695
9	Kaštel Stari	St. John the Baptist	1714
10	Kaštel Štafilic	St. Lucy	1719
11	Kaštel Gomilica	St. Jerome – old parish church	1731
12	Kaštel Štafilic	Immaculate Conception of the Blessed Virgin Mary	1765
13	Kaštel Lukšić	Assumption of the Blessed Virgin Mary – new parish church	1776
14	Kaštel Kambelovac	St. Lazarus	1854
15	Kaštel Kambelovac	St. Michael and St. Martin	1890
16	Kaštel Stari	Our Lady of the Rosary	1871
17	Kaštel Novi	St. Peter the Apostle	1901
18	Kaštel Gomilica	St. Jerome – new parish church	1914

Doroti Brajnov Botić[1], Zorana Sokol Gojnik[2]

[1] University of Split, Arts academy, Zagrebačka 3, 21000 Split, Croatia
https://orcid.org/0000-0003-3282-0145

[2] University of Zagreb Faculty of Architecture, Fra Andrije Kačića Miošića 26, 10000 Zagreb, Croatia
https://orcid.org/0000-0002-2148-2243

doroti@umas.hr
zsokol@arhitekt.hr

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Architectural Features of Churches in the Kaštela Coastal Area between 1492 and 1918

church
Kaštela area, Croatia
liturgical architecture
Modern Age
style
typology

This paper aims to synthesize recent knowledge about the churches built between 1492 and 1918 in the Kaštela area and present its characteristics obtained by research in the doctoral thesis of the first author. The research covered 18 churches located in the coastal area. Fourteen churches have been preserved, two were pulled down, while the existence of two other churches was detected on old maps and in written documents. After a genealogical and catalogue study, a typological and stylistic analysis of the churches has been made. The longitudinal aisleless churches as a dominant shape vary in dimensions, type of construction, construction solutions and elements of architectural decoration.

Introduction

The liturgical architecture[1] of the Kaštela area appears twofold in terms of space and time: medieval churches were built on the slopes of Kozjak, while the construction of modern age churches[2] is concentrated in the coastal area[3] (Fig. 1). Such disposition of churches was determined by historical circumstances. Due to the Ottoman and Wallachian threat, the inhabitants were forced to abandon their medieval settlements on Kozjak and settle in the newly built forts along the coast. The origins of developed new forts, and afterwards settlements along the coast within which churches gradually developed, date to the 15th and 16th c. This is when the area assumed the appearance preserved until the present. By the 17th c., 17 towers or castles were built, with or without a fortified settlement. The entire area was named Kaštela (castle) after them (Marasović, K., 2002: 15). The churches followed the urban development of the settlement. The population increased over the ages, leading to the construction of larger churches in order to meet the religious needs of the population.

The aim of this paper is to present the characteristics of modern age churches, its typological and stylistic features.

Research

This paper presents a part of the complex research carried out during work on the doctoral thesis (Brajnov Botić, 2023). In the course of the research, many sources[4] and information from previous research were used, as well as a specific methodological approach to analyzing the entire modern age churches of Kaštela.[5]

Research methodology – At the beginning of research, churches were registered and

1 In contemporary Croatian and international theological and liturgical science, and consequently in architectural terminology for the last thirty years, the term *liturgical architecture* is used as an extension of the term *church*.
The term *liturgical architecture* was introduced to lead experts in the field to a deeper understanding of architectural typology whose function is to gather the community to celebrate the liturgy. The term *liturgical architecture* implies architecture specially structured for the ritual – liturgy. Liturgy, Greek *leit-ourgia* (work, act of communion) is the salvific event of the Mystery, experienced through the communion of the celebrants. As liturgy is very complex in its theological, functional and symbolic layers, the term *liturgical architecture* was introduced to direct experts to a complex understanding of typology under the aspect of liturgy, without neglecting the aspect of the community. The intention of the term *liturgical architecture* is specifically directed to raise awareness of a complex functional and symbolic liturgical dynamics in the architectural design process.
The term *church*, Latin *ecclesia*, Greek *ekklesia* (community), primarily emphasizes one aspect of the building's function – the gathering function of the Christian community.
Even the term *sacred architecture* often creates confusion. The term *sacred architecture* is much wider, and it includes different typologies that house different forms of spiritual needs of users.
Since the term *church* is established in the language, and therefore more understandable to the readership, the term *church* will be used for this paper.

2 In historiography, the discovery of America in 1492 is considered the beginning of the Modern Age, and lasts until the end of World War I in 1918 (Whitney Hall, 1988). This period will be considered in this paper.

3 The coastal area in this paper covers the area from Ulica Ivana Pavla II, the main highway through Kaštela, to the coast.

4 Along with the collected and studied extensive bibliography, the basis of the research were visitations by Split and Trogir bishops, kept at the Archdiocesan Archives in Split. A valuable source of information were the parish archives and a number of unpublished documents that shed light on the process and circumstances of construction of certain churches. Analyzing the spatial development of Kaštela villages and the location of churches in historical and urban wholes in settlements, the archival documents and old maps, prints, drawings and photographs were studied in detail. Part of the aforesaid material was published in literature or on internet sites, while part of the collected material is kept at the parish archives and numerous other institutions or with individuals.
A valuable source for studying the spatial development of Kaštela was the Austrian cadastral survey M 1:1400, 1:2880, Map Archive for Istria and Dalmatia from 1831 in the State Archives in Split which is important in terms of facts about buildings and ownership. The aforementioned plans are compared with geodetic surveys of settlements made by the State Geodetic Administration in M 1:1000, and also with the recently made DOF – Digital Orthophoto Maps M 1: 5000, also made by the State Geodetic Administration in 2019 and 2020.

chronologically listed. The method applied in this paper is based on direct field research i.e. study of churches *in situ*. During fieldwork a detailed photographic documentation of the churches was made. Along with photographic documentation, the photo libraries of many institutions and all parish archives in Kaštela were also used.

A series of architectural surveys of churches and architectural details was made

Survays about the conservation and restoration carried out on the churches were also used, together with the architectural surveys of the churches produced over the years by the former Conservation Department in Split, and the works of architects engaged in the scientific research of this area. All results obtained have been included in the catalogue[6] that was the starting point for further research and yielded conclusions. As a matter of course, the analysis and evaluation of architecture and urban-planning intertwined with historical and artistic analyses and evaluations of certain artistic works (e.g. activity of certain architects, builders and builders' families).

Characteristics of Churches

Since no comprehensive typological classification[7] of modern age churches in the Kaštela coastal area[8] has been made so far, this paper aims to present the typological classification based on ground plan analyses, spatial features, architectural elements, constructive features and building material.[9]

Longitudinal Types – Aisleless Churches

Summarizing information about the construction and number of modern age aisleless churches and their design in the area of Kaštela, this paper primarily brings a proposal of typological classification within the largest longitudinal aisleless group, while other types will be elaborated separately.

Aisleless Churches of Smaller Dimensions with a Square or Rectangular Apse (16th c.)

A number of smaller churches (except one) were built on the land of noble families. They maintain traditional medieval ground plans – spatial concepts. They were built by members of local workshops, mostly builders. In spite of their very simple design, the wall surfaces contain elements of architectural decoration with traces of Gothic and Renaissance stylistic features. Spatial organization and construction do not possess any stylistic features. Churches built immediately after the founding of fortified settlements in the 16th c. are modest and have a primarily utilitarian function.

The aisleless type of smaller dimensions with a square or rectangular apse has the simplest design, dimensions and presence of architectural elements. Simple ground plan shapes of

5 Previous research and published papers:
The Trogir and Kaštela area was first historically studied in the 17th c. in the works of eminent Croatian historians Lucić (1979) and Andreis (1977: 351, 352). Lucić mentions the Church of St. Peter, while Andreis, along with descriptions of the development of settlements on the coast, lists churches from Kaštel Štafilić to Kaštel Lukšić. Each church was given basic information about its construction. At the end of the 19th c and the beginning of the 20th c, several authors describe the development of Kaštela villages along the coast. However, in all works, churches were mentioned incidentally (Chiudina, 1898; Pavlov, Vuletin, 1916; Perojević, 1934).
In recent scholarly and scientific literature, particularly in notable historical and artistic syntheses about Kaštela (Babić, 1991; Omašić, 2001), modern-age churches were studied summarily. Several monographs about the settlements presented the summarized genesis of churches (Kečkemet, 1978; Bego, 1991; Pera, 1997, and Ivasović, 2001). An exception is but a few monographs about certain churches (Acalija, 2007; Duvnjak, 2007; Babin, 2012) and several scholarly and professional papers, which contributed to the knowledge about their genesis, but most often in local historical context considered from the historical and artistic standpoint based on available information, formal analyses of architecture, liturgical elements and inventory.
A significant contribution to the knowledge about churches was given in K. Marasović's doctoral dissertation, in which, apart from a primary analysis of fortification architecture and analysis of the urban-planning development of Kaštela settlements, churches were also mentioned.
Kaštela's modern-age churches are represented by several notable examples in syntheses, but only of baroque architecture (Horvat, Matejčić, Prijatelj, 1982; Horvat Levaj, 2015; Marković, 2018). All mentioned papers were the starting point for the research in this paper.

6 It contains 17 churches built in the modern age (one church was omitted due to insufficient information). Catalogue entries contain visual material (recent geodetic surveys of the State Geodetic Administration, M 1:5000 DOF – Digital Orthophoto Maps, cadastral surveys, ground plans, elevations and photographs) and the most important data about each church based on published bibliography, field and archival research.

7 Klaić, 1987: 1353. Type in architecture may be defined as a pattern, form, sample (Anić, 1991: 737; Argan, 1989: 29; http://hjp.znanje.hr/index.php?show=search /accessed: 2.9.2020/). Closely related to type is typology that denotes the study of types or similarities, i.e. determining charachteristic features, division by type (Marković, 2004: 11). What churches in the same type group have in common is the following: the ground plan scheme, spatial concept, vaulting, as well as the type and quantity of wall decoration in designing wall surfaces.

8 In published scholarly literature, typological analyses of Kaštela's modern-age churches often referred to the Baroque period, i.e. to the 17th and 18th c.

9 In order to group the churches categories, they were studied within the same time frame. As an important element the classification, the number of buildings of the same or similar features in the studied area has been considered. Longitudinal and central-type churches are appearing in new variants.

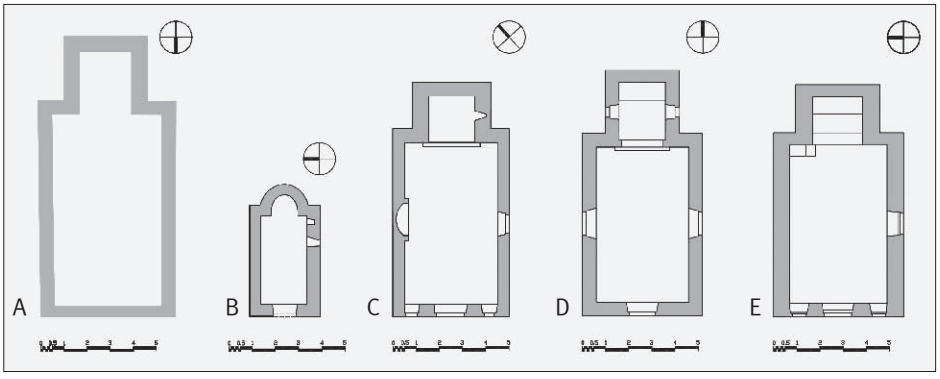

FIG. 2 THE REAR AND FACADES (UP) AND GROUND PLANS (DOWN) OF AISLELESS CHURCHES OF SMALLER DIMENSIONS (16TH C.): A) K. SUĆURAC, ST. LUKE; B) K. ŠTAFILIĆ, ST. BARTHOLOMEW; C) K. NOVI, ST. ROCH; D) K. LUKŠIĆ, ST. JOHN THE BAPTIST; E) K. STARI, ST. JOSEPH (17TH C.)

this group type and modest architectural decoration sometimes make stylistic determination more difficult. This type often lacks significant stylistic features because the primary function of these churches was liturgy and they were built in modest and unfavorable historic and social conditions, which reflected on their design.

Churches of this type have small dimensions: 7-8 m by 11-14 m, having the same or similar longitudinal aisleless ground plan disposition, mostly with a square or rectangular apse with a barrel or pointed vault narrower and lower than the nave. They also have a standardized design of the gable facade with repeated architectural elements common in Dalmatian architecture such as rose windows, bell gables etc. The nave ends with a flat ceiling or has a barrel vault, sometimes even a pointed one above which is a gable roof covered by canal tiles. The walls are often made of roughly cut stone with wider joints. Door jambs, lintels and window frames, architectural decoration in general show a finer, but still modest treatment. The perimeter walls are 50 to 60 cm wide. The openings on the walls are small and appear mostly on the façade, namely one pair of square or rectangular windows by the main portal. The lateral walls either do not have openings or they are small so that the lighting in the nave in some churches is asymmetrical.

The constructions of liturgical buildings reflect the technical achievements of the time, they are integrated into the architecture and directly influence the design of the building (Marasović, J., 1977: 58). Types of construction are thus characteristic for a certain period. Churches of this type were built by two-face load-bearing stone walls filled with rubble and mortar, and due to the span, basic types of construction were vault or arch and vault, or arch with braces (Marasović, J., 1977: 60).

The following churches make up the group of small dimensions with a square or rectangular apse: St. Luke in K. Sućurac (between 1573-1603; Marasović, Kamenjarin, 2021: 449-462), St. Roch in K. Novi (1586; Babin, 1999: 151-161); St. John at Rušinac in K. Lukšić (mentioned in the visitation in 1590; Brajnov Botić, 2011: 41-59). The Church of St. Joseph in K. Stari (Brajnov Botić, Lušić, 2013: 195-210) can also be added to this group because although built at the end of the 17th c. (1695), by its dimensions and type, it is similar to the aforementioned churches.

The only example of an aisleless church of small dimensions with a semicircular apse (conch) is the Church of St. Bartholomew at

Resnik (first mentioned in the visitation in 1579; Bužančić, 2017: 27-37). Although different from other churches by the shape of its apse, it is listed in this group because of its dating and dimensions (Fig. 2).

The churches most often lie in the east-west direction with the west entrance, but there are isolated examples such as the Church of St. Luke situated in the north-south direction with the north entrance, and the Church of St. Joseph with the same characteristics, also of north-south direction with the south entrance.

Aisleless Church with Rectangular Apse and Added Chapels (16th c.) – Isolated Example

The old parish church of the Assumption of the Blessed Virgin Mary in Kaštel Lukšić (1530) (Diana, 1975: 135-175) is an aisleless church with architectural elements of Gothic-Renaissance vocabulary with a rectangular apse, added chapels and sacristy (Fig. 3). By adding the northern and southern chapel of St. Roch, and later the sacristy onto the nave, its ground plan assumed an irregular shape making it different from other churches in Kaštela. The presbytery and southern chapel end with pointed vaults. The shallow northern chapel has a barrel vault. Above the nave is an open roofing, i.e. a wooden construction covered by canal tiles. The presbytery, as well as the two mentioned chapels, northern and southern, are lower and narrower than others parts of the church. This church is the only example of such spatial design among all analyzed aisleless modern-age churches in the Kaštela coastal area, and was therefore separately elaborated.

Aisleless Churches of Larger Dimensions with a Square or Rectangular Apse (17th and 18th c.)

In more favorable historic circumstances of the 17th and 18th c., and consequently in better material opportunities, new, larger aisleless churches were built maintaining archetypal spatial schemes. They were built by members of builders' families active in Central Dalmatia. They show Baroque stylistic features in several decorative elements, and less in spatial and constructive solutions. With the activity of builders' families and independent builders, unlike the in the 16th c., liturgical architecture became the work of authors.

Churches from this group are more complex than churches from previous groups. They are different by dimensions and application of elements of architectural design. They maintained simple ground plan features where architectural decoration is evident,

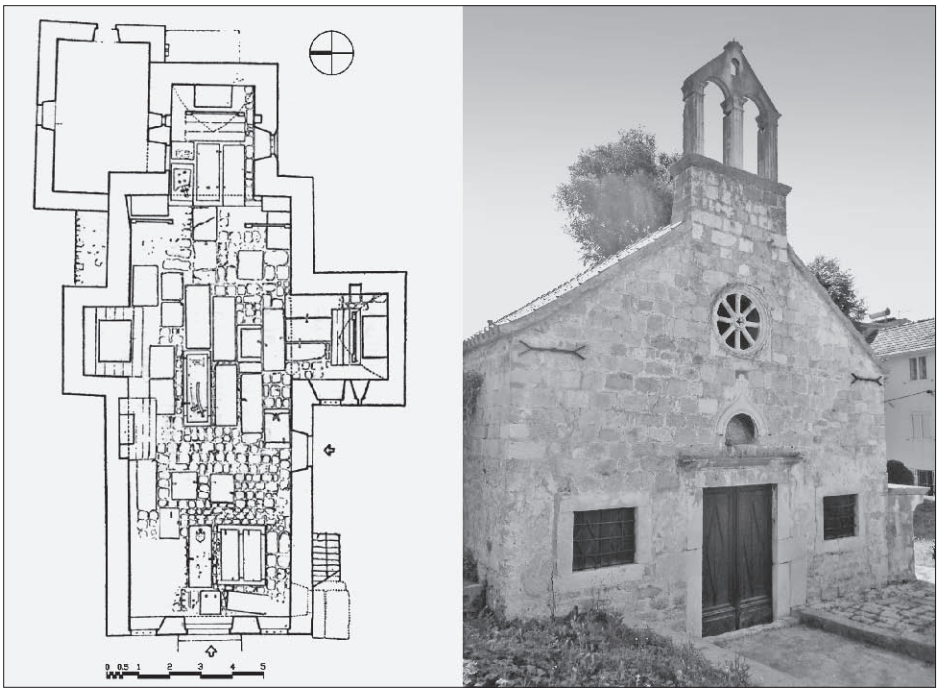

Fig. 3 Ground plan and facade of the aisleless church with rectangular apse and added chapels – isolated example, K. Lukšić, Church of the Assumption of the Blessed Virgin Mary – old parish church

showing Baroque features. Churches of this type have greater dimensions 8.5-10 m by 15-19 m, and are characterized by the same or similar longitudinal ground plan disposition, mostly with a square or rectangular apse with a barrel or pointed vault which is narrower and lower than the nave. Their gable facades are also of standardized design, with architectural elements common in Dalmatian architecture such as rose windows, bell gables etc. The nave has a flat ceiling, ceiling with round edges, or ceiling with round edges and notched panels above which is a gable roofing covered by canal tiles.

The only openings on the main facade are the portal and rose window or two rose windows one above the other. Facades of churches from this typological group do not have square windows by the main portal as is the case on smaller aisleless churches. The natural lighting of the nave is symmetrical. Windows appear on the lateral walls, one, two or three on each wall. If there are windows in the apse, they are often symmetrical.

The design of these churches follows the tradition of previous styles, but very modest traces of baroque can be seen on the details of decorative architectural elements, rather than in the spatial concept.

Walls of some churches are built of roughly cut stone with wider joints while some churches are built of stone cut in a precise way with hardly noticeable joints. Wall surfaces are not treated in the same manner. This depended on

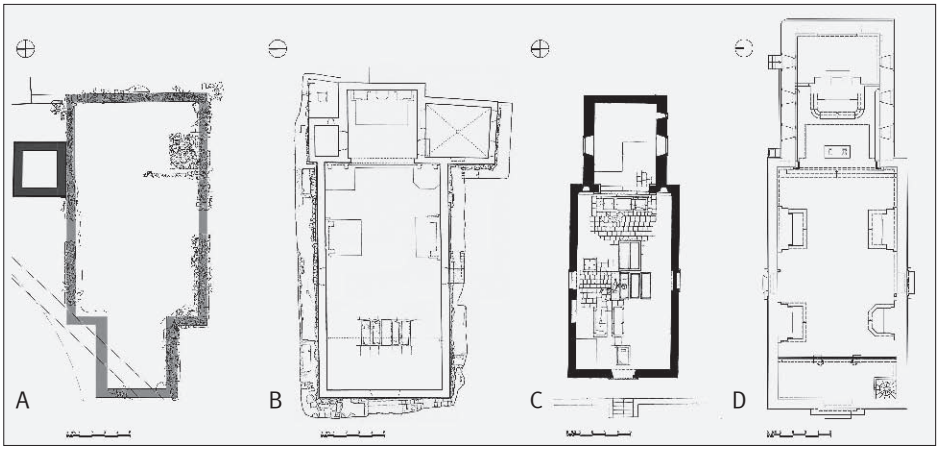

Fig. 4 Facades (up) and ground plans (down) of aisleless churches of larger dimensions with square or rectangular apse (17th and 18th c.): A) K. Sućurac, St. George; B) K. Stari, St. John the Baptist; C) K. Gomilica, St. Jerome; D) K. Štafilić, Immaculate Conception of the Blessed Virgin Mary

the financial situation of the commissioner, but also on the skill of the builder whom the construction was entrusted to. The width of perimeter walls varies from 50 to 70 cm.

Door jambs, lintels and window frames, i.e. architectural decoration in general was finely treated. These elements best reflect baroque stylistic features, especially in the application of decorative elements, flower or diamond within a square field at the bottom of the door jamb, but also the design (convex beams) of the cornices and consoles on facades.

The most prominent examples of this group are: Church of St. John the Baptist in K. Stari (1714; Babin, 2012), Church of St. Jerome in K. Gomilica – old parish church (1731; Kezić, 1994: 227-235), and Church of the Immaculate Conception of the Blessed Virgin Mary in K. Štafilic (1775; Sokol, 1998: 119-123; Acalija, 2007.). Due to discovered architectural surveys during the research for this paper, the pulled down old parish Church of St. George in K. Sućurac (1693) may be added as well (Kećkemet, 1978; Marasovic, Kamenjarin, 2021: 449-462, Fig. 4). All four churches lie beyond the fortified settlement.

The study of the published works about churches in this group showed various definitions of nave vaulting, and it is therefore necessary to determine them more precisely. According to some authors, naves in some churches have a barrel vault (Sokol, 1998: 121) or even ceiling (Babin, 2012: 30; Marković, 2018: 42). The analysis of these churches has shown that the naves of churches in K. Sućurac and K. Gomilica have a ceiling, while the naves of churches in K. Stari and K. Štafilić have a ceiling with rounded edges at the end. The only difference between the latter is that the vault in the church in K. Stari has notched panels, unlike the vault of the church in K. Štafilic. The apses of the churches in K. Gomilica, K. Stari and K. Štafilić have a barrel vault forming a wider triumphal arch, while the apse in the church in K. Sućurac has a pointed vault. The roof constructions above the nave are dominantly

wooden, all have a tie beam above which, there is either a double brace or single post. Similarities in the design of the exterior envelope of churches in K. Stari and K. Gomilica are obvious.[10]

Aisleless Church with Added Chapels within the Nave (18th and 19th c.) – Late-Palladian Type

Although one church built in Kaštela bears the traits of the so-called Late-Palladian (Neo-Palladian) type (Marković, 1992), it should be considered in the context of overall liturgical construction in Kaštela mainly because of its representative qualities in relation to other churches in this area, and also because of the fact that it is the only one built following a foreign pattern.

The origin of this type is Palladio's church *Il Redentore* (1577-1592; Marković, 2004: 41; *** 1999: 487). It is an aisleless longitudinal church, with three pairs of chapels separated by pairs of composite semi-columns (Fig. 5). Above the semi-columns, there are beams that bear a trough vault. In the vault with panels, there are semicircular windows that follow the axes of the chapels. Panels also appear on the facade side of the nave as well as above the triumphal arch (Marković, 2004: 41). Above the presbytery rises the cupola while a semi-dome stands above the apse. The term Palladian motif is present in literature (for more detail see: Summerson, 1998: 129; Marković, 2004: 45; Horvat-Levaj, 2015: 350-351). In terms of style, this is Venetian Baroque classicism based on Palladio's spatial concept mostly realized in Istria from the beginning of the 18th c.

The only modern age church in Kaštela similar to this type is the new parish church of the Assumption of the Blessed Virgin Mary in K. Lukšić (Fig. 6; Horvat, Matejčić, Prijatelj, 1982: 466; Horvat-Levaj, 2015: 388). By its design, with some differences, it continues the tendencies of the mentioned churches from Veneto, followed by the Istrian peninsula. This is testified by the fact that the project for this church was commissioned in Venice in 1773.[11]

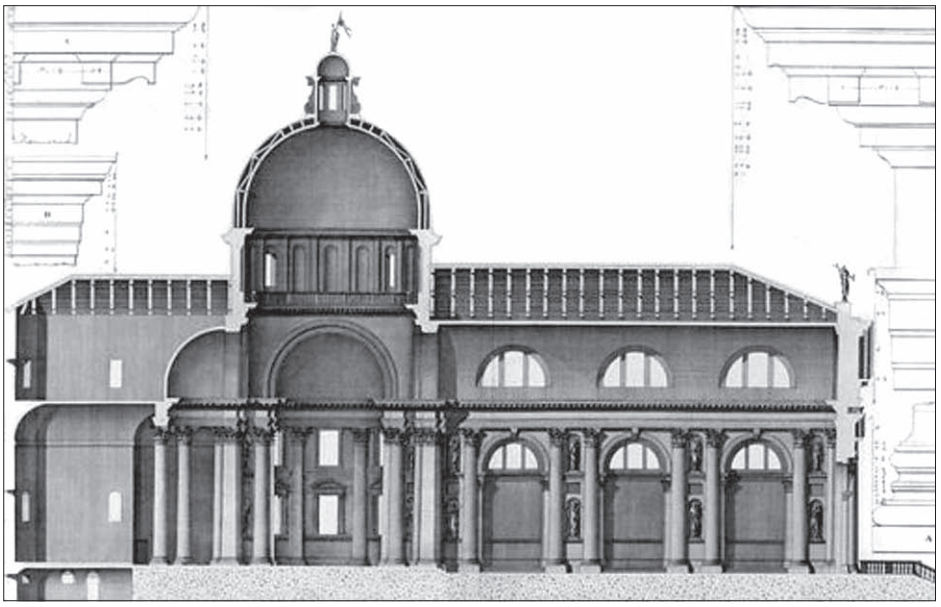

Fig. 5 A. Palladio, *Il Redentore*, Venice, longitudinal section

There are visible differences in the design of panels and above the rounded corners of the nave, particularly in the barel vaulting of the square bay in the presbytery with panels, unlike most Istrian churches that bear a domed vault in that place. Architectural decoration is designed with the same material as stucco decorations, among which are composite capitals of the pilasters. The apse wall is also articulated by pilasters which is not typical for Late-Palladian churches.

The difference from the usual Late-Palladian type schemes is that the pilasters are not el-

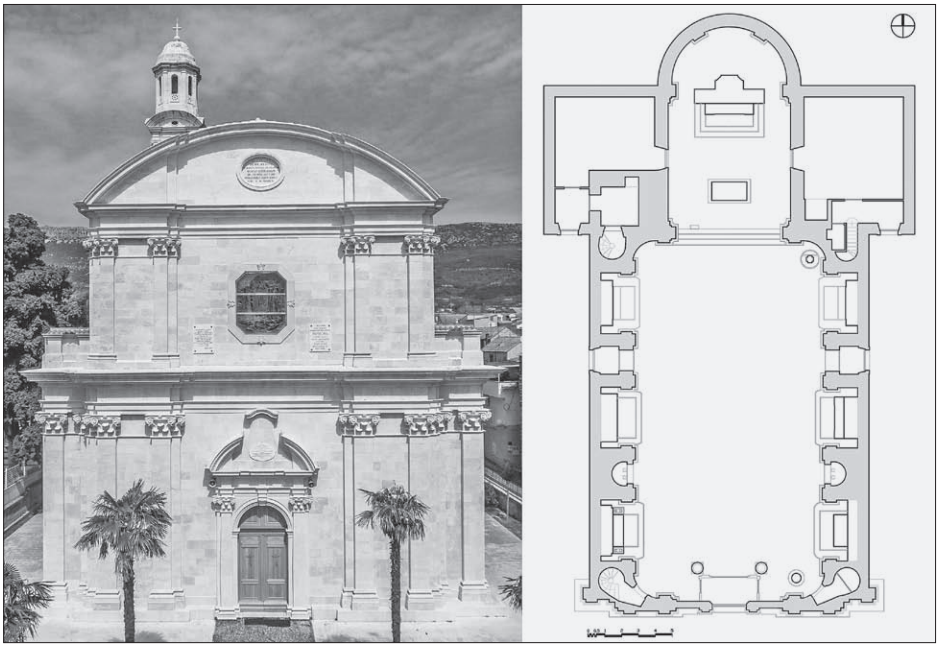

Fig. 6 Facade and ground plan of the aisleless church with added chapels within the nave (18th and 19th c.), Late-Palladian type, K. Lukšić, new parish church of the Assumption of the Blessed Virgin Mary

10 Along with the churches grouped here, the churches of St. Michael and Martin in K. Kambelovac and St. Peter the Apostle in K. Novi, probably had baroque features in their earlier phases. However, the transformations over the ages erased the baroque layers. Since archival data have neither been discovered yet, nor have archaeological excavations been carried out in full, it cannot be determined whether the pulled down church of St. Lucy in K. Štafilić belongs to this typological group. This is something that is left for future research.

11 Horvat-Levaj, 2015: 388. The project has unfortunately not been preserved.

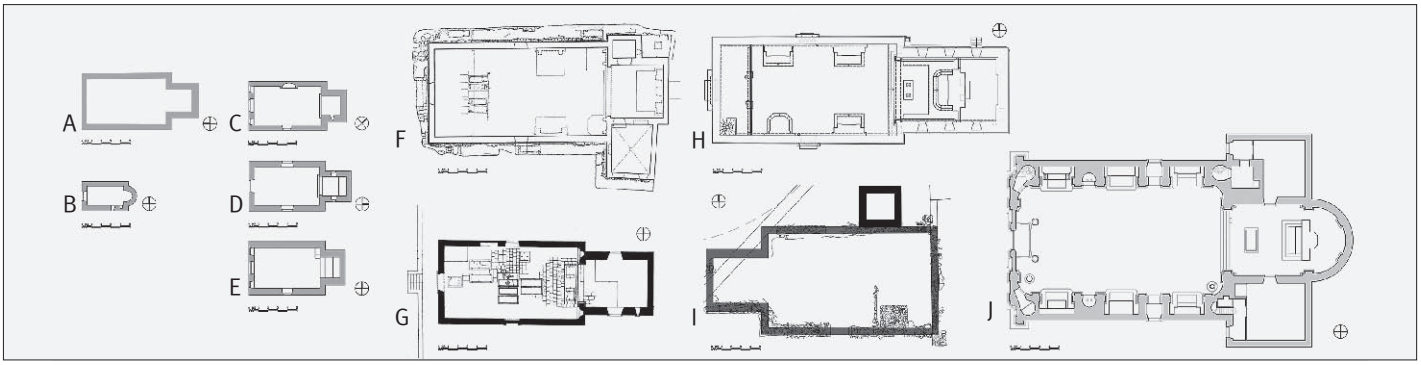

FIG. 7 GROUND PLANS OF AISLELESS CHURCHES IN THE KAŠTELA COASTAL AREA: A) K. SUĆURAC, ST. LUKE; B) K. ŠTAFILIĆ, ST. BARTHOLOMEW; C) K. NOVI, ST. ROCH; D) K. LUKŠIĆ, ST. JOHN THE BAPTIST; E) K. STARI, ST. JOSEPH; F) K. STARI, ST. JOHN THE BAPTIST; G) K. GOMILICA, ST. JEROME; H) K. ŠTAFILIĆ, IMMACULATE CONCEPTION OF THE BLESSED VIRGIN MARY; I) K. SUĆURAC, ST. GEORGE; J) K. LUKŠIĆ, ASSUMPTION OF THE BLESSED VIRGIN MARY – NEW PARISH CHURCH
* The overall presentation does not show the old parish church of the Assumption of the Blessed Virgin Mary in K. Lukšic (Fig. 3), because of its specific ground plan shape defined by chapels added to the aisleless body of the church.

TABLE II TYPOLOGY OF LONGITUDINAL AISLELESS CHURCHES – RESEARCH RESULTS

Typology of longitudinal aisleless churches	Number of churches	Percentage of 16 churches
1. Aisleless churches of smaller dimensions with square or rectangular apse (16th c.) and an isolated example from the 17th c.	5	31,25%
2. Aisleless church with rectangular apse and added chapels (16th c.) – isolated example	1	6,25%
3. Aisleless churches of larger dimensions with square or rectangular apse (17th and 18th c.)	4	25%
4. Aisleless church with added chapels within the nave (18th and 19th c.) – Late-Palladian type	1	6,25%

evated on high pedestals in the nave nor on the church facade.

The facade is composed of two levels with a series of pilasters with composite capitals[12], with a portal above which is an interrupted segmented gable above which is a window in the form of an octagon. The facade continues with a segmented gable. The ground floor level is wider, with pedestal ends that had to serve for sculptures, which is a common scheme in Venetian architecture.[13]

This type in our areas was originally referred to as *primorski type*, following Slovenian literature (Horvat, Matejčić, Prijatelj. 1982: 440). Two terms defining its typology were introduced later: Late-Palladian type and Neo-Palladian type. These two terms were introduced in scholarly literature by V. Markovic (Marković, 1992: 425-458; Horvat-Levaj, 2015: 348).

The analysis results of types of longitudinal aisleless churches (Table II) show a predominance of aisleless churches of smaller dimensions with a square or rectangular apse with the exception of one church with a semicircular apse (31,25%) and an aisleless church of larger dimensions with a square or rectangular apse (25%).

CHURCHES OF OTHER TYPES BUILT OR LAYERED IN THE 19TH AND 20TH C.

In the 19th and the beginning of the 20th c. the existing parish churches underwent additions or new, considerably larger ones were built dominating the urban structure of the settlement. They belong to different types and are mostly of different historicist stylistic features. Some churches follow stylistic tendencies of the time of construction but they reflect incoherent historicist style. The implementation of historicist ideas shows a tendency towards more modern architectural expression in relation to churches from previous centuries based on traditional patterns. The novelty they bring about in terms of architecture is a greater number of aisles. Their authors are mostly known.

12 Horvat, Matejčić, Prijatelj (1982: 735) and Horvat-Levaj (2015: 388), incorrectly state that the facade has Corinthian pilasters.

13 Marković, 2018: 213. It cannot be determined with certainty whether the pedestals were part of the original project or they were designed by the Somazzis when building the church.

14 The new parish church of St. Jerome in K. Gomilica belongs to the group of large churches. It is a longitudinal aisleless building with added chapels and a polygonal apse, of large dimensions, built at the beginning of the 20th c. (1914-1918). By the design of the outer church wall envelope, there are no pure stylistic features that would list it to the previously defined or some new typological groups. The bell tower is detached from the church. Since the architect of the church is unknown, and no architectural surveys of the church construction have been found, the church does not bear any pure stylistic features, plus the fact that it was built at the very end of the modern age, it was not analyzed in detail in this group but rather only listed in general in the Tables I, III, IV and V.

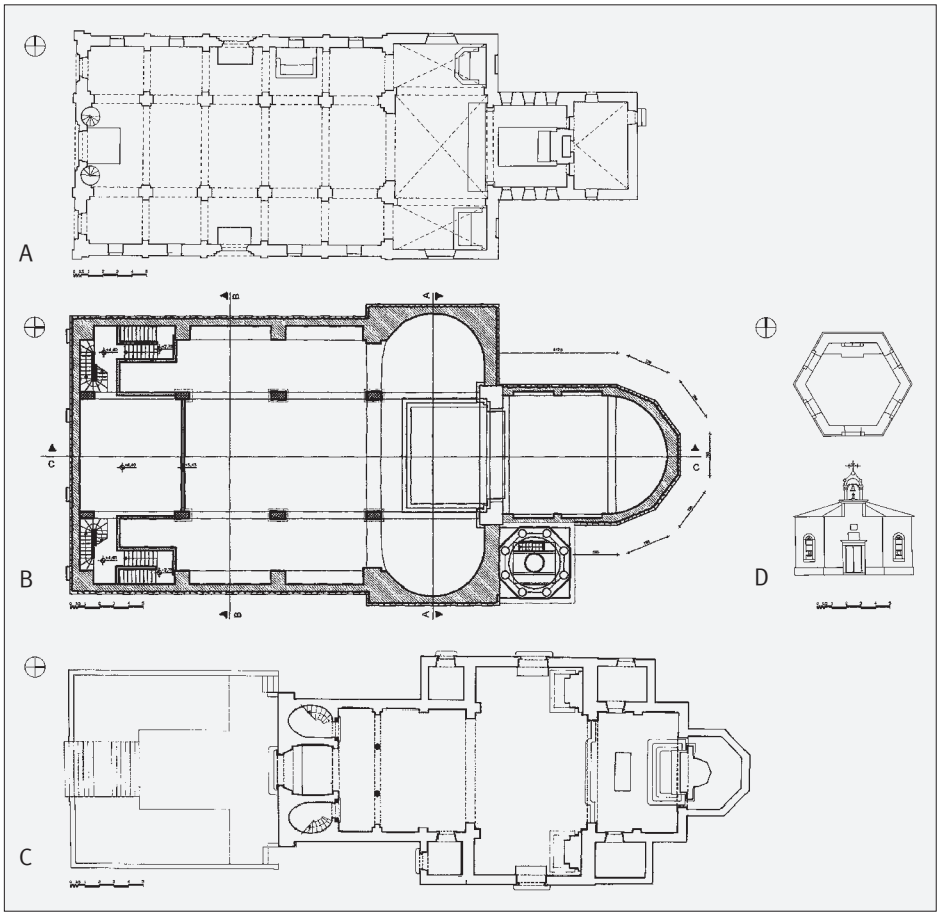

Fig. 8 Facades (up) and ground plans (down) of churches of various types in the Kaštela coastal area (19th and 20th c.): A) K. Novi, St. Peter the Apostle; B) K. Stari, Our Lady of the Rosary; C) K. Kambelovac, St. Michael and Martin; D) K. Kambelovac, St. Lazarus

Neither by their ground plan disposition, nor by their stylistic features do these churches belong to the previous groups and they should therefore be separately determined by type (Fig. 8).[14] Morphologically and typologically all of them are heterogeneous, and some are without pure stylistic features (Fig. 8). In the group of longitudinal churches with aisled ground plan are: Church of St. Peter the Apostle in K. Novi (Duvnjak, 2007) and the Church of Our Lady of the Rosary in K. Stari (Babin, 2005).

Since its construction, the Church of St. Peter the Apostle in K. Novi (1871-1902) was reconstructed several times. The present-day appearance is the result of its historicist design in the 19th c. and neo-Romanesque stylistic features. It is an aisled type with an inscribed transept and rectangular apse with a ground plan in the shape of a Latin cross. It is a basilica-type church (Duvnjak, 2007: 29, 31). Its polygonal bell tower is detached from the church. The church consists of an older part with presbytery, sacristy and lateral

Table III Churches of other types – research results

Churches of other types	Number of churches	Percentage of 16 churches
1. Longitudinal aisled	2	12,5%
2. Central	1	6,25%
3. Longitudinal, Latin cross ground plan	1	6,25%
4. Longitudinal aisleless with with added chapels	1	6,25%

Table IV Churches, stylistic features – research results

Churches-stylistic features	Number of churches	Percentage of 16 churches (14 preserved churches and 2 for which archival data exist)
1. Gothic-Renaissance	2	12,5%
2. Renaissance	2	12,5%
3. Baroque	5	31,25%
4. Late-Palladian style	1	6,25%
5. Historicism	2	12,5%
6. Without stylistic features	4	25

chapels, and the new part designed in the historicist style. The main facade has three parts with an elevated central part ending with a gable. It has three portals of which the central one is larger and has a rose window above. The western, southern, and northern facade bear decorative architectural elements with reference to Romanesque and Gothic elements (Duvnjak, 2007: 33). The Romanesque ones are blind arches connecting shallow lesenes separating window axes, while the Gothic ones are pinnacles. The portals of the lateral naves are smaller and of simpler design. The church interior shows an aisled articulated space. Above the main portal is the choir. Aisles are separated by massive square columns connected by arches above which there are symmetrically placed oculi allowing penetration of natural light. The naves and aisles have ceilings. The presbytery is higher than the level of aisles and walls are open with large windows ending with an arch. It has a barrel vault, while the transept has a groined vault.

The new parish Church of Our Lady of the Rosary in K. Stari (1871-1971) was built during hundred years which led to a number of changes in the project. It does not bear pure stylistic features. The bell tower is attached to the church. The church façade is vertically articulated in three parts, with three portals of which the central one is larger. They are divided by pilasters ending with Ionian capitals. The façade is horizontally divided by a balcony above which two rose windows lie in the central axis. It ends with a semicircular gable. The side facades are open with a series of simple vertically positioned rectangular windows above which there are prominent gables. Hardly noticeable from the church body are the transept walls. The church is aisled and the central nave wider than the aisles, and has an inscribed transept divided in three bays with semicircular endings. Above the main entrance is the choir. The aisles are divided by massive square columns connected by arches. The upper part of the aisles has ceilings. The interior of the apse is semicircular with exterior polygonal walls.

Although both churches are longitudinal and aisled, they have no design or stylistic features in common.

The Church of St. Michael and Martin in K. Kambelovac (1890-1893; Bego, 1991) also underwent a number of reconstructions throughout the ages, which considerably changed its position and appearance. The bell tower was preserved from the previous phase of the church. The present state of the church dates from the 19th c.

It is a longitudinal aisleless church with a Latin cross ground plan. It bears Neo-Classicist features that reflect in simple and symmetrical lines of the facade ending at the top with a triangular gable, at the top of which is a sculpture of the church patron saint. The church façade design shows an inclination towards stylized elements of Roman morphology. Neo-Classicist design of the facade is also evident in reduced details and clean empty wall surfaces, particularly in geometric forms of the building and the simple volume that reflects rationality. The facade has one portal and one oculus in the axis of the portal. The church is in harmony with the plateau in front of it. On the lateral walls there are several oculi at the very top. The transversal nave walls have larger oculi.

In the church interior, the historicist elements of design are visible in the measured tone and cleanliness. The church interior is integral, not divided into aisles. The lateral chapels accentuate the direction towards the presbytery, also defining the ground plan shape of Latin cross. The presbytery is oriented towards the north, elevated two steps above the level of the nave, it is polygonal and has three narrow windows ending with an arch. The presbytery area is graded accentuating thus the direction towards the detached altar with tabernacle placed deep in the apse. The nave walls are articulated by stone pilasters above which is a cornice and windows on top, each with three smaller oculi on each side. A somewhat larger oculus appears on each side of the transept. Lateral walls of the transept each have one entrance. Above the entrance is the choir in the width of the nave.

Table V Time of building, typology and style

OVERVIEW TABLE

SETTLEMENT	MONUMENT (CHURCH)	TIME OF CONSTRUCTION (CENTURY)						TYPOLOGY							STYLISTIC PERIOD FEATURES				
		15	16	17	18	19	20	Aisleless churches of smaller dim. (16th c)	Aisless church with rectangular apse and added chapels	Aisleless churches of larger dim.(17th and 18th c)	Aisleless church with added chapels within the nave (18th and 19th c.) Late-Palladian type	Aisleless churches of larger dimensions	Three-nave	Central	Got.hic Renaissance	Renaissance	Baroque	Historicism	Without stylistic features
Kaštel Sucurac	St. Martin	■																	
Kaštel Sucurac	St. Luke		■					■											
Kaštel Sucurac	St. George			■						■							■		
Kaštel Gomilica	St. Jerome-old parish church				■					■							■		
Kaštel Gomilica	St. Jerome-new parish church						■					■							■
Kaštel Kambelovac	St. Michael and St. Martin					■						■						■	
Kaštel Kambelovac	St. Lazarus					■								■					■
Kaštel Lukšić	Assumption of the Blessed Virgin Mary-old parish church		■						■						■				
Kaštel Lukšić	Assumption of the Blessed Virgin Mary-new parish church				■						■						■		
Kaštel Lukšić	St. John the Baptist		■					■							■				
Kaštel Stari	St. John the Baptist				■					■							■		
Kaštel Stari	St. Joseph			■				■									■		
Kaštel Stari	Our Lady of the Rosary					■							■						■
Kaštel Novi	St. Roch		■					■								■			
Kaštel Novi	St. Peter the Apostle						■						■					■	
Kaštel Štafilić	Immaculate Conception of the Blessed Virgin Mary				■					■							■		
Kaštel Štafilić	St. Lucy				■														
Kaštel Štafilić	St. Bartholomew		■				■												■

The only central modern age building on the studied area is the small hexagonal cemeterial, votive Church of St. Lazarus (1854) in K. Kambelovac without pure stylistic features. It is a modest, utilitarian building, an example of vernacular architecture. It is different from all previously studied churches. The reasons for this may be found in its purpose, but also in the spatial givens on which it was built.

From the results obtained it is obvious that in the Kaštela coastal area, churches of other types are less frequent (Table III), i.e. only (12,5%) aisled, and that other specific types are each represented by one example which amounts to a total of (18,75%).

Stylistic Peculiarities

The analysis of architecture of modern-age churches in Kaštela shows the following features: mixed Gothic-Renaissance, Renaissance, Baroque, Late-Palladian and historicist style. Stylistic features are mostly implemented in architecture by means of architectural elements and less in the spatial concept.

A mixed Gothic Renaissance style appears in 12,5% of churches, with stylistic indications evident in designing architectural elements on the facade: rose windows with the billet motif, pointed arch and bell gable with Renaissance square columns fluted on the front side. Elements of Gothic design vocabulary in the interior are evident in the design of pointed arches above the presbytery and southern chapel.

Renaissance features are present in only several churches, about 12,5% of them. The churches have smaller dimensions. Stylistic features are evident in the definition of doorjambs and lintels of the portal, rose windows and bell gables. In churches with Renaissance features, the presbytery, and sometimes the

nave, still have a pointed vault. Main facades have square or rectangular windows.

Most churches in the Kaštela coastal area bear baroque features, namely 31,25%. They are larger than Renaissance churches. Stylistic features are evident in the definitions of door-jambs and lintels of the main portal and lateral portals of the church. The main facades also have rose windows and bell gables, without any windows by the main portal. Windows on these churches stand high on the lateral walls of the nave, sometimes of the apse, too. They have an elliptical shape with volutes or have a semicircular window. In the church interiors, presbyteries have barrel vaults, while the aisles have flat ceilings with rounded edges. Vaults and ceilings in certain churches have stucco decorations.

A smaller number of churches bears historicist features namely 12,5%. Historicist features can be seen in the design of the church exterior envelope namely in neo-Romanesque and neo-Gothic elements on one church, and neoclassicist elements on the other. 25% churches bear no recognizable stylistic features.

Results of stylistic features on churches in the Kaštela coastal area (Table IV) show that the majority of churches, about 75% bears stylistic features of periods in which they were built, while the minority does not (25%). This is mostly vernacular, utilitarian, folk architecture.

Conclusion

The aim of this paper was to bring a comprehensive synthesis and valorization of Catholic liturgical architecture in the Kaštela coastal area between 1492 and 1918. The chosen period coincides with the period of the modern age, and is specifically applied in this area because it was the time when the castles were built and developed, followed by settlements along the coast, which is a result of tumultuous circumstances in the immediate vicinity. Churches are part of the urban development of settlements.

The spatial frame is limited to the coastal area because in the modern age 18 liturgical buildings were built in that area. The construction of churches corresponds to historical, social and religious circumstances. The beginnings of the construction of churches in the 16th c. show rather modest utilitarian spatial solutions of churches with continued building practice of previous periods. It maintains the traditional ground plan and spatial solutions continuing from medieval liturgical architecture. They reveal the characteristics of the Gothic or Renaissance stylistic vocabulary, however without the Renaissance idea of space. Along with more peaceful historical circumstances, and consequently new financial opportunities of the population and commissioners, the 17th and 18th century saw a more complex architecture with more quality and more elaborate elements and with additions of Baroque stylistic features, following the characteristics of the period, within the context of Central Dalmatian liturgical architecture. The Baroque spatial concept is not present. It is evident at the level of decorative elements and some constructive solutions. This architecture is mostly designed by families of builders and builders active in the Central Dalmatian area. They gave the architecture their personal imprint, thus being different from the ones of previous centuries built by anonymous builders. Slowly gaining economic power, Kaštela became stronger, which encouraged the commission of the only foreign project for the parish church in K. Lukšić, which is the only church built following a foreign pattern, and shows elements of the Late-Palladian concept. This was a significant contribution in terms of style and design. Other churches built in the 19th and 20th c. are heterogeneous in terms of style and type, and often show historicist stylistic features. Historicism also produced large buildings, often stylistically incoherent and of unclear historicist vocabulary, but with a tendency to follow the period movements in construction. Research results show that in the coastal area of Kaštela longitudinal aisleless churches in many variants (68%) are dominant. They are most numerous, and in terms of time and space, the most common, while other types of churches are less common (30%). The analysis of stylistic features of liturgical buildings showed that most churches were built in the Baroque period (31%), while only one or two were built in each other period. The Late-Palladian style church needs to be pointed out – it is the only one built following a foreign pattern (6%). Churches without stylistic features (25%) are those of mostly vernacular, utilitarian, folk liturgical architecture.

The analyses carried out yielded results from which it may be concluded that the most numerous are aisleless churches of longitudinal orientation that vary by dimensions, stylistic features, architectural design elements, interior organization of liturgical space and constructive solutions.

[Translated by Lada Laura;
proofread by Anita Tičinović]

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Sources of illustrations

Fig. 1	https://geoportal.dgu.hr/
Fig. 2	(up): A) Archivio di Stato Venezia; photos: B – M. Bonacin; C,D,E – D. Brajnov Botić; (down): A,C,D,E – D. Brajnov Botić; B) R. Bužančić
Fig. 3	Ground plan: S. Machiedo; photo: D. Brajnov Botić
Fig. 4	(up): photos: A,B,C – D. Brajnov Botić; D – DAZD; (down): ground plans: A – Đ. Barać, M. Žic; B – M. Žic; C – Geoing; D – D. Brajnov Botić
Fig. 5	https://www.researchgate.net/figure/Section-of-the-Redentore-church-Source-Drawing-by-Ottavio-Bertotti-Scamozzi-1783_fig5_316104737 (accessed 29.3.2021.)
Fig. 6	Photo: Z. Barišin; ground plan: D. Brajnov Botić
Fig. 7	Ground plans: A,C,D,E – D. Brajnov Botić; B – R. Bužančić
Fig. 8	(up): A,C – photos: Z. Barišin; B,D – D. Brajnov Botić; (down): ground plans: A – M. Žic, Đ. Barać; B – Anić, d.o.o.; C – K. Jelaska; D – J. Tadin
Tables I-V	Authors

Authors' biographies and contributions

Doroti Brajnov Botić, Ph.D., is senior lecturer at the Arts Academy of the University of Split. Her research is focused on Modern Age liturgical architecture in the area of Kaštela and its surroundings. She has authored a number of scholarly and professional papers.

Zorana Sokol Gojnik, Ph.D. is an associate professor at the je Faculty of Architecture of the University of Zagreb. Her focus of interest is sacred liturgical architecture. She teaches "Sacred Architecture" and leads the research project "Croatian Sacred Architectural Heritage in front of the Challenges of Renovation" at the Faculty of Architecture of the University of Zagreb.

The main contribution of co-authors: conceptualization: D.B.B. and Z.S.G.; methodology: D.B.B. and Z.S.G.; validation: D.B.B. and Z.S.G.; formal analysis: D.B.B. and Z.S.G.; investigation: D.B.B.; resources: D.B.B.; data curation: D.B.B.; writing – original draft preparation: D.B.B.; writing – review and editing: Z.S.G.; visualization: D.B.B.; supervision: Z.S.G. Both authors have read and agreed to the published version of the manuscript.

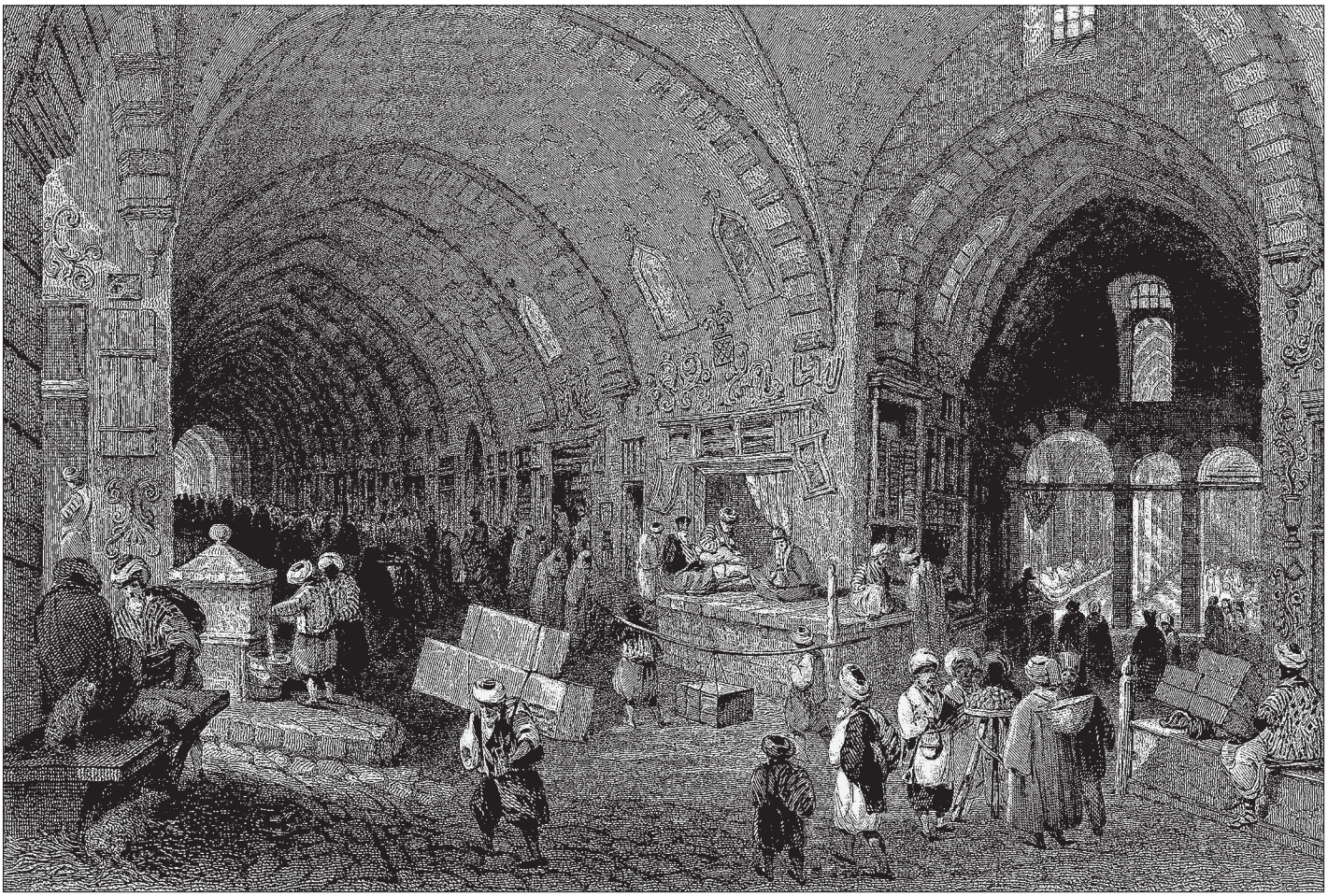

Fig. 1 Engraving of the Grand Bazaar by W.H. Bartlett

Tuba Akar

Mersin University, Faculty of Architecture, 33100 Mersin, Turkey
https://orcid.org/0000-0002-9193-5615
tubaakar@mersin.edu.tr

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Ottoman Bazaars in Anatolia and the Balkans
An Overview of Influences in Defining Spatial and Architectural Qualities

Anatolia
Balkans
bazaar
historic commercial space
Ottoman city bazaars

Bazaars were spaces that formed the center of the cities during the Ottoman period, had a certain order, and were shaped spatially and architecturally depending on the geographical-topographical characteristics and commercial potential of each city. Proximity to the citadels, connection with city gates and main roads, relations with Friday mosque and other public buildings in the city were the main factors shaping the bazaar spatially. In bazaars, where *bedesten* and khans, and in some cases covered bazaar-*arasta*s, appeared on a building scale, shops that lined on open or covered streets formed the architecture of the bazaar. In addition to these, the sovereignty and order established by the state over trade during the Ottoman period, the institution of waqf, and the guilds of tradesmen also played a decisive role in the bazaar. With the bazaars examined, it is concluded that while administrative and commercial influences in the shaping of bazaars in Anatolian and Balkan cities during the Ottoman period created bazaar spaces with similar qualities, urban inputs led to the differentiation of bazaars in terms of scale and spatial and architectural qualities.

INTRODUCTION

"*The Great Bazaar has nothing exteriorly to attract the eye (...). It is an immense stone edifice (...). But once inside you stand bewildered. It is not an edifice, but a labyrinth of arcaded streets (...). Every street is a bazaar, almost all leading out of one main street (...) a long confused perspect of bazaar (...). The confusion, however, is only apparent. This immense bazaar is ordered like a barrack (...)*"

(DE AMICIS, 1878: 75-76)

In the 19th century, Edmondo de Amicis, who visited the Grand Bazaar during his visit to İstanbul, mentioned that behind the chaos of this bazaar, there was a very strict order, and that people could find what they were looking for within a few hours without needing anyone's guidance.[1] The bazaar in Ottoman culture always attracted the attention of western people. Because bazaars were lively shopping centers where men and women, young and old, Muslims and non-Muslims, foreigners and locals, and all segments of society could meet their needs. Thus, the bazaar, which was an important center of people's daily lives in the Ottoman Empire, was also the place where European travelers visiting the Ottoman Empire visited and learned about Ottoman people, culture, trade, and commercial spaces (Fig. 1).[2]

The city's bazaar included commercial spaces of various qualities, consisting of *bedesten*s, khans, covered/open bazaar-*arasta*s, and shops, as well as other public spaces such as mosques, baths, fountains, and coffee houses.[3] Furthermore, bazaars were not only made up of the built environment, but also marketplaces, which were open spaces for the sale of fruits and vegetables or animals, and fairs[4], which were established in certain periods, were also developed in or near the bazaar area. Thus, bazaars, with their buildings and open spaces, formed the commercial centers of the cities in the Ottoman period.

In fact, the commercial centers of cities in Islamic societies, bazaars, markets, or *sûk* (in Arabic), have similarities in their spatial layout and architecture as well as regional and cultural differences. In Islamic cities, the bazaar, located in the center of the city, had a public character as the commercial zone of the city, and developed in a spatially regular layout (relatively straight and vertical streets) where commercial, religious, and other social buildings were located. The neighbourhoods, on the other hand, surrounding the commercial center had an irregular, organic morphology as private zones (Raymond, 2008a: 59-62). This is the main feature that distinguishes the Islamic city from other cities. In the spatial development of the bazaar within this general setting of the Islamic city, the trading patterns of pre-Islamic societies and the religious, economic, social, and political inputs after Islam were effective (Gharipour, 2012: 27-51). Here, the commercial potential of cities (location, production and industry), as well as functional and regional characteristics that influenced architecture (factors such as security, nature of goods and trade, construction materials, climate), shaped bazaars of different sizes. For example, bazaars in the cities such as Isfahan, Yazd, Tabriz, Aleppo, Cairo, and Tunis were much larger and more complex. According to Raymond (2008b: 740), the fact that there were 5000 shops in the bazaar of Tunis in 1860, 6600 shops in Damascus in 1871, and 20,000 shops in Cairo in 1729 indicates the size of the bazaars of these cities. In fact, there were 4399 shops in the Grand Bazaar of İstanbul in 1886 (Eyice, 1992a: 512). This situation shows that the bazaars developed on different scales in the cities of the three continents where the Ottoman Empire ruled.

Actually, the urbanism and architecture that developed in this vast territory dominated by the Ottoman Empire were similar in the Anato-

1 In his travelogue, de Amicis (1878: 71-94) described the Grand Bazaar in great detail, street by street, without omitting any detail.

2 The Grand Bazaar, the most frequented place by travelers visiting the Ottoman Empire, was also described in Miss Julia Pardoe's book and visualized in W.H. Bartlett's drawings.

3 In cases where some of the terms used in the article do not have a common English equivalent, such as *bedesten*, *arasta*, the original version in italics is preferred. Others are expressed in words with common English equivalents, e.g. khan, shop, Friday mosque. However, in proper names such as Bursa Bedesten, the word is used without italics.

4 Established in the 16th and 17th centuries in the Balkans rather than Anatolia, fairs were organized for about a week or fifteen days at certain times of the year, inside or outside the city, linked to caravan trade, and developed in conjunction with waqfs established by the Sultan or senior courtiers (Faroqhi, 1978).

lian and Balkan cities in terms of scale and characteristics. However, there was an architectural and urban unity created by the cultural geography of the area covering western Anatolia and the Balkans, defined as the core area of the Ottoman Empire (Cerasi, 1998: 129-132). Nevertheless, the similarity of the built environment also depends on the fact that the fief system, on which the military, administrative, and land cultivation of the state was based, was mainly implemented in the Anatolian and Balkan provinces (İnalcık, 2012). Moreover, while architectural production and the patronage behind it were similar in provincial cities such as those in Anatolia and the Balkans, they developed under the influence of the center, İstanbul.[5] The construction of mosques in the conquered territories, indicating Ottoman dominance, took place rapidly, with models (projects) sent from the center, and materials and labour supplied locally (Kiel, 1990: IX-XV, Hartmuth, 2011). Even if the city was located on trade route, a bazaar was built along with the mosque. Moreover, the Ottoman urbanization policy established in the early period in Anatolia with T-plan mosques was also applied in the Balkans (Boykov, 2015, 2011). Pinon (2008) describes the cities that emerged as a result of these urbanization policies implemented by the Ottomans in the Balkans as the 'Ottomanisation of Balkan cities', rather than Ottoman cities. This is because the Ottomans built on the pre-existing settlements.[6] However, there were many cities in the Balkans where the residential fabric was intensively developed with Ottoman identity (Pinon, 2008: 150).

As the Ottoman construction and urbanization in Anatolia and the Balkans interacted, the characteristics and scale of the bazaars established in Anatolian and Balkan cities varied according to the economic potential of the city and its location. Factors such as being on commercial and military routes, being dominant in the trade of various goods (eg. silk trade in Bursa, mohair trade in Ankara) influenced the shaping of the bazaar space. While much larger-scale bazaars developed in cities such as İstanbul, Bursa, Ankara, and Kayseri, smaller-scale bazaars were formed in other Anatolian cities and cities such as Skopje and Sarajevo in the Balkans. Ultimately, this is also due to the fact that the Ottomans established a trade organization in the Balkan cities similar to that in Anatolian cities (İnalcık, 2005: 34-35), and that a significant proportion of religious and commercial buildings in the Balkans were endowed by Ottoman sultans or the ruling elite.

Previous Studies, Aim, and Methodology

Urbanization and architecture in Anatolia and the Balkans during the Ottoman period have been the subject of many studies. While most of these studies focus on religious buildings and urbanization, studies on bazaars and commercial buildings are relatively limited. Among these, Cerasi's (2001) study of the Ottoman city is important in terms of the place of the bazaar in the city and the spatial analysis of building types. Kuban's (2007) book *Ottoman Architecture*, on the other hand, stands out for its analysis of the bazaars on an urban and architectural scale in the geography dominated by the Ottomans. Pinon's (2008) article entitled *The Ottoman Cities of the Balkans* discusses the nature of the Ottoman urban fabric in the Balkans, its connection to Anatolia, and the place of the bazaar within this fabric. In addition, Kiel's (1990) book on architecture in the Balkans and general assessments of Ottoman building processes in the Balkans in the introduction part provide important details. Ayverdi's (2000) three-volume study of Ottoman architectural works in Europe, which analyzed these works both from historical documents and in-situ, is a valuable source for including commercial buildings that still exist or have been lost.[7] Indeed, the findings of Turan and İbrahimgil's study (2004) suggest that a significant proportion of these buildings no longer exist.

Among the existing literature focusing on bazaars in the Islamic city, Gharipour's (2012) *The Bazaar in the Islamic City* deals with bazaars in the wider Islamic geography, including the Ottoman Empire, while Raymond's (2008a, 2008b) two articles in *The City in the Islamic World* evaluate the bazaar in Arab cities in different contexts. The pioneering works of Özdeş (1954) and Cezar (1983) stand out among the sources analyzing the urban and architectural characteristics of the bazaars developed in Anatolia during the Ottoman period.[8] On the other hand, Tankut (1973) and Ergenç (1980)

5 Hartmuth (2011) divided architecture that developed in the Balkans into four periods as polycentrism, centralism, decentralisation and recentralisation in the context of the relationship between the center and its periphery, and discussed architecture in the context of the patronage.

6 Pinon (2008: 156) stated that only Sarajevo was founded by the Ottomans in the Balkans, while other cities already existed.

7 This work, the first edition of which was published in four volumes in 1975, was republished in three volumes in 2000. The study provides information on almost 20,000 buildings in the Balkans (Kiel, 1990: xi).

8 Akar (2009a) states that bazaars and its buildings have been examined separately by different disciplines such as urbanism, architecture, art history and history, and that interdisciplinary studies are required for their more holistic evaluation.

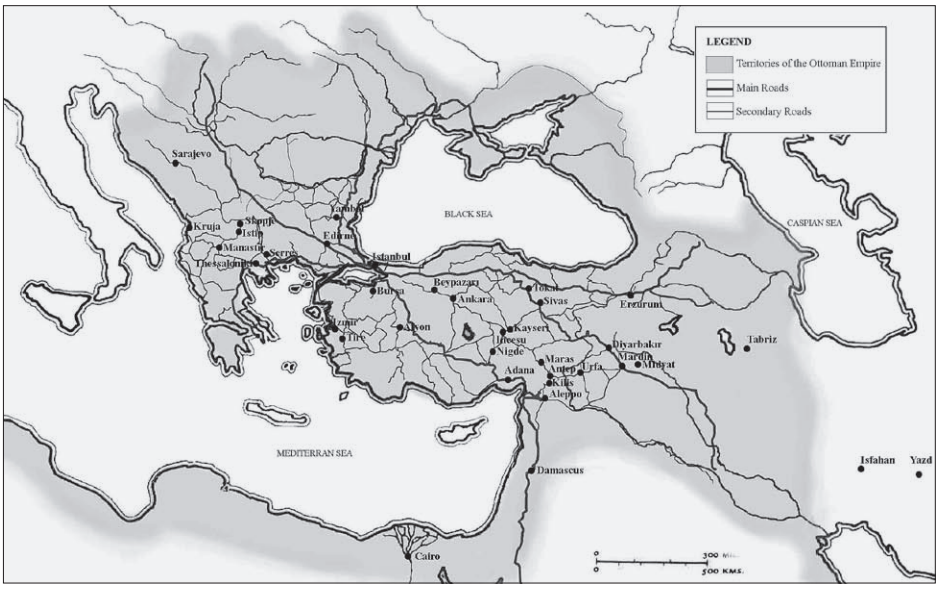

FIG. 2 THE LOCATION OF THE CITIES WHOSE BAZAARS WERE MENTIONED IN THE ARTICLE WITHIN THE OTTOMAN TERRITORIES AND ROAD NETWORK

have analyzed the spatial distribution of commercial functions in the bazaar and the influence of artisan guilds. Among these sources, Cezar (1983) discussed the bazaars together with the area covered by the Ottoman geography and examples of bazaars in other Islamic countries, and also partially touched upon the bazaars in the Balkans.[9]

Although the subject has been addressed in many studies, the inputs that shape the bazaar space were much more comprehensive and included differences across the vast geography of the Ottoman Empire. In this context, this study aims to contribute to the existing literature by investigating the spatial and architectural qualities that constituted the bazaar space, and the factors that shaped it in Anatolia and the Balkans, where the architectural and urban unity rather than variety was shaped by cultural geography of the Empire. At this point, it can be asked: What were the common features that determined the identity of the Ottoman bazaars in Anatolia and the Balkans, and what were the factors that shaped the bazaar? In order to answer this question, the article aims to identify the spatial and architectural character of the bazaar, and the administrative and commercial factors that formed it. Accordingly, the article analyzes the subject by overlapping information from documents[10] and field data. Therefore, the administrative role of the state, guilds and waqfs in shaping the bazaar space in the Ottoman city were analyzed, and the impact of the trade and goods on the bazaar space were revealed. In addition, the spatial inputs that determine the location of the bazaar within the city and the architectural characteristics of the buildings that make up the bazaar were discussed in the context of explaining the bazaar in the city as a whole. Since these bazaars were generally formed in time, the examples of the bazaars and commercial buildings analyzed in this study were built in different periods.[11] However, although the bazaars were generally shaped until the end of the 16th century both in Anatolia and the Balkans, there are also examples built or rebuilt until the 19th century, especially in Anatolia (Fig. 2).

ADMINISTRATIVE AND COMMERCIAL FACTORS IN SHAPING THE BAZAAR

During the Ottoman period, the formation and shaping of bazaars in cities was not random but was planned by the administrative and commercial mechanism established by the state. Within this mechanism, the size and quality of the bazaar were linked to the commercial potential of the city. This trade could be from rural to urban, as well as inter-regional or inter-country trade. It is possible to talk about various factors that determine how this commercial potential shaped the space.

The administrative and economic structure of the state was most influential in the spatial shaping of the city's bazaar. The state made various regulations in order to ensure that trade in the bazaar was safe, continuous and of a certain order and standard, and that it was accessible to the public on comfortable and equal terms. As an example of how the bazaar should be organized, a 15th century law regulating the prices of goods and food stated:

"*For every good that comes from the provinces to the city to be sold, no one from the people of the city should meet that good and take it. Every good should come to the place allocated for it in the bazaar. For example, every type of nut should come to the nuts market. Let everyone see it there, let everyone*

9 Among bazaars in the Balkans, the Skopje bazaar has been the subject of many studies with its relatively preserved condition. The spatial quality, values and changes of the Skopje bazaar were discussed comprehensively in Krstikj's doctoral thesis (2013), whereas İbrahimgil's study (2022), comparing the historical bazaar of Skopje with other bazaars in Anatolia and the Balkan geography showed that the bazaars underwent rapid change and lost their character due to factors such as war, earthquake, fire, reconstruction actions.

10 These documents are mostly published works and some are based on archival documents. There are also original data such as cadastral maps.

11 Although some bazaars in Anatolia can be traced back to the Seljuk and Principalities periods, it should be noted that they were mainly developed and shaped during the Ottoman period.

12 This text, mentioned in Taş's (2010: 12) article citing the code published by Ottoman historian Ömer Lütfü Barkan (1942), was written in Ottoman Turkish. It was simplified and translated into English by the author.

take a piece as much as they need, not one person should take it all (...) and even fish and caviar should come to the bazaar and be shared there, and even flax should come to the flax bazaar and be shared there (...) or the official of each commodity should allocate a share, and the one who does not come can take it later."[12]

Thus, the state wanted every good sold to come to the bazaar and market allocated for it and to have a fair trade there.

Based on the practices reported in historical sources, the spatial characteristics of the bazaar were determined as follows (Ergenç, 2013: 171-173):

– Having a separate place for each good offered for sale in the bazaar, making it a place known by everyone, useful and convenient for the public.

– Commercial activities in the bazaar have an order (such as the unit of measurement, the quality and price of the goods sold) determined by laws and traditions.

– The goods traded must be in demand and must be delivered fairly to those in need.

– Collecting taxes on the goods traded in the bazaar, and having officials for this purpose.

Thus, while establishing both commercial and spatial order in the bazaar, the state also aimed to record the commercial goods and collect taxes.

The marketing and taxation of the goods produced in the Ottoman lands were also carried out in the bazaars under the control of the state. In particular, the nutritional needs of the people were provided from the rural areas on the periphery of the cities and towns and it was envisaged that the products grown in the countryside would be brought to the closest market (Taş, 2010: 12).[13] As a matter of fact, the nature of the goods sold and the trade carried out in these bazaars shaped the space. In the bazaar, there were market areas where foodstuffs or animals from the countryside were sold. These could sometimes be open spaces, especially weekly markets where there were livestock sales or vegetables and fruits were sold on wooden *sofa*s (stalls), or closed spaces consisting of shops in the form of *arasta*, such as the bazaar of nut vendors, molasses bazaar, etc. In addition, in the closest bazaars to which the countryside was commercially connected, spaces characterized as *kapan* or *kapan* khan functioned as places where commercial goods were weighed and taxed. This could be seen in the bazaars of many cities, such as cotton *kapan*s and wheat *kapan*s, or it could be independent of the type of product, as in the Skopje Kapan Khan.[14] In addition to these, the bazaar had to be equipped with secure, castle-like *bedesten* buildings where valuable goods from inter-regional or inter-country trade could be sold, as well as commercial structures such as khans where merchants could both market their goods and stay.

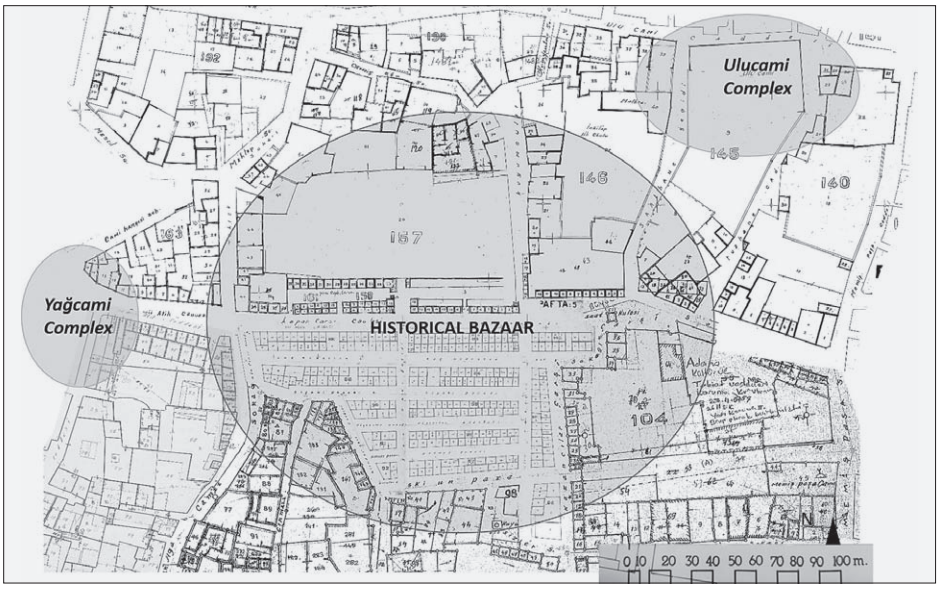

Fig. 3 Historical bazaar and the two complexes, all were the waqf of Ramazanoğlu

Tradesmen's guilds also had an impact on the spatial organization within the bazaar, and had regulations on the quality and quantity of commercial space (Kal'a, 1994; İslamoğlu, 2017). The Ottoman tradesmen's guilds, which were founded on the tradition of *ahilik*[15], applied an order in the shaping of the commercial space in which the business lines were positioned according to the *bedesten* (Ergenç, 1980). Issues such as the spatial proximity of interrelated tradesmen, such as the spatial proximity of butchers, candle makers and soap makers in the raw material-production

13 This was not the case for some raw materials or some cities. For example, İstanbul could procure raw materials from all other cities, or although mohair was produced in a widespread area around Ankara, it had to come to the Ankara market, not to the closest market (Kal'a, 1994: 428).

14 The word *kapan* means trap in modern Turkish and figuratively means trick. However, in Ottoman Turkish, it means the official big scale where the goods were weighed. Skopje Kapan Khan takes this name because the goods came here, were weighed and taxed in it, just like in the *kapan* khans in many Anatolian cities. Therefore, it was not due to the high security offered by the khan as Hartmuth (2016: 5) stated.

15 This organization, which was based on religious and moral foundations, played an economic and political role in Anatolia during the Seljuk period, but in the Ottoman period it became an institution that only regulated the administrative affairs of tradesmen's guilds from the 15th century onwards (Kazıcı, 1988).

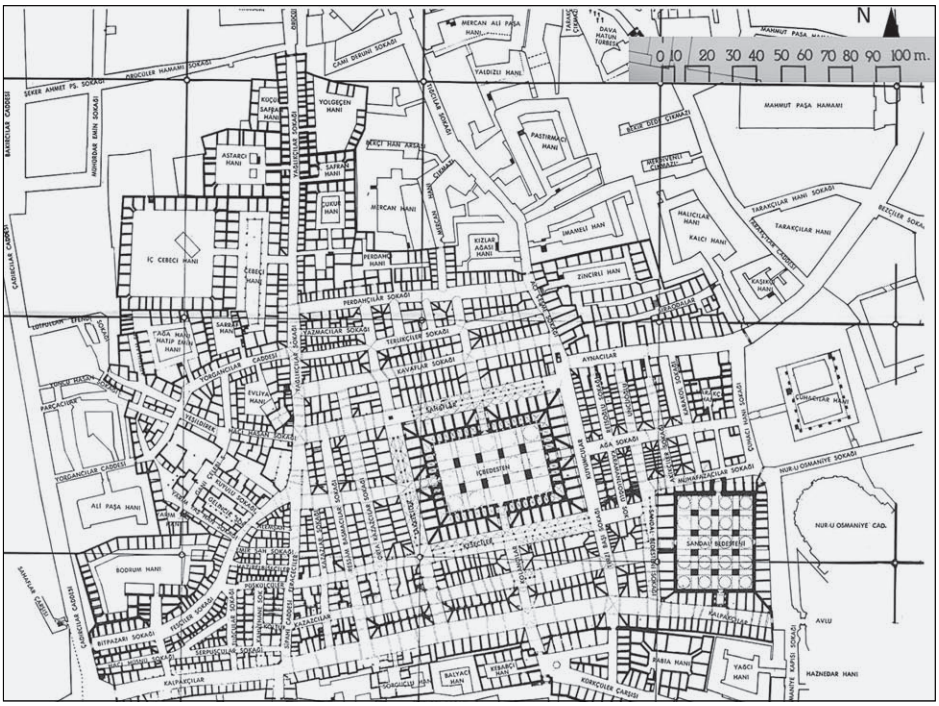

FIG. 4 GENERAL PLAN OF THE GRAND BAZAAR

relationship[16]; the determination of a place in the city for some tradesmen groups, such as the location of tannery engaged in leather-working on the periphery of the city, on the water's edge for public health and hygiene; or the number of tradesmen and related shops were all under the control of the guilds.

Another effective mechanism in bazaars was waqfs because in Ottoman building construction practices a significant portion of public buildings and even residences were built through waqfs or connected to a waqf after their construction, which made the waqfs effective in the bazaar.[17] The shops, khans, and *arasta*s in the bazaars could belong to separate waqfs, or the entire bazaar could belong to a single waqf. For example, the new bazaar established in Adana in the 16th century was a waqf of Ramazanoğlu Piri Pasha, the ruler of the region, and was endowed to generate income for the two complexes (Ulucami and Yağcami) in the city (Fig. 3). The waqfs used the income from the rent-generating waqf properties within the bazaar (either rental income from leased properties or profit/income in cases where the waqf operated the property itself) to cover the functional costs of the buildings of the waqf, such as mosques and madrasas. Waqfs also spent their income on the repairs of the properties belonging to the foundation.[18] Thus, waqfs were active and effective in the city's bazaar as property owners, operators of the buildings, as well as institutions that undertook the maintenance and repair of the buildings.

SPATIAL AND ARCHITECTURAL QUALITIES OF THE BAZAAR

In the city, in order for the bazaar to be administratively and commercially safe, accessible, and controllable, it had to be established and developed in a location that was spatially appropriate to the topography of the city. In this context, the bazaar in the city developed in the immediate vicinity of the citadel or city wall, and was located in the most convenient and easiest place for human transportation, taking into account the topography and the port and/or road network of the city within the scope of sea and/or land trade (Cezar, 1983: 35-58). The fact that the administrative and military administration of the city was located in the citadel also played a role in the positioning of the bazaar close to the citadel or city walls (Şahinalp and Günal, 2012: 155). In addition, the commercial area in the city developed between the Friday mosque and the *bedesten*, and that a functional gradation was formed around the *bedesten* (Cerasi, 2001: 119-120).[19] Depending on the value of the goods sold, there was a proximity to the *bedesten*, while khans, craft districts, tanneries, and marketplaces spread from the center of the *bedesten* towards the periphery. Depending on the topography of the city, this spread was characterized by the settlement of commercial activities on a main axis known as Uzunçarşı[20] Street, or Bazaar Street, which was generally located around the *bedesten*.

When the location of the historical bazaar in the cities and the shaping of the bazaar were

16 Fat obtained from butchers was used to make candles and soap.

17 For detail, see: Cezar, 1983: 261-282.

18 For detail, see: Akar, 2009b.

19 In addition to Cerasi's publication titled Ottoman City, other Turkish sources such as: Ergenç, 1980; Tankut, 1973 and 1975; Kuban, 1968 have similar arguments.

20 It means elongated bazaar, taking its name after its form, shopping units aligned on both sides of the street.

21 In the development of Skopje bazaar, the fact that the bridge built over the Vardar, like the slope, was an important factor providing accessibility, enabled the city's bazaar to develop as a regional center (Hartmuth, 2006: 4-5).

22 The importance of the road network passing through the city in the spatial development of the bazaar in Tire, an important commercial center in the Aegean region between the 14th and 16th centuries, is emphasized in Caner Yüksel's (2015) study.

23 Inside the *bedesten*s there were lockable compartments called chests, cupboards, cellars, or safes. Both bazaar tradesmen and wealthy people used to bring their valuable goods to the *bedesten*s and store them in the rented compartments. In addition, official documents, such as books belonging to tradesmen's guilds and court registers, were also kept in the *bedesten*s.

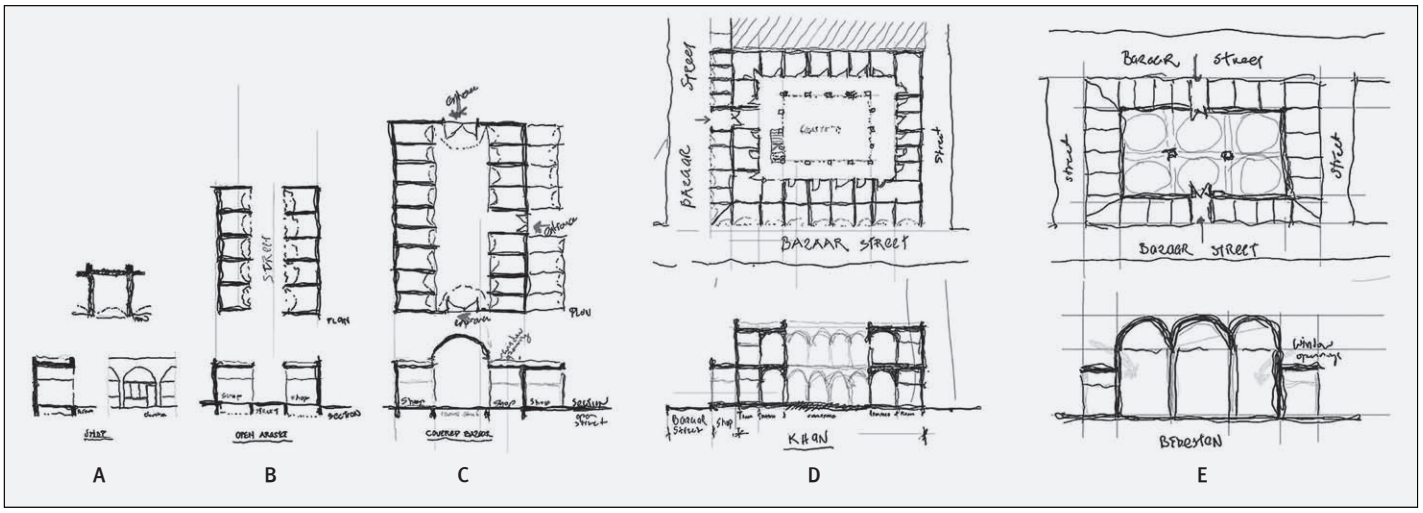

Fig. 5 Schematic drawings (plans & sections) of the commercial buildings in the bazaar: A – shop, B – open *arasta,* C – covered bazaar, D – khan, E – *bedesten*

analyzed, it was seen that the bazaar was close to the citadel in the city. However, in cases where the citadel was located at a higher level than the urban area, as in Maraş, Antep, or Skopje[21], the bazaar was located at the skirts of the citadel, at a lower level and on an area with less of a slope. In Ankara, the bazaar, located between the two city walls, was situated partially up and down, taking into account the slope of the area. In Adana, Diyarbakır, and Tire, where the slope of the land was relatively low, the bazaar was located on the main street where the city gates opened, or on the main road passing through the city, and in relation to Friday mosque and other public buildings, rather than in proximity to the inner citadel.[22] In Bursa, the bazaar was located between the Friday mosque and the *bedesten* and along the Uzunçarşı Street.

The bazaar of the city consisted of shops, khans, *bedesten*s and covered bazaar-*arasta* on a building scale, while the rest was made up of streets (Kuban, 2007: 602). In fact, it is possible to say that the street was dominant in the bazaar when the quality and number of shops in terms of scale and the relations they established with the street were taken into consideration. As a matter of fact, the Grand Bazaar in İstanbul (Fig. 4), which had 61 streets (Ergin, 1945: 361), was a complex of streets. The shops, which were the most numerous and the smallest unit of the bazaar, surrounded the facades of the *bedesten*s and khans and came together around a covered or open street to form *arasta*s and artisan bazaars (Fig. 5).

The *bedesten*, the central structure, the heart of the bazaar in the city, was the building where valuable goods were sold or stored.[23] The presence of a *bedesten* indicated the presence of international trade in the city (İnalcık, 1980:2). However, although there was generally one *bedesten* building in most of the cities, there were more than one bedesten in cities with larger and more developed trade such as İstanbul, Ankara, Kayseri, Sivas and Sarajevo.

*Bedesten*s were generally built in a spatial arrangement in the form of a large single space with several domes or a covered bazaar-*arasta*. *Bedesten*s in cities such as İstanbul, Bursa, Edirne, Sarajevo (Bursa Bedesten), Istip, Thessaloniki, Serres, and Yambol belonged to

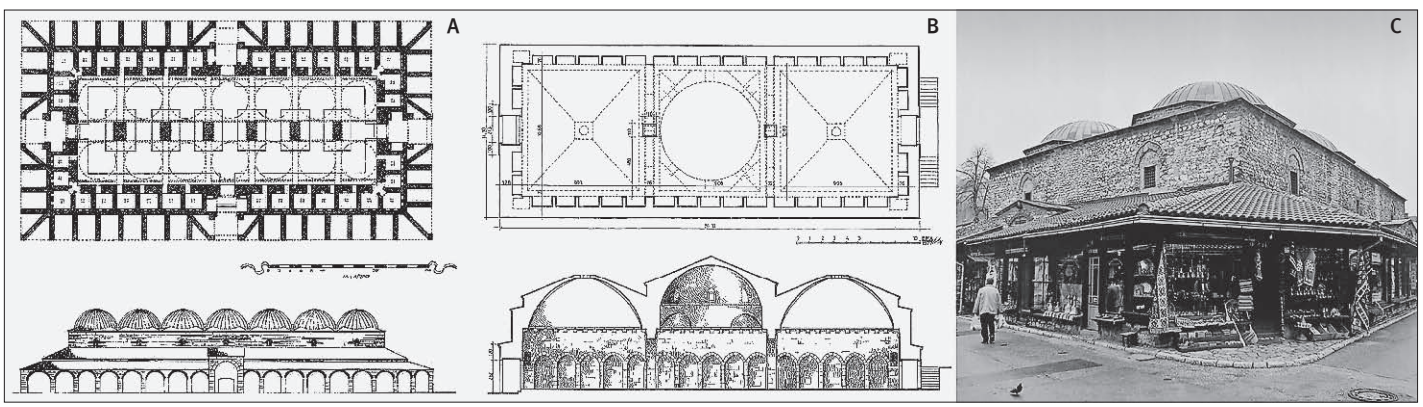

Fig. 6 Bedestens of: A – Edirne, B – Istip, C – Sarajevo (This building, known as Bursa Bedesten, is one of the two *bedesten*s in Sarajevo.)

FIG. 7 COVERED BAZAARS OF: A – EDIRNE ALI PASHA, B – EDIRNE SELIMIYE, C – MANASTIR

multi-domed space group (Fig. 6). Such *bedesten* buildings were square or rectangular in shape, their walls were made of stone masonry, and their domes were usually covered with lead. The structure, which was as strong as a fortress, could only have small window openings with iron bars on the upper level of the walls. Generally, there were doors opening to the bazaar in four directions, and there were masonry shops adjacent to the building on four sides. Examples of the *bedesten* buildings as covered bazaar-*arastas* are the bedestens in Beypazarı, Antep (Zincirli Bedesten, Kemiksiz Bedesten), Niğde, Adana, Afyon, Gazi Hüsrev Bey Bedesten – another *bedesten* in the bazaar of Sarajevo, and the *bedesten* in Manastır. These buildings called *bedestens* (Gaziantep, Niğde, Adana and Sarajevo examples) consisted of shops lined up on a covered street. The Beypazarı Bedesten, on the other hand, was in the form of an open *arasta*, but the fact that the *bedesten* had doors opening to the street made it a more specialized and secure structure. There were also examples of both a large domed space and a covered bazaar-*arasta* surrounding it, such as the *bedestens* in Ankara and Tokat.

Apart from those called *bedestens*, there were also commercial buildings called *arastas* or bazaars, which were spatially covered bazaar-*arastas* (Fig. 7). These consisted of shops located around a covered street, and the building, which was massively closed to the outside, was perceived as a building with doors opening to the outside at the ends and in the middle of the inner street. For example, the *arasta*, which was added to the Selimiye complex in Edirne to generate income, was a covered bazaar-*arasta* structure. In this case, often similar or different tradesmen groups could be together in these bazaars. Edirne Ali Pasha Bazaar, İstanbul Spice Bazaar, Sipahi and Gelincik Bazaars in Bursa, and the covered bazaars in Mardin, Midyat and Urfa were similar structures.

However, bazaar-*arasta*s consisting of shops located on an open street within the bazaar were more common (Fig. 8). They were usually areas where shops belonging to the same tradesmen group were together. For example, names such as shoemakers' bazaar or coppersmith bazaar indicated that the same tradesmen were together. The bazaar-*arasta* was no longer a building, but a street and shops lined up around the street. These

FIG. 8 OPEN BAZAAR-*ARASTA*S OF: A – ANTEP, B – ADANA, C – MARAŞ

Fig. 9 Shops: A – a shop facade in Maraş Bazaar; B – a shop facade in Beypazarı Bazaar, its metal shutters were folded at both sides; C – timber shutter of a shop in İncesu Arasta

streets can be observed in many bazaars in Anatolia, as well as in bazaars that still preserve their textural characteristics in cities such as Skopje (Eski Çarşı), Sarajevo (Başçarşı), Manastır, and Kruja in the Balkans. In some cases, these streets consisting of bazaar-*arasta*s may have been covered.[24] However, this cover is only to cover, shade, and protect the street from climatic conditions such as sun and rain. In this case, there are no doors on the bazaar-*arasta* street.

The shop, which was the smallest unit of commercial spaces in the bazaar, whether it was in a covered or open bazaar-*arasta*, or adjacent to a *bedesten* or khan, was usually completely open to the street and surrounded by masonry walls on the other three sides (Fig. 9). The street-facing facades of the shops were closed with timber (or metal) shutters in the evenings. Shops may have had cellars or basements on the lower levels for storage purposes.

Another type of commercial building in historical bazaars was the khans. The classical spatial scheme of khans consists of a courtyard in the center, porticoes surrounding the courtyard and rooms placed behind the porticoes. Although this scheme remains the same, the outer boundaries of the khan were shaped according to the lot on which it was located. In addition to the typical scheme, different spatial analyses were rarely applied. For example, the İzmir Kızlarağası Khan was more like a complex of *arasta*s than a khan (Kuban, 2007: 395) or Erzurum Taşhan was an architectural solution in a cold climate with an atypical plan scheme.[25]

Depending on the street situation, shops may have been located on the exterior facades of the khan. Generally built as two-storey masonry, the khans may have rarely been built with three storeys or have a basement depending on the slope of the land. Basement floors were usually designed as stables, as in the case of the Ankara Çengel Khan. In khan buildings with two courtyards, such as the Bursa Koza Khan, Edirne Rüstempaşa Caravanserai[26] or Skopje Kurşunlu Khan, the stables were located in the second courtyard (Fig. 10). In addition to the stables, khans may have also contained a masjid, a fountain, a latrine or, in some cases, a bath as in the Ankara Suluhan. Although the khans were located in the bazaar within the city, since the khan doors were locked at night (closed after the evening prayer and opened after the morning prayer), the bathing, ablution and worship needs of khan residents were met.

Discussion and Conclusion

As Edmondo de Amicis points out, the order in the bazaar, the organization of space in such a way that one could easily find what one was looking for, was in fact an indication that the basic goal stated in the Ottoman laws had been spatially achieved. While the laws stipulated that the bazaar should be accessible, useful, and convenient for the public, this required a very clear order behind the chaos of the bazaar. This order was provided

24 In addition to these street covers, which are thought to be original, there is a tendency in many historical bazaars in Anatolia today to cover the streets with current interventions, either with primitive solutions by tradesmen or projected by municipalities.

25 Cezar (1983: 217) stated that the upper floor of this khan, which has an atypical plan, was designed as a *bedesten* and grouped it as a floor *bedesten*.

26 Caravanserais were generally built in Anatolia during the Seljuk period on the commercial road network, outside the city, for the safe travel and accommodation of travelers. In the Ottoman period, caravanserais were built as part of the *menzil külliye*s on the pilgrimage route, outside of the city or on its periphery. However, there were also a few examples where some khans within the city were referred to as caravanserais.

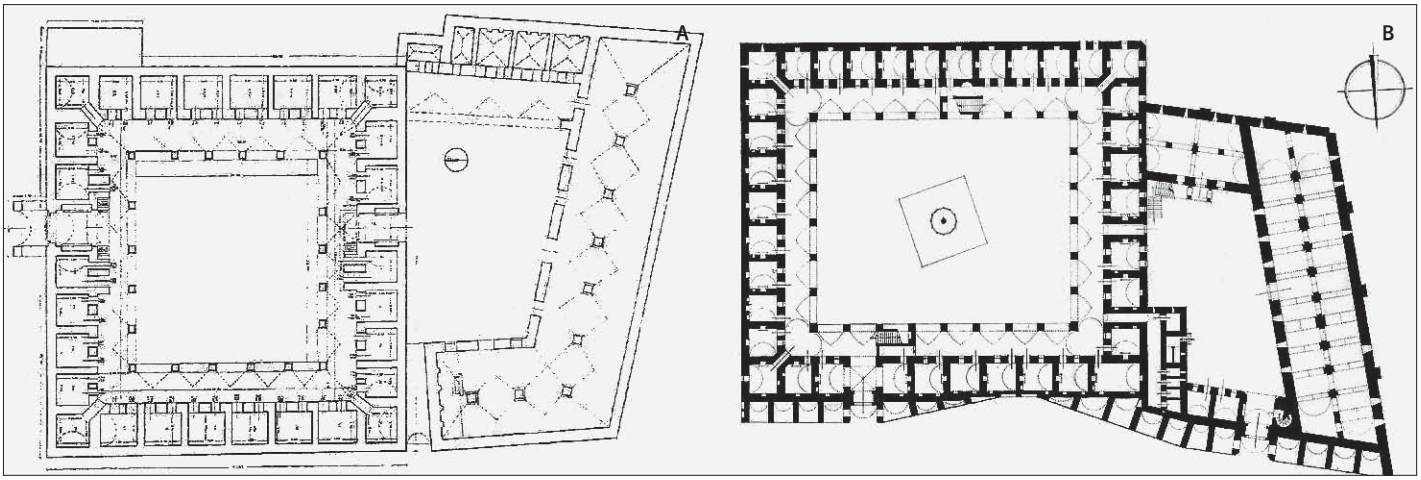

Fig. 10 Plans of the khans: A – Skopje Kurşunlu Khan, B – Edirne Rüstempaşa Caravanserai

by the hierarchical relationship of the administrative and commercial factors with spatial and architectural qualities of the bazaar space.

In the Ottoman city, the Friday mosque and bazaar had an important place in the urbanization policies of the state. As a matter of fact, in Ottoman documents, the characteristic of the settlement was expressed as 'The market stands, Friday pray is performed'. The mosque indicated the existence of a population to perform Friday prayers, and the bazaar indicated the existence of trade to meet the needs of this population. Thus, by establishing a prosperous developed city with a mosque and a bazaar, the state would provide its people with comfortable and convenient shopping, its tradesmen with safe and regulated trade, and generate revenue by collecting taxes on every product sold in the bazaar.

The value of the goods coming to the bazaar from different distances and the type of trade played an important role in the shaping of the bazaar structures. Long-distance trade involved the international trade of valuable goods. These valuable goods had to be sold and stored in a sheltered place in the bazaar of the city. This was only possible in the *bedesten*, which was located in the center of the bazaar, and was shaped as a solid and secure structure. Short-distance trade, on the other hand, involved interregional trade or trade in goods produced in the neighbouring region. These goods (such as cotton, wheat, silk, salt, etc.), which constituted the income from agriculture, animal husbandry and partly mining-related fief system, were brought to the khans, where they were sold and/or stored for wholesale. The khans located in the bazaar, around the *bedesten*, could be closer or further away from the *bedesten*, depending on the value of the goods sold in them. The goods such as artisanal products, fruits, vegetables and livestock, which were produced locally (in the village or in the neighbourhood) and offered for retail sale, would reach the consumers in the tradesmen's bazaars or the marketplace. These bazaars and shops were located around the *bedesten* and khans, connected to the bazaar street, the main axis of the bazaar. The bazaar street was also the main route connecting the city to the outside or had a strong relationship with it. Marketplaces were located on the periphery of the bazaar. As a result, the commercial goods coming to the city would find themselves directly in the bazaar, and the distance it took and value of the commercial goods would determine their place in the bazaar.

This hierarchy formed by the nature of trade and goods in the bazaar, the topography and the geographical conditions of the city (slope, natural assets such as rivers and the sea, climate), the citadel, city walls and gates, roads, and the location of the Friday mosque all determined the location of the bazaar within the city. Therefore, although bazaars in cities had similarities, each bazaar was shaped according to the city it was located in. In addition, the location, production and industry of the city also determined the presence of the *bedesten*, the number of khans and shops, and the size of the bazaar. Thus, while some cities had large bazaars because they were located on trade routes, some towns or small cities might have only one khan, arasta or shops, or only a marketplace.

While the bazaars were shaped according to the cities, it was clear that the buildings in the bazaar were also shaped according to the trade within it. *Bedesten*s, covered bazaar-*arasta*s and khans were buildings intended to create closed, sheltered and comfortable spaces. As a matter of fact, the existence of covered bazaars and street coverings in hot regions was an indication that climatic factors

were also taken into consideration. The shops that were attached to the facades of these closed buildings or that were originally part of the building, together with the shops lined up opposite each other along the streets of the bazaar, were usually the areas where goods were stored and exhibited. However, shopping was not done inside the shop, but in front of the shop, i.e. on the street, as shown in Bartlett's engraving (Fig. 1).

While the spatial organization of the buildings in the bazaar such as *bedesten*, khan, covered bazaar-*arasta* was generally the same, different spatial experiments were sometimes seen, albeit to a lesser extent, with the adaptation of the buildings to the form of the lot and land elevation. While stone and brick were used as the main construction materials, locally available materials were generally preferred. For example, the bazaar in Adana was built entirely with brick, the main construction material in the city. Commercial buildings were built with masonry to ensure the safety of the goods, to survive for a long time, and also be fire resistant.

These masonry buildings and the lively trade within them also represented the power of the state. Because almost all of the buildings in the bazaar were waqf buildings and these waqfs belonged to sultans, viziers or ruling elits both in the Balkans and in important cities of Anatolia. Therefore, the well-maintained and strong condition of these commercial buildings, which were waqf, not only created a space for lively trade in the bazaar, but also expressed the continuity of religious, social and public services and the continuity of the state by generating income for the waqf.

In cases concerning the bazaar and tradesmen, in addition to the laws, the state also adopted the traditions and practices of tradesmen guilds by saying 'since time immemorial' or 'as it was customary'. In the relationship of the guilds with the bazaar space, the prayer dome/prayer square, usually seen in the covered/open bazaar-*arasta*, was one of the reflections of the tradesmen's tradition on the space. The tradesmen would gather under the prayer dome every morning and start the day with prayers for abundant and auspicious earnings. In addition, the coexistence of tradesmen groups in the bazaar and in the *arasta* order, was a spatial formation that allowed the guild to control the quality of commercial goods or services, competition among tradesmen, and the public to demand quality goods.

In conclusion, while the commercial organization established by the Ottoman state with its laws and practices, waqfs, and guilds created common features in the spatial shaping of the bazaar in the city, the contextual characteristics of the cities differentiated the bazaars from each other. Commercial buildings such as *bedesten*, khan, covered or open bazaar-*arasta*, shops, etc., which emerged as a result of commercial goods and trade patterns, were located in the bazaars of many cities. However, since the number of these commercial structures varied according to the commercial potential of the city, bazaars differed from each other in terms of scale. Nevertheless, the pattern of the main bazaar street forming the backbone of each bazaar and the pattern of other bazaar streets made the bazaars similar to each other. However, the fact that each bazaar was shaped according to the topography and contextual inputs of the city in which it was located differentiated the bazaars among each other. Thus, every bazaar in Ottoman cities was both similar to and different from each other. Therefore, while the bazaars in Anatolia and the Balkans, where the organization of the Ottoman state was implemented in the same way, were spatially and architecturally similar, urban inputs created bazaars that were not identical.

[Proofread by Lisa Anna Meredith]

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Author's biography

Tuba Akar, Ph.D., is a conservation expert architect specialized in waqf institution and historical sources in the conservation of cultural heritage, Ottoman baths and commercial buildings. She earned her B.Arch. in Architecture at Çukurova University, M Sc. and Ph.D. in Restoration Graduate Programme in Architecture at Middle East Technical University (METU). Akar currently teaches at Mersin University as an associate professor of architecture.

Fig. 1 Model of the Seissel's Plan from 1958

Vladimir Bojković

University of Montenegro, Faculty of Architecture, Bulevar Džordža Vašingtona bb, 81000 Podgorica, Montenegro
https://orcid.org/0000-0002-2822-0529
bojkovicv@gmail.com

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Development of the City of Nikšić through the Planning Documentation of Croatian Architects

Nikšić, Montenegro
Seissel, Josip
Slade Šilović, Josip
urban plans

The task of this work is to present three key urban plans, courtesy of which the city of Nikšić developed during its modern history. After liberation from the Ottoman Empire in 1877, Nikšić received its first regulatory plan, prepared by the architect Josip Slade Šilović (1828-1911) in 1883. The city developed according to this plan until the Second World War. After the Second World War, Montenegro became part of the Socialist Federal Republic of Yugoslavia as a republic, and Nikšić became the city with the highest degree of urbanisation in that federation. This rapid urbanisation was directed by the second urban plan, carried out by the Urban Planning Institute of the Faculty of Architecture, Construction and Geodesy, Zagreb, in 1954-1958. The author of this plan was professor and architect Josip Seissel (1904-1987). The third urban plan of importance for the city was carried out by the Urban Planning Institute of Croatia, Zagreb, in 1984 and was adopted in 1986. This urban plan enabled a logical upgrade of the previous two plans. A result of these three urban plans by Croatian architects is Nikšić's unique form and urban identity.

Introduction

From the standpoint of the settlement's periodisation, Nikšić's past can be divided into several periods: Illyrian, Roman, Gothic, Slavic, Ottoman, the period of liberation from the Ottomans, and the modern development of the city. Each of these historical stages has yielded different urbanistic and architectural perceptions of the city's design and function. The result is a city with a multi-layered spatial and cultural structure (Bojković, 2020: 190). This paper deals with research on the modern development of the city, which is inextricably linked with urban plans. It is interesting that the key urban plans for Nikšić were all drawn up by Croatian architects.

With the first regulatory plan from 1883, prepared by architect Josip Slade Šilović (1828-1911), the city of Nikšić gained the basis for its development as a modern city. The first regulatory plan enabled the positioning and formation of a specific urban architecture which, today, shapes the urban identity of Nikšić.

After the Second World War, Montenegro became part of the Socialist Federal Republic of Yugoslavia as a republic, and Nikšić became the city with the highest degree of urbanisation within that federation.[1] Rapid urbanisation called for the adoption of new urban plans, which impacted the inherited urban form of the city. In this context, the General Urban Plan of Nikšić is the most important plan, and it was carried out by the Department of Urban Planning of the Faculty of Architecture, Civil Engineering, and Geodesy *(Zavod za urbanizam Arhitektonsko-građevinsko-geodetskog fakulteta)*[2], in Zagreb, in 1954-1958. The author of this plan was professor and architect Josip Seissel (1904-1987), assisted by architects Dragan Boltar (1913-1988), Boris Magaš (1930-2013) and Bruno Milić (1917-2009).

In the mid-1980s, the Municipality of Nikšić engaged the Urban Planning Institute of Croatia *(Urbanistički institut Hrvatske)*[3] to prepare the Spatial Plan of the Municipality of Nikšić and the General Urban Plan of Nikšić. These documents enabled further development of the city.

The first regulatory plan formed the basis for the modern urban development of Nikšić which would supplement the general urban plans from 1958 and 1984 in a logical manner with responses to the demands of the dynamic social and economic changes of the time. We can follow by Croatian architects the continued urban development of Nikšić alongside the formation of a recognisable architectural urban identity through three key urban plans.

1 Nikšić, from being a small town with barely more than 4,500 inhabitants before the war, developed rapidly in the postwar period. In the period from 1921 to 1941 the growth in the population was only 20%, while the growth in the period from 1941 to 1961 was 338%, or 17 times faster. The degree of urbanisation of Nikšić was correlated to the growth of the population, so in 1953 it was 22.1%, increasing to 35.1% in 1961 and 49.5% in 1971. The degree of urbanisation and the population growth were conditioned above all by political and management decisions regarding the development of the city, mainly its industrialisation. Thus, the percentage of the population that was employed in industry and mining in 1953 was only 6.07%, increasing to 34.0% in 1961 and reaching its maximum in 1971 when it was 44.0%.

If we consider, by decade, the movements of the number of inhabitants in the city itself and the Municipality of Nikšić, we come up with the following figures: at the end of the 1940s the municipality had 38,359 inhabitants, 6,013 of whom lived in the city. By the end of the 1950s the municipality had 46,589 inhabitants while the city had 10,236 inhabitants. At the end of the 1960s the municipality had 57,399 inhabitants while the city had 20,166. At the end of the 1970s, the inhabitants in the municipality numbered 66,815, while the number for the city was 28,527. At the beginning of the 1980s, the municipality was home to 72,299 people, while the figure for the city was 50,399 and this was the period which required the adoption of a new General Urban Plan of the city. At the end of the 1980s, the city of Nikšić had about 56,000 inhabitants, while the municipality had around 74,500. During the 1990s, the number of inhabitants remained relatively constant and in the municipality there were 74,706 inhabitants and in the city 56,141. There were small changes in the number of inhabitants and during the 2000s, in the municipality there were 76,677 inhabitants and in the city 59,179. Already in 2011 the population had

Fig. 2 Regulatory Plan of Nikšić 1883, architect Dr Josip Slade Šilović

fallen, whereby in the municipality there were 72,433 inhabitants and in the city 56,970. (Bojkovic, 2019: 20)

2 After World War II, more precisely in 1956, the decision was taken to divide the Technical Faculty into four independent faculties: the Faculty of Architecture, Civil Engineering and Geodesy; the Faculty of Mechanical Engineering and Shipbuilding; the Faculty of Electrical Engineering; and the Faculty of Chemistry and Food Science. By decision of the Croatian Parliament in 1962, the Faculty of Architecture of the University of Zagreb was established as an independent scientific and teaching institution. According to the statute from 1964, the faculty consists of five chairs, six departments and three cabinets. One of the departments was the Department of Urban Planning of the Faculty of Architecture, Civil Engineering, and Geodesy. (https://www.arhitekt.hr/hr/o-fakultetu/kontekst/ on 12 May 2024)

3 The Urban Planning Institute of Croatia was established by the decision of the Ministry of Construction of the People's Republic of Croatia on 27 December 1947, tasked with the professional studying and solving of all urban planning problems of cities and settlements. In the first seven years of this activity, the Urban Planning Institute of Croatia operated within the State Authority, that is the Ministry of Construction. In 1954 it became an institution with independent financing. (http://uih.hr/o-nama/ on 20 April 2024)

4 Evans claims that the Lower Town is a medieval construction, firstly on the basis of its layout and quadrangular shape, then on the basis of the characteristic towers which the town had at its corners and in the area of the town ramparts, and finally according to the construction of the lower parts of the town walls, which he states are undoubtedly medieval. The Lower Town was not the work of Ottoman builders, but was actually the medieval town of Onogošt rebuilt by the Ottomans (Ivanovic, 1986: 45).

The First Regulatory Plan for the New Nikšić – The Beginning of a Modern City Development

After a decisive victory over the Ottoman troops, the successor of the Petrovic dynasty Prince Nikola (1841-1924) occupied Trebjesa Hill near Nikšic at the end of July 1877. Montenegrin troops liberated the city on 9 September 1877. The liberation of Nikšic had major repercussions in all the South Slavic countries (Pavicevic, 1972: 25).

Sir Arthur John Evans (1851-1941), the famous British archaeologist, was present when Nikšic was liberated by the Montenegrin Army. In a diary entry for 23 September 1877, he wrote that the city had suffered terribly from the bombardment. Evans wrote that the city had three sections: the citadel; the inner part of the city – called the Lower City – which was surrounded by city walls; and an expanse outside the walls where the market and the main streets were found. Evans was particularly fascinated with the inner, older section of the city, which had the layout of a Roman castrum. *"The central tower of each wall has a round archway beneath which the street runs, and it seems as if in the original town two main streets intersected each other at right angles, as they should in a Roman 'Chester'."* (Evans, 1878: 63)[4]

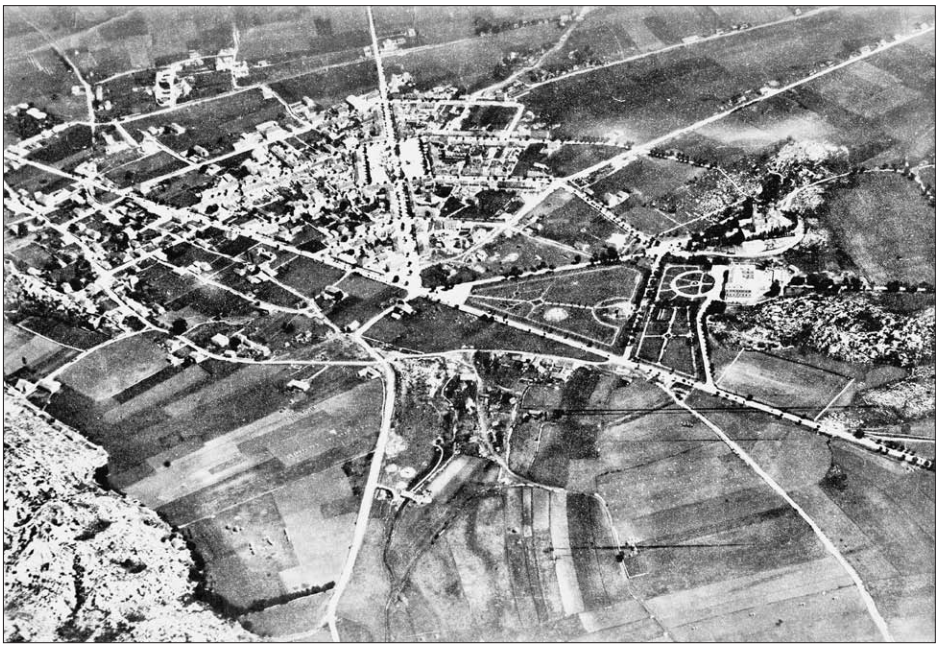


Fig. 3 View of the city in the 1930s, old postcard

Within only a few years after the city was liberated, the city still kept the same overall morphology that it had had under the Ottoman Turks. At the proposal of citizens to obtain space in order to erect the new city, Prince Nikola came to Nikšić in the spring of 1884, bringing with him the plan of the new city drawn up by Dr Josip Slade Šilović in 1883.[5] In March of 1883, Josip Slade Šilović came to Nikšić to record the current situation and started drawing up a regulatory plan for how the city would look in the future. The design included simple, clear shapes, a city open to the sun and nature, a place with optimal living and working conditions for its future inhabitants (Šakotić, 1996: 112).

It was intended that the plan would provide housing for about 10,000 residents. The way that the streets were designed, the city could be expanded multiple times – with appropriate changes – but would still remain a modern city in terms of its organisation and traffic. Slade apparently took great inspiration from the Renaissance ideas of the urban layout of the Italian town of Palmanova,which he probably visited, as it is near Padua, where he was engaged on his doctoral studies (Fig. 2). The future city was to be built around a large quadrilateral plaza, with four other smaller plazas in other parts of the city, linked by broad, straight streets, radiating outwards from the centre. The plan stipulated that green areas, essential city infrastructure, sewerage and a water mains had to be built, as well as single-storey and two-storey buildings on the boundaries of the urban zones (Maksimović, 1961: 15). The depth of the urban blocks was 95 m with a double row of plots of land. According to the plan, the construction of buildings with a basement, ground floor and two upper floors was foreseen, and typification of the buildings was also carried out. A system of "edge buildings" was implemented, with outer and inner construction lines. The depths of the buildings varied from 8 m to 14 m. Behind the houses, gardens were planned (Mitrović, 2019: 124).

A famous chronicler of that time, Bekica Šobajić, described in early 1884 that the construction of the city's main plaza was planned to be completed rapidly. Vicko, an engineer from Trogir (Rubinoni), divided up the entire area designated as streets into flat parts – plots. The army was engaged on the construction and each plot was allocated to a battalion which completed the work (Šobajić, 1899: 24).

Three plazas, out of five, were built according to this plan. The quadrangular plaza in the middle of the town was constructed first (today's Freedom Square). At a distance of 180 metres from this plaza is another plaza, this time eight-sided (today's Sava Kovačević Square), which was realised on the basis of Slade's design. The third, five-sided, plaza is right next to the Cathedral Church (today's Šako Petrović Square). The visual effect that Slade created in these plazas placed the greatest emphasis on the main edifice located on it. Thereby, the main, central edifices (the Cathedral Church and Prince Nikola's Castle) were aesthetically improved and emphasised (Bojković, 2023: 20).

According to the first regulatory plan, Nikšić was constructed according to the first regulatory plan until 1941 and all the postwar urban plans were established on the basis of this plan's concepts. It should be noted that the construction discipline of that time was very strict and did not allow any deviation from the established plan (Ivanović, 1986: 47; Fig. 3).

General Urban Plan of Nikšić, 1954--1958 – Josip Seissel, Dragan Boltar, Boris Magaš and Bruno Milić

Nikšić's postwar development required a rapid implementation of urban planning. There was no institution dealing with the implementation of urban plans and controlled construction of the city after the Second World War. The organisation of the urban planning service was implemented gradually (Bojković, 2018: 42).

The Department of Urban Planning of the Faculty of Architecture, Civil Engineering, and Geodesy in Zagreb carried out the second postwar urban plan for Nikšić in 1954-1958.[6] The author of this plan was professor and ar-

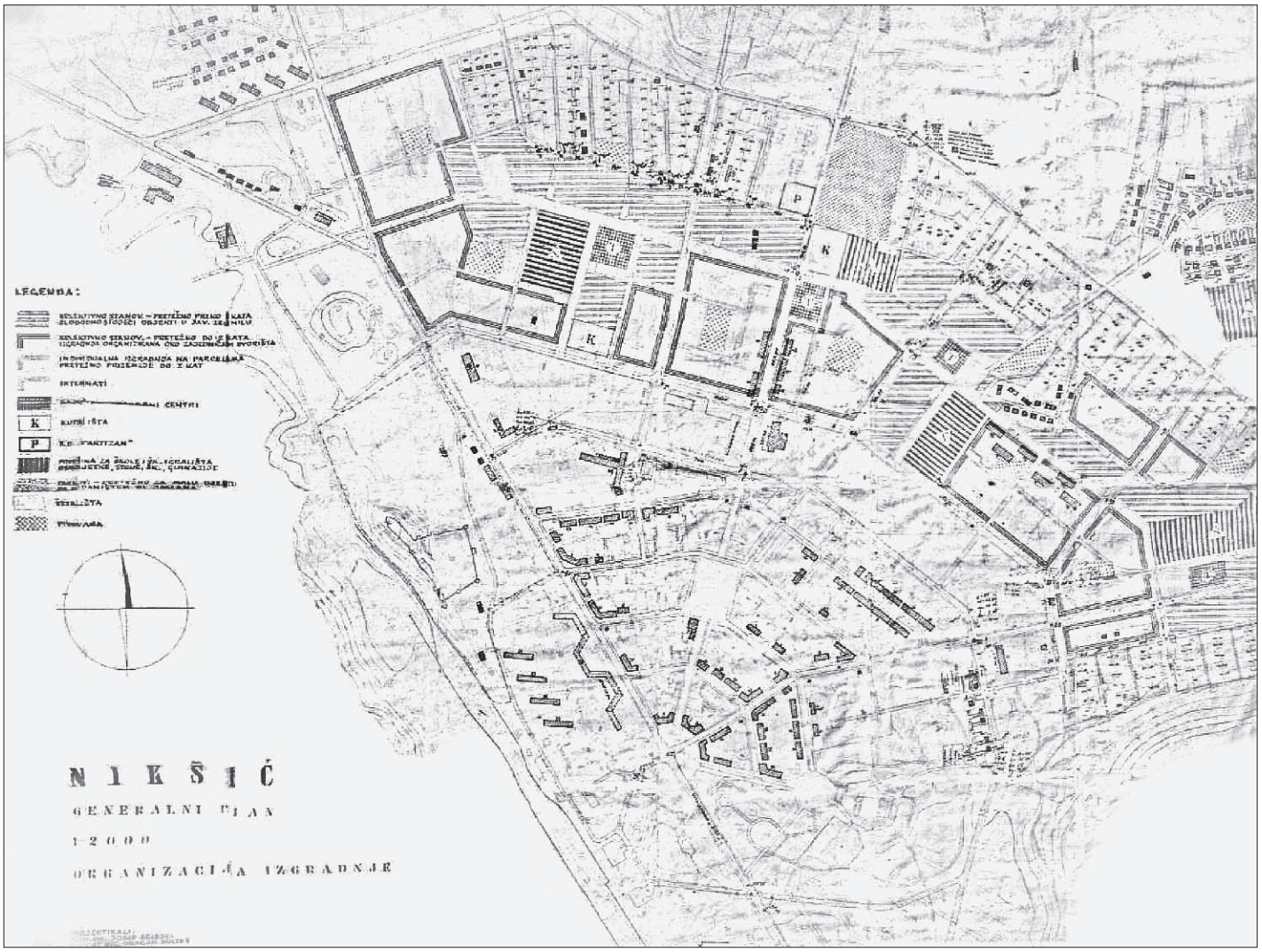


Fig. 4 The General urban plan from 1958, J. Seissel, D. Boltar, B. Magaš, B. Milić

chitect Josip Seissel, assisted by architects Dragan Boltar, Boris Magaš and Bruno Milić[7] (Fig. 4).

The general urban plan of Nikšić from 1958, as the first applied postwar urban plan, can be viewed through three aspects. The first aspect refers to the boundary of the plan, the second refers to its characteristics themselves, and the third aspect concerns the relationship to the inherited urban structure of Slade's regulatory plan.

The general urban plan had boundaries that extend from Duklo Bridge on the River Zeta, then along the River Bistrica to the eastern fence of the Boris Kidrič Ironworks, crossing the Nikšić-Šavnik road. Then it went by a straight line to the bank of the River Gračanica and from there along the right bank of the river, including the settlement "Budo Tomović" to the bridge over the River Gračanica, from this bridge to the road to Ozrinići in front of Trebjesa and then to the source of the River Mrkošnica, then along this river to the Small Bridge. From the Small Bridge along the ironworks' industrial spur line to the main line of the railway, and from this railway line to the Petrović houses. Then via the foothills of Studenačke glavice to the place where the railway line and the Nikšić-Trebinje road cross, and from there along the main railway line

5 Josip Slade Šilović, a native of Trogir, studied architecture in Split, and was awarded a doctorate at the University of Padua (Bojkovic, 2019: 19).

6 According to the enacted 1958 General Urban Plan, the residential zone of Nikšić covered an area of 11.25 km² and contained 11 residential urban units (Ivanović, 1977: 93).

7 In one of the new city zones, Milić designed one of the first multi-apartment high-rise buildings, the Meander Building, construction on which began in 1958 (Bojković, 2018: 42).

FIG. 5 URBAN BLOCK WITH THE MEANDER BUILDING (B. MILIĆ) – UNION BUILDING AND RESIDENTIAL TOWER (Đ. MINJEVIĆ), POSTCARD FROM 1962

along the River Zeta to Duklo Bridge (Ivanović, 1972: 47). This urban plan for the first time clearly defined and determined the wider and narrower construction area of the city (Fig. 1).

This plan has some similarities with Slade's plan regarding the central green belt in which the construction of social, public and civic facilities was foreseen. Seissel's plan also foresaw the central part of the city remaining as it had been built according to Slade's plan. In addition to the green zone, Seissel's plan also had a zone of multi-apartment high-rise blocks, where workers from the industrial zone of the city lived.

After this zone, a zone of mixed residential buildings – collective and ones for individual families – followed, and after this zone, there was a peripheral settlement of single-family residential buildings. The industrial zone was located outside this settlement, but had direct connection with the city and transit traffic. Territorial expansion of the city was planned towards the River Bistrica in the north, and in the northeast and east to the industrial zone. In the city, the limits of constructions with business and commercial facilities would still be retained.

This plan did not contain the detailed planned construction, and there were only some partial solutions, without surveying the terrain and without the very important economic analyses that were necessary for the reconstruction of certain parts of the city. Although this plan originally envisaged that there would be buildings with two upper floors and ones with one upper floor, city planners subsequently reconstructed a series of buildings where some had three or four upper storeys and others had five or six upper storeys (Fig. 5).

After the development of this urban plan, the Municipality of Nikšić entrusted the revision of the plan to a special expert commission made up of the architects Miloš Somborski (1902-1983), Stojan Maksimović (1934-2024) and Mihailo Radovanović (1899-1973), who concluded that the plan should be complemented with a preliminary project of city levelling, a sewerage and water supply system.

If we consider the General Urban Plan of Nikšić through the prism of its relationship to the in-

FIG. 6 A DEPARTMENT STORE, A VIEW FROM EAST SIDE AND WEST SIDE. THE DEPARTMENT STORE WAS BUILT ON THE AXIS OF THE STREET FORESEEN BY THE URBAN PLAN FROM 1958.

8 The contract of works for the Spatial Plan and General Urban Plan was signed in 1982. The local monthly newspaper "Nikšicke Novine" in an article titled "Implementation of the new urban plans contracted" wrote that the decision to entrust the implementation of the Spatial Plan and General Urban Plan to an institute from Croatia was one more form of how two areas were being brought closer, but was also the continuation of work that had been started long ago when Nikšić had its first urban plan in 1883, which was carried out by Croatian architect Josip Slade Šilović (Nikšicke Novine, 700: 25).

9 The 1984 General Urban Plan foresaw the following five spatial units which would be the focus of urbanisation: 1. The central district, with an area of 410 ha; 2. The northern district, made up of the settlements of Dragova Luka and Ćemenca, with an area of 276 ha; 3. The southern district, made up of Klićevo, with an area of 403 ha, and Straševina, with an area of 171 ha; 4. The western district, made up of Kočani and Uzdomir, with an area of 374 ha; and 5. The industrial zone – The Boris Kidrič Ironworks, with an area of 160 ha (Radojičić, 2010: 567).

herited urban structure of Slade's plan, we can see its full contribution. The quality of this urban plan is reflected in the fact that it fully accepted the solutions and basic principles of Slade's regulatory plan as the basis from which the modern city evolved. Also, the quality of this plan is reflected in the suitable positioning of buildings of social significance in the continuous zone along the historical core.

Spatial Plan of Nikšić Municipality and General Urban Plan of Nikšić, 1984-1986 – Urban Planning Institute of Croatia, Zagreb

The adoption of the Spatial Plan and the General Urban Plan of Nikšić required the municipality to decide to include the surrounding villages into the urban area. This decision was necessary because a large number of houses were built without any planning permission in these villages, which had nearly 18,000 inhabitants living in them, while in the city itself there were about 38,000 inhabitants. The 1958 plan envisioned the city having about 56,600 inhabitants. This phenomenon was due to land outside the city's real estate district being inexpensive, because they did not require any expenditure on communal infrastructure. The expansive development of the city in the period from 1960 to 1980, accompanied by rapid population movements in the peripheral parts of the city and the nearest villages, caused the unplanned development of these parts (Radojičić, 2010: 320).

The local administration of the Municipality of Nikšić decided to engage the Urban Planning Institute of Croatia from Zagreb for the preparation of the Spatial Plan and the General Urban Plan of Nikšić.[8] These plans were finished in 1984 and their implementation started in 1986. The contract for making the plans was signed by the president of the Institute's Board of Directors, Neven Kovačević, and the president of the Nikšić Municipal Assembly, Velisav Vuksanović. The planning coordinator was Antun Paunović. The architects who worked on the conception of the plans were Antun Paunović, Radovan Muck and Ninoslav Dusper.

The General Urban Plan envisaged the division of the city region into five subareas[9]: the central, northern, southern, western and industrial zones. The central area was a completely urbanised area that aspired to preserve the authentic urban forms. It was envisaged that the replacement of single-storey houses with multi-storey ones would not disrupt the existing ambience. The system of streets and plazas was fully retained. For the northern area, the planned arrangement of green areas along the River Bistrica was proposed. This part of the city was intended for the construction of individual housing. The southern area envisaged the shaping of the suburban settlements located in this area. The western area, like the northern one, also envisaged the construction of individual housing units. A green belt was planned along the River Zeta, as was the reconstruction and arrangement of the existing transport infrastructure (Fig. 7).

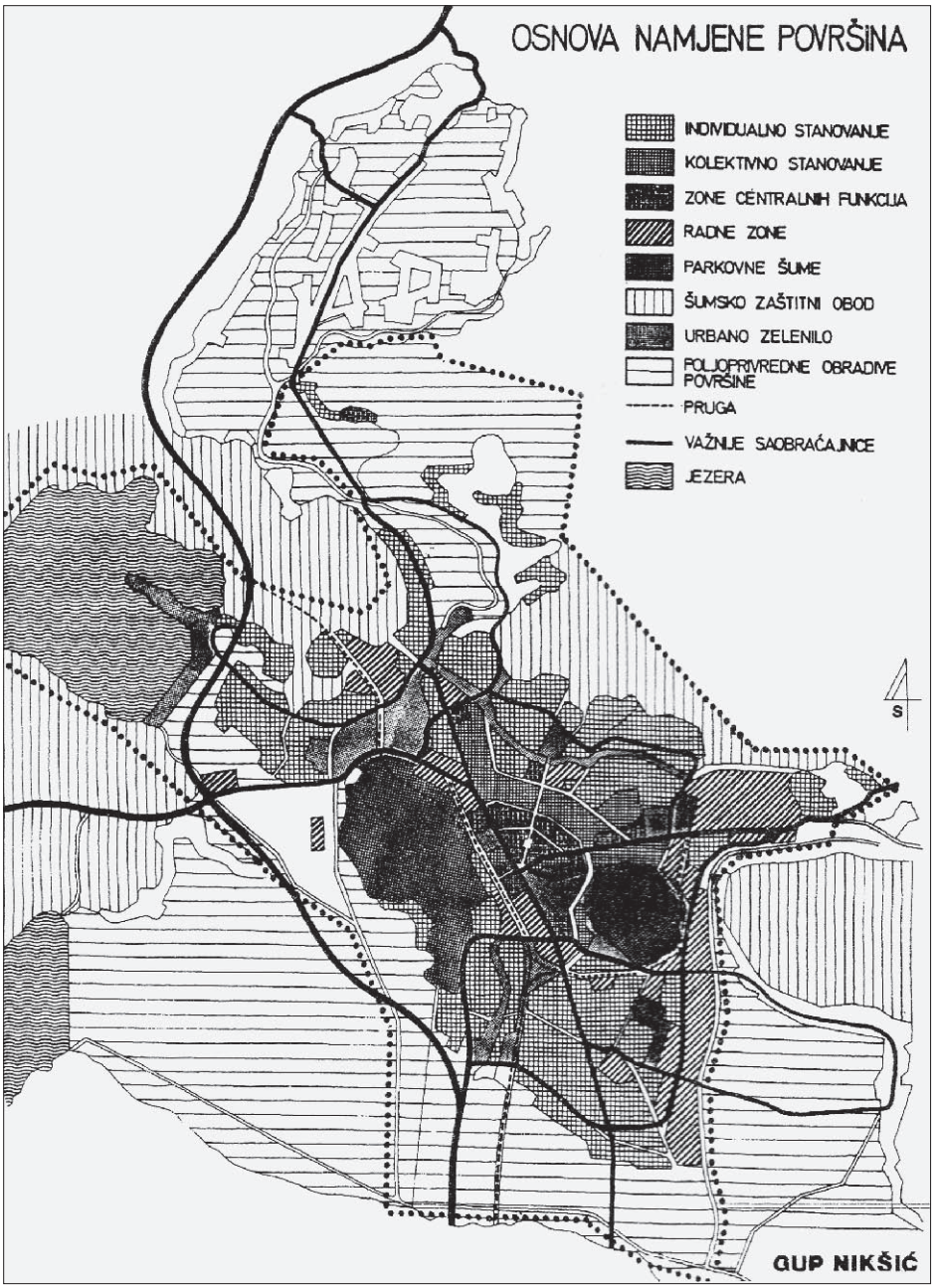


Fig. 7 General Urban Plan of Nikšić, 1986

The importance of the General Urban Plan was reflected in the protection and improve-

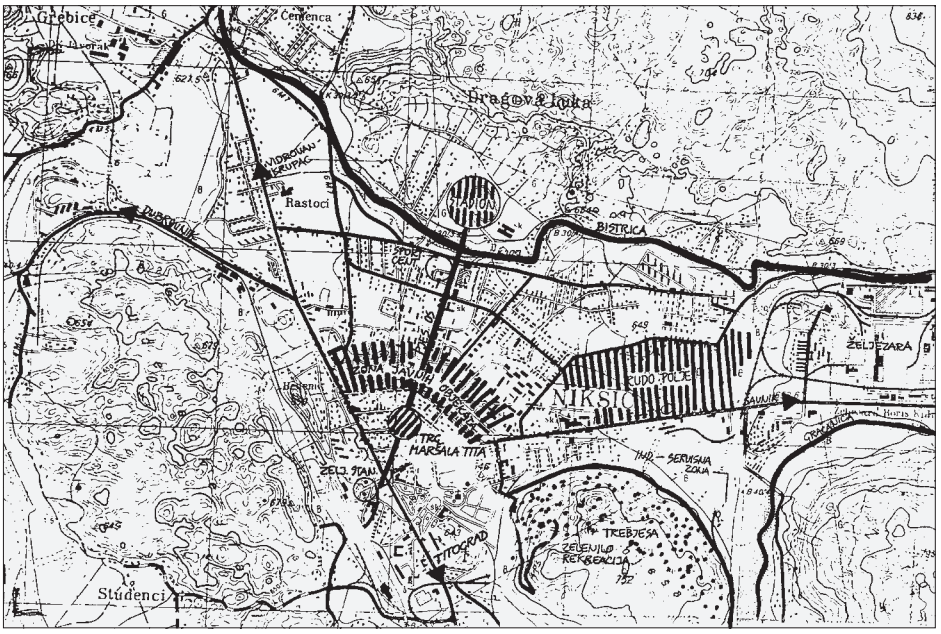
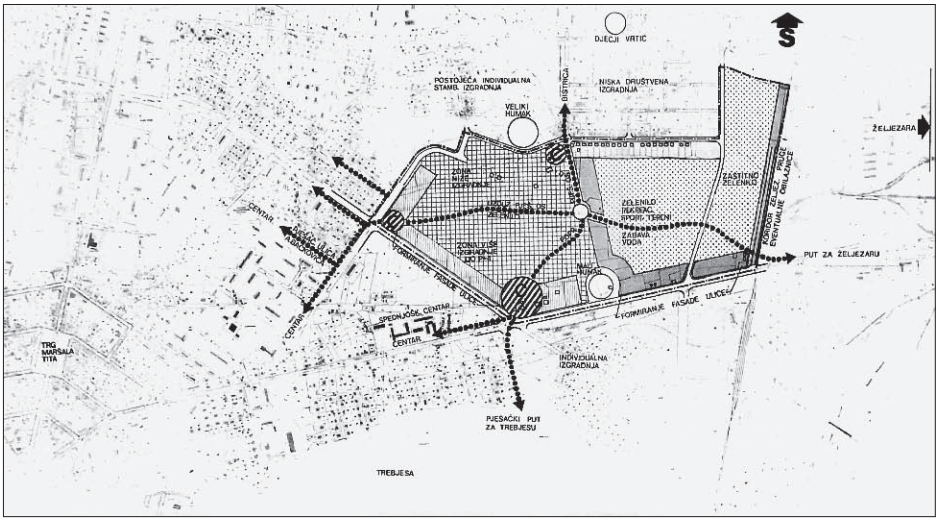


FIG. 8 DETAILED URBAN PLAN OF THE RUDO POLJE ZONE, PROGRAM PROPOSAL – THE RELATIONSHIP BETWEEN THE SETTLEMENT AND THE CITY

ment of green areas. One other important characteristic of the General Urban Plan is respecting the inherited urban setting that arose according to the directions of the previous urban plans in the first line of the 1958 General Urban Plan, which logically built upon the urbanistic legacy of the first regulatory plan. In the implementation of the urban plan, there were some inconsistencies that had a greater impact on the city. One of the major failures was the construction of a department store in the early 1980s, which thwarted the vision of the 1958 plan to shape the so-called green belt by linking the streets of the eastern part by a boulevard to the western part of the city (Fig. 6).

FIG. 9 DETAILED URBAN PLAN OF THE RUDO POLJE ZONE, PROGRAM PROPOSAL – PRELIMINARY SPATIAL DISTRIBUTION OF FUNCTIONS IN THE ZONE



The Urban Planning Institute of Croatia also prepared the detailed urban plan for the future Rudo Polje settlement in 1983 (Fig. 8). The observations and analysis that the authors of the urban plan stated in the Proposal of the Detailed Urban Plan are interesting. The authors stated that one of the main characteristics of the new construction of Nikšić was the loss of standard street dimensions and the spirit that this fostered, which were present in the old part of the city centre. That is why the city had not managed to form a tangible urban environment in the previous development phase, but remained with an abstract space with a multitude of unarticulated intermediate areas. Therefore, one of the first tasks of urban planning in Nikšić was to create the conditions for the formation of urban physiognomy. The creation of a new housing structure in Rudo Polje was also to be directed along these lines (Paunović, Muck and Dusper, 1983: 66; Fig. 9). The detailed urban plan of the Rudo Polje settlement paid special attention to the programme of housing construction. The plan envisaged the construction of a maximum of 700 apartments of different typologies. The plan suggested avoiding the impersonal constructions from earlier periods that neglected the elements of the city's identity. The plan envisaged the construction of buildings that would contribute to the accommodation of three-generation families, but also the construction of buildings that could, in a certain number of cases, also have commercial areas (Fig. 10).

THE SIGNIFICANCE OF URBAN PLANS FOR THE DEVELOPMENT OF NIKŠIĆ

During the period from the implementation of the first regulatory plan from 1883, up until the end of World War II, the city developed slowly. The economic basis was not sufficiently developed to enable the foreseen urban structure of the first regulatory plan to be completely formed. However, the achieved construction provided the foundations for further directions of development of the city structure. Looking at the realisation of Slade's plan today, one can see that Nikšić is laid out with connected communities arranged around it radially, reminiscent of Renaissance-inspired city layouts. This is an unusual shape for a city, even among developed environments in Europe. A radial layout is especially suited to the conceptual design of small or medium-sized cities (Đokić, 2004: 215).

As is the case with any other city layout, a radial layout has its benefits and disadvantages. Most of the benefits relate to the way the centre of the town and the suburbs are con-

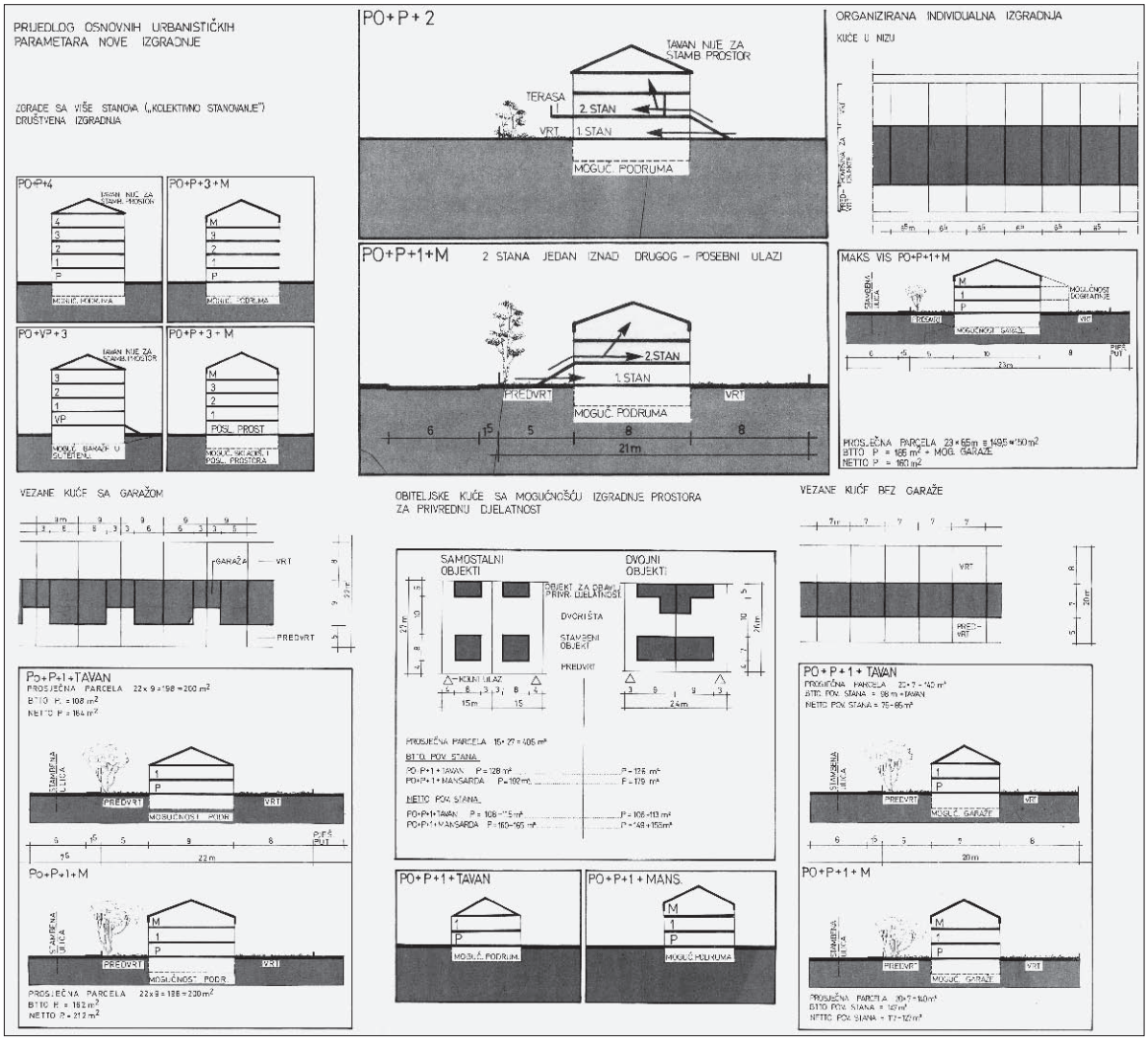


Fig. 10 Proposal of typological examples of residential buildings

nected, the hierarchical position of buildings and the functions within the town's structure. However, the radial form has its downsides. The awkward orientation and the way that the main spokes coming out of the centre have insufficiently defined intersections with the streets they run perpendicular to, which does not permit clear and rational functional-physical assemblages to be formed. All the mentioned characteristics can be seen in the first regulatory plan of Nikšić.

The physical structure of Nikšić through the first regulatory plan is seen in its infrastructure, green surfaces and in the buildings, as the most significant constituent parts that define the basic structure. The positioning of individual buildings and groups of buildings, the extent to which they match the regulatory or construction layout, the way these buildings are connected by roads, then way the buildings are grouped in the form of residential suburbs or smaller residential units – all these elements constitute the basis of the urban structure (Radović, 2009: 56).

Before anything in a city is physically constructed, the shape of the city must be put onto paper, which is where the urban plan comes in. Josip Slade's design brought together all these features into a suitable configuration of urban elements, as well as the positioning of the buildings. The first regulatory plan of Nikšić is one such example containing everything mentioned above, a fact which only adds to its value. As such, the first regulatory plan became the base from which all future post-war urban plans will be developed.

When Yugoslavia formed after the end of World War II, Montenegro was among the least developed republics. Thanks to the socialist system which demanded equal growth of the economy and industry in all regions of the country, Montenegro had a particularly advantageous chance in this context. Nikšić was singled out as the city where the indus-

trial development of the republic would be initiated. Altogether, Nikšić is the example on the basis of which we can understand how the development of cities went after World War II.

The municipal services for urban planning and architecture had only recently begun to be formed and did not have enough trained architects, civil engineers or geodesists. The first Montenegrin architects, in the main, finished their education at the architectural faculties in Zagreb or Belgrade, and gained experience mainly by designing structures of public significance, while more complex urban plans were drafted by experts from more developed areas, mainly from Zagreb and Belgrade.

The first postwar urban plan of Nikšić from 1958, which was drafted in Zagreb, responded to two important requirements. The sudden development of Nikšić's economy had caused a growth in the population, which demanded major changes in the existing structure of the city. One of the most important demands was related to accommodation, so the need was indicated for designing and building a large number of apartment buildings of different typologies for multiple families. It was necessary to build structures in new urban blocks and provide all the necessary amenities and functions, such as kindergartens, schools, health facilities, shops and cultural buildings.

The stark contrast that was present between the modern setting and the preserved remains of the previous periods of construction were toned down in the 1958 Urban Plan through the logical formation of a visible spatial continuity of construction through transitional zones. In this way, the basis of the city's architectural urban identity, which would be augmented by the next Urban Plan of 1984, was established.

The most significant city landmarks built in this transitional zones are: Olga Golović Primary School (1957), by architect Đorđije Minjević, the Health Centre (1976), by architect Dušan Duda Popović, the Investment Bank (1975), by architect Slobodan Vukajlović (1934-2006), Hotel Onogošt (1982), by architect Ivan Štraus (1928-2018), Home of the Revolution (1977), by architect Marko Mušič (1946), the Municipal Court (1963), the Faculty of Philosophy (1962), Nikšić City Hall building (1962), by architect Đorđije Minjević, and the Administration Building of the Construction Company (1958), by architect Periša Vukotić (1899-1988; Bojković, 2019: 42-59).

The 1984 General Urban Plan considered Nikšić's problems at that time and provided solutions for them through the foreseen traffic infrastructure and the arranged communal network for all parts of the city. The plan featured usage of maximum protection and increase in green areas, as well as of the construction heritage from the previous periods. The general plan particularly featured the need to construct accommodation facilities and other buildings of a more modern architectural appearance.

Today, when we look at the parts of Nikšić which were built in line with the urban plans from 1958 and 1984, we notice that, over time, they have justified their function and spatial recognisability, and that they have given a special urban quality of life to the citizens.

CONCLUSION

Although in Montenegro there is still no systematic and organised research into the country's rich urban and architectural heritage from the end of the 19th century and for the whole of the 20th century, this paper aims to present the work of Croatian architects and urban planners in the city of Nikšić, despite insufficient material being available in the State Archive of Montenegro and Archive Department of the city of Nikšić. It should be noted that to this day it is not known where the original copy of the first regulatory plan is, while the General Urban Plan from 1958 is presented only in fragments and in bad condition in the Nikšić City Archive.

The realisation of the concept of an ideal city, which architect Josip Slade Šilović presented only schematically, was in the end very difficult to fully implement, since, after all the wars, Montenegro was left very poor. The unique case of the construction of the city of Nikšić deserves to be studied further. In order to get a more complete picture of the phenomenon of the development of the city of Nikšić through the planning documentation of Croatian architects, it is necessary to conduct more intensive research of archival materials in Zagreb both about the planning documentation (after the Second World War) and about individual authors.

The idea of those who drew up postwar urban plans was to ensure that the city could expand logically, beginning with Nikšić's first regulatory plan. The extent to which the construction of the city developed in continuity is a direct consequence of how successfully the postwar plans were adhered to. This is where these plans show their particular quality.

[Proofread by Peter Stonelake]

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Illustration sources

Fig. 1	Ivanović, 1977: 111
Fig. 2	Monografija Nikšic, 1972: 125
Figs. 3, 5, 6	Private archive of author
Fig. 4	State Archives of Montenegro, Archive of Nikšić, Building section, box 1958
Fig. 7	Radojičić, 2010: 123
Figs. 8-10	State Archives of Montenegro, Archive of Nikšić, Building section, box 1986

Author's biography

Vladimir Bojković is an assistant professor at the Faculty of Architecture in Podgorica. He received his Ph.D. at Università Politecnica delle Marche at Dipartimento di Architettura in Ancona in 2018. His research is focused on architectural/urban city identity phenomenon, its methodological approach determination and problems of continuity as well as history of modern architecture and urbanism in former Yugoslavia.

Dubravko Bačić

The Renewal of Dwelling

European Housing Construction 1945-1975

Publisher: Triest Verlag, Zurich, 2023

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Translation, copy-editing, proofreading: Benjamin Liebelt

396 pages, color and b/w photographs, drawings
[31/22 cm, English, softcover with jacket]

ISBN 978-3-03863-038-8

Editors: Elli Mosayebi, Michael Kraus

The Renewal of Dwelling: European Housing Construction 1945-1975 is a book with a long history of becoming. The work leading to the publication of this volume started with the research seminar ***Wohnen in Europa*** (Housing in Europe), taught at the TU Darmstadt by Professor Elli Mosayebi between 2012 and 2018. In 2016, Mosayebi organized an exhibition and international conference at the German Architecture Museum (DAM) in Frankfurt, titled 'The Renewal of Dwelling – European Housing Construction 1945-1975'. The exhibition which later extensively travelled around Europe showcased some seventy architecturally outstanding, but internationally not very well-known apartment buildings in Brussels, Zagreb, Cologne, Oslo, Porto, Lyon and Athens.

According to the editors, Mosayebi (currently Professor of Architecture and Design at the ETH Zurich) and Kraus (who was a Research Assistant at Mosayebi's chair in Darmstadt, and is currently Research Assistant at the Chair of Design and Urban Architecture at the Bauhaus-Universität Weimar), the initial focus of the research was on innovative apartment floor plans arising out of specific local conditions. An analytical comparison of these projects, however, also revealed a stimulating tension between universally shared international ideals and the locally conditioned realities of particular cities and their architects. Eventually, the research material was significantly expanded and edited by Mosayebi and Kraus in a 400-page volume, which also includes essay contributions (developed out of the papers presented at the 2016 Frankfurt DAM conference) by: Jasper Cepl (Bauhaus University Weimar) with Sam Jacoby (Royal College of Art, London) and Valerio Massaro (London South Bank University), Irina Davidovici (ETH Zurich), Philippe Dufieux (ENSAL Lyon), Nuno Grande (University of Coimbra), Anne-Kristine Kronborg (Oslo School of Architecture and Design), Karin Šerman and Jana Horvat (Faculty of Architecture, University of Zagreb), and Panayotis Tournikiotis (NTUA Athens).

The study is based on 54 selected settlements and buildings from Zagreb, Cologne, Oslo, Porto, Lyon, Athens and the regions of Liverpool/Manchester and Leeds/Sheffield. Each city is presented using a selection of housing developments in the catalogue section, accompanied by an essay. As the editors explain in their Introduction, the catalogue and the corresponding essays are mutually complementary – they have equal status while communicating different insights: the catalogue presents drawings (original and redrawn), sketches and photographs of architectural and urban-planning qualities, while the texts describe the projects' characteristics and specific contexts and conditions in which they were developed. In particular, the essays address the role of public policy as a moderator of funding mechanisms used for housing projects in individual cities.

Most of Europe's housing was built between 1945 and 1975. In only 30 years, the stock was not only renewed, but also significantly expanded. The public sector played a key role, as states and participating institutions sought a way to tackle the existing housing shortage. They also recognized a unique opportunity to implement their political ideals. For the first time, this publication presents how such a fundamental renewal of dwelling and its architectural implementation was achieved. A comparison between individual projects reveals universal themes, as well as local aspects integrated into the architecture.

Readers are invited to engage with the examples presented and to use the book as a kind of an "open archive", filled with interesting architecture. The content is structured non-hierarchically, in seven geographically organized chapters with examples: Porto (9 examples), Lyon (7), Cologne (8), Leeds, Liverpool, Manchester and Sheffield (9 examples all together), Oslo (7), Zagreb (8), and Athens (8 examples). The editors suggest grouping the housing construction projects of the European postwar period into the following six thematic fields /projects with.../: two (separate) entrances, the hidden skeleton, the garden in the facade, tall building in the city, large dimensions and the human scale, and the refined materials. This classification is based on the comparative approach of the study: the focus was not on the individual cities or on the chronological sequence of the buildings, but rather on common and occurring themes that shaped European housing construction between the international debates and their local refractions. The aim of the book, therefore, is to reveal the diversity and richness in European housing development during the post-war renewal, and to possibly inspire new approaches.

Looking back at the heyday of European housing in the 1950s through 1970s, the publication seeks to influence future developments that are innovative under the current circumstances and demands on housing. Today, many of the presented buildings are in danger of being demolished or have already been removed, due to a lack of sufficient appreciation. The dominant narrative is one of the deficiencies, and the value debate on the preservation of such buildings lacks visions for the future. This book aims to renew the existing narrative and thereby inspire a positive approach to such post-war buildings.

Finally, Croatian readers will especially appreciate the fact that Zagreb's housing projects are well represented in this volume by such architectural masterworks as Drago Galić's ***Kemikalija*** residential building (1956) and his GNO-VPZ residential block in Vukovarska st. (1957), Drago Ibler's ***Drveni neboder*** apartment building (1958), Stanko Fabris' VP Split residential block in Vukovarska st. (1960), Ivan Vitić's National Bank apartment complex in Laginjina st. (1962), Slavko Jelinek's Zapruđe estate (1966), "Rockets" residential towers by Centar 51 (Šerbetić, Iveta, Richter and Korenik, 1968), and the ***Mamutica*** residential complex (1974) by Đuro Mirković. In the accompanying essay dedicated to Zagreb, entitled "Private space in collectivist setting: Housing in Zagreb 1945-1975", Karin Šerman and Jana Horvat discuss the sociopolitical context and realities of the post-WW2 Zagreb housing projects, elaborating on a range of topics including the strong Modernist architectural tradition, housing legislation and policy, new socialist centre in Trnje, collective housing projects in the historical city centre, and planning and development of New Zagreb.

Dražen Arbutina, Borka Bobovec

Challenges of Recovery and Resilience: ArhiBau.hr 2022 scientific conference proceedings

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The international scientific conference entitled *Challenges of Recovery and Resilience: ArhiBau.hr 2022* was part of one of the largest construction fairs in the region, with an expert conference, organized by the Zagreb Society of Architects. The central theme of the four-day fair and the three-day conference *Challenges of Recovery and Resilience* poses exciting challenges for the construction sector and the architectural profession, which were invited to create solutions for complex issues of ensuring accelerated economic recovery and green transition for sustainable development, as well as greater resilience to future crises. The four-day program of the fair and the accompanying conference deals with topics that will engage stakeholders in the construction sector: from buyers to suppliers; from engineers to contractors; from investors to managers and insurers; from laymen to professionals; from the real sector to civil society, institutional sector, and public administration.

Due to the need to discuss and reflect on the specifics of the moment and new circumstances, the Zagreb Society of Architects (DAZ) initiated the organization of an event that included a wide circle of experts and scientists, who not only presented scientific research, but also discussed several contemporary topics in architecture, urban planning, and landscape architecture through numerous panels and discussions. The main part of the conference was conceived as a gathering that promoted the culture of architecture and sustainable development. Under the title *Challenges of Recovery and Resilience*, experts were invited not only to speak on topics included in the national recovery and resilience plan, green and digital transition, but also to discuss the New European Bauhaus, aspects of a circular economy within the construction sector, urban planning, sustainable tourism, green infrastructure, and issues of heritage protection, as well as the reconstruction of buildings after recent earthquakes.

In this context, experts defined ways, methods, and processes to reduce potential threats and damages, and, ultimately, when damage does occur, reduce tensions between participants, as well as speed up and simplify the reconstruction process. This is why the responsibility of experts in such situations is even greater: they can (and should) help in the restoration of everything that cannot heal or independently react to catastrophic events. The goal of the theoretical considerations presented during the conference was to analyze several key phenomena that define today's tasks of architecture and urbanism. Among them, several important topics, and current tasks in the observed field of activity were covered, including a new task of architecture to provide a possibility for individuals to remain alone and safe, having an obligation and sometimes even desire to isolate themselves from other people and to contribute to health and safety, at the same time maintaining social cohesion to a certain degree.

In this respect, architecture, urban planning, and landscape architecture ought to provide new approaches to responding to the challenge of context redefinition, providing thereby new perspectives on self-sufficiency, individuality, and collectivity. Their task is to discuss how a collective function can be protected, restored, and even enhanced by providing adequate material context in everyday life. Today's circumstances could change the very nature of terms and issues of alienation and self-isolation, and new principles of functioning are to be set up via new modes of communication. It is the context in which virtual environment and digital communication, previously often mentioned in negative light, have become the only way of social interaction, thus creating real virtual societies with virtual activities. It might so happen that being a part of a virtual society is no longer a matter of choice, but rather of obligation.

Sixteen authors have presented and published their papers in the Book of Conference Proceedings. These papers present a valuable tool for understanding that the context of recovery does not rely only on reaction, but also on preventive action that will focus on resilient material and social structures. The titles of the published papers within the Book of Conference Proceedings are: *Primordial Lace Woven into the Fabric of the City, National and University Library of Kosovo; The History and the Future of the Industrial Plant for Confectionery Production in Zagreb's Ravnice / Kraš Grupa; Greening Cities: Combining Old Approaches and New Perspectives in Zagreb; The Transformation of the Public Urban Environment in Milan – From Green Corridors to Tactial Urbanism; Care as a Material Doing; Regenerative Architecture and Biocentric Habitation – Including and Transcending Building?; Integrated sustainable building design approach in architectural student curriculum; Learning from the past: The Tropical Architecture in Kinshasa.*

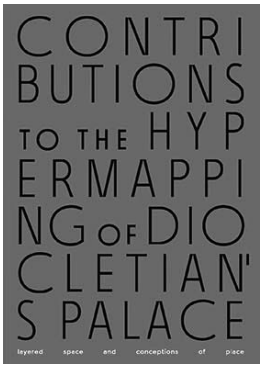
The Croatian Academy of Sciences and Arts has contributed to the event not only through individual participation, but also via inclusion of its constitutive parts, especially the Croatian Museum of Architecture, which participated in the preparation and implementation of the exhibition *Kinetic Architecture*. This exhibition, which presented exceptional architecture created by Andrija Mutnjakovic, F.C.A., presented an additional dimension of architecture as a phenomenon that, for many, bears significance precisely in the materialization of revolutionary ideas.

Karin Šerman

Contributions to the Hypermapping of Dioclatian's Palace

Layered Space and Conceptions of Place

Essays by Damir Gamulin, Leslie Lok, Ana Šverko, Sasa Zivkovic



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Design and layout: Damir Gamulin

ISBN 978-953-7875-64-0

Every new research on Diocletian's Palace demonstrates, times and again, how much there is still to learn about, and from, this unique living urban monument. The Palace figures as a conceptual mine one can endlessly and productively dig, but to which one can also endlessly and profitably add, discovering ever new layers while reinforcing its underlying conceptual structure. It proves a true spatio-temporal palimpsest against whose rich urban polygon one can test and hone ever new theoretical concepts.

The new book on Diocletian's Palace fits into such line of productive digging, mapping, and hypermapping of this fecund urban field. It consists of four essays, all distinct and specific in themselves yet also indicatively interconnected. The first two essays are by scholars from Cornell University – Sasa Zivkovic and Leslie Lok, while the other two are studies by Croatian researchers and designers – Ana Šverko and Damir Gamulin.

When invoking the concept of collage as his central interpretative tool, Zivkovic in his "Ultimate Collage City" performs, in a sense, a most logical choice, logical not only because of the huge explanatory potential of that very tool, but logical also considering the author's academic affiliation. Namely, it was precisely Cornell University where that concept was initially launched, in the late 1970s, by Colin Rowe and Fred Koetter, in their celebrated *Collage City* book. Building on that concept, Zivkovic promotes Diocletian's Palace as an "ultimate collage city". Not, of course, in a sense that the Palace in its original state followed the logic of collage, but that with its historical structure the Palace formed preconditions for the creation of a continuing, ongoing, transhistorical collage, manifested in various aspects – collage of forms, spaces, ambiences, materials. Yet for such intense bricolage to be successful, what is necessary – as Rowe himself insisted – is an underlying "systemic fix", some sort of "balancing act" – a precise fixed system, which, precisely because of its fixity and rigidity, might enable all sorts of variables and differences.

The potentials of this historical structure to sustain transformation and change is at the core of Leslie Lok's investigation too. Looking into the urbanism of Diocletian's Palace, in her "Figure to Mat" she explores how an initial clear architectural "figure" – the historical castrum itself – set in relation to the surrounding landscape as its neutral "ground", transformed through history into an intense urban "mat", characterized, in contrast, by a certain "formlessness", as a formless network defined by heightened interconnectivity and horizontal density. Noticing this shift – from figure to mat – Lok searches for preconditions that triggered and enabled such change, as a sort of the DNA of the Palace that permitted such unexpected development into mat-building-urbanism. If – as Lok proposes – the conditions that propelled such unlikely evolution were a series of bottom-up densifications that occurred through history, the elements that enabled such densifications were the Palace's own key elements – its original hybrid function, its implied grid organization and the fixed boundary wall. Such fixed elements were then, paradoxically, potent enough to guide the Palace's urban development toward a mat-building principle, i.e. toward "close-knit patterns of neutral collectives open to growth and change", as Alison Smithson introduced and described it.

The ability to navigate smoothly through the Palace's intricate spatial fields and corresponding theoretical complexities are demonstrated by Ana Šverko in her "Time-Inclusive Design". She creatively remixes various theories and creates interesting theoretical collages, to explain the Palace's various aspects and phenomena. In a manner of a skilful bricoleur, she pulls from the rich modernist/postmodernist/contemporary theoretical repositories useful conceptual tools and follows their productive encounters. She relies primarily on the insights of the renowned scholars of Diocletian's Palace – Robert Adam, Aldo Rossi, Herman Hertzberger and Jaap Bakema – to whom she joins the researchers of recent urban phenomena, such as Koolhaas, Otero-Pailos, Kevin Lynch, primarily along the lines of the topic of preservation, protection, and critical conservation. Through their instructive interference, Šverko promotes an interesting proposal of the necessity of a "time-inclusive design", the one that might guarantee the qualities of lasting, enduring, controlled change and sustainability, where *lasting* here refers not only to that of forms, but also of overall systems, integral ambiences, spatial essences and urban identities.

Along the similar lines of suitable contemporary interventions in such valuable historical spaces, reasons also Damir Gamulin. In his "Thinking Shadows, Drawing Place", he commits to devising a design method that would be inspired, or even generated, by that very historical context, by way of creating a site-specific conceptual model as an integral and inseparable part of the very design process. In doing so, he turns to the immaterial element of shadows as an ephemeral yet real layer of the overall atmospheric quality, as intimate outcome of the interplay between light and architecture and as such an indispensable segment of the integral spatial experience. The idea is to reach a new method of creation that would "integrate classic methods of design with more developed atmospheric approaches such as the techniques of scenography, film and choreography", and that would use both tangible and intangible elements such as light, shadow, scent and movement, in responding to new needs while preserving the registered *genius loci*. Gamulin's profound analysis sets the track for such sensitive, inclusive and responsible design method.

With all these new insights, built invariably on the layers of existing mappings, this new hypermapping of Diocletian's Palace proves extremely valuable, introducing new interpretative perspectives and understandings, and indicating new veins of projective design procedures. This in turn confirms that the Palace is not only a fabric that attracts and receives new layers of explication, but also a platform that launches and projects new design methods, aims and procedures. And it is precisely this active, future-oriented aspect that is particularly interesting, proving to be the Palace's uniquely potent legacy.

Marijana Sironić

Viktor Kovačić's Villa Vrbanić – Das englische Haus

Vila Vrbanić Arhitekta Viktora Kovačića – Das englische Haus

Nina Gazivoda

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The year that celebrates the 150th birth and 100th death anniversary of architect Viktor Kovačić, has seen the monograph *Vila Vrbanić arhitekta Viktora Kovačića – Das Englische Haus* authored by Nina Gazivoda, Ph.D. The monograph is an homage of sorts to the founder of modern Croatian architecture.

Culturo-scientific interpretation and study of Villa Vrbanić (1911-1912), Viktor Kovačić's valuable architectural marvel positioned at then Josipovac, today number 2 I.G. Kovačića Street in Zagreb, aids the cognisance of Kovačić's impactful *oeuvre* in the context of modern Croatian architecture as well as that of Europe, given its impact and interaction with the English architecture of the late 19th and beginning of the 20th century.

Research of Villa Vrbanić, consolidated in this monograph, is a result of continuous work conducted by Nina Gazivoda, and refers to the work and activity of Viktor Kovačić, in particular to the part of his *oeuvre* that encompasses a comprehensive approach to urban villa design.

The conducted research aims to point out to once exceptional architectural and design value of the Villa's exterior and interior, and applied design approaches of *Gesamtkunstwerk* and *landscape planning*, which led to the Villa gaining the status of a cultural heritage site. Additionally, such a status was extended to the built-in interior equipment of the Villa.

Furthermore, the aim was to use the revealed research findings towards setting up procedures required for the restoration of the Villa, as well as to nurture affirmation and preservation of urban villas positioned in Rokov perivoj gardens and summer houses at Josipovac, both discussed in detail in another book by the same author, *The Villa Frangeš on Rokov perivoj in Zagreb – The origins of its construction and recognising its importance*, published in Zagreb in 2008.

Though the impact of the English residential architecture on Viktor Kovačić's work had previously been stipulated by V. Lunaček and A. Laslo, this monograph has established for the very first time and elaborated on the relationship of Kovačić to the English architecture of the ultimate quarter of the 19th and beginning of the 20th century.

It is not a mere accident that Kovačić, as published in his notable article *Moderna arhitektura* in journal *Život* in 1900, got his inspiration from the modern architecture movement in England, namely from its founder J. Ruskin, pledging to the truthfulness of artistic (architectural) expression and devoting himself to strong movement of modern spirit.

This way, the author reveals an immediate impact of the English residential architecture on Villa Vrbanić and other work of Kovačić's, as much as its direct impact, observed through the work of Viennese architects J. Hoffmann, K. Moser and A. Loos. In that context, another influential figure relevant to Kovačić's work is the Berlin architect H. Muthesius and his colossal work *Das englische Haus*, subject to detailed analysis in the monograph.

Led by the principle that the first and foremost role of a house is to enable comfortable living and that to do so, it needs to be architecturally designed, Villa Vrbanić ensures high quality of living, with functionality and content features at the level of an upper middle class English household, as seen from the work of the aforementioned English architects. Next to Muthesius' elaboration, the author delves into some of the most significant theoretical pieces, oeuvres and individual masterpieces of the Secession movement in general and those significant for Croatian architecture of that period, and various happenings in the world of English architecture of that era.

From the cultural heritage point of view, Villa Vrbanić is a part of the Historical Urban Area of Zagreb heritage site, which, amongst others, includes areas that the historical urban center is immersed in and which frame the city's urban tissue, its accentuated urban block structure and the bearers of its identity features, all formed until the mid-20th century.

From the viewpoint of a contemporary approach to preservation of inherited cultural and natural values of the historical whole, not only is the cognisance of the value of the design approach witnessed not just in the exterior and interior design of Villa Vrbanić *(Gesamtkunstwerk)* exceptionally significant, but so is the Villa's surroundings in the heart of Tuškanac forest, and the established landscape element (made possible by the appropriate size of the allotment and its landscape design), integrated in the comprehensive architectural approach, rendering it an inseparable component of its overall value *(landscape planning)*.

Once a wooded area under the hills of Medvednica reaching almost into the core of the city center, Josipovac is Zagreb's very first example of an executed, planned transformation into a cottage-neighborhood of family garden villas. The construction set off in the late 1880s, covering the initial area of twenty allotments. It is important to highlight that the cottage neighborhood construction in Josipovac was a mere continuation of the late 18th century tradition of sporadic and dispersed, usually anonymously executed construction of summer houses as part of seigniories, and occurring only a decade or so following the appearance of the Viennese model of the cottage-neighborhood, Cottagen-Viertel, in neighborhoods Währing and Döbling, inspired by the English cottage-style houses. In fact, cherishing traditional models of construction, Zagreb of that time was not falling behind in the application of contemporary European tendencies of *landscape planning,* applied in the construction of summer houses under the hills of Zagreb's Medvednica.

Though originally scientifically purposed, this monograph sees art history, architecture and urban planning disciplines and their respective key events intertwined and contextualized in the given socio-historic circumstances, snapshotted around the life of the Vrbanić family, oftentimes even expanding on other arts and cultural activities of that era. It is for those reasons that the monograph is of interest to a much wider audience than perhaps initially imagined. In this context, the audience is provided with examples of English film and literature pieces to get a deeper grasp of where Kovačić drew inspiration from in the production of his own *oeuvre*. Particularities of the Secession era in Europe are also depicted through various visual and literary media, which Ž. Čorak describes as *duality and doubt principles, reality pluralisms.*

Dubravko Bačić

The Architecture of Dubrovnik between the Two World Wars

Arhitektura Dubrovnika između dva svjetska rata

Antun Baće

Publishers: ArTresor naklada and Institut za povijest umjetnosti, Zagreb, 2023
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Antun Baće's long-awaited book *The Architecture of Dubrovnik between the Two World Wars* is a truly masterful, meticulous and comprehensive exploration of Dubrovnik's interwar architectural heritage. The book grew out of Baće's dedicated research carried out for his 2015 Ph.D. thesis, supervised by the late Professor Tomislav Premerl and defended at the University of Zagreb, Faculty of Humanities and Social Sciences. His academic pursuits and extensive archival research blended perfectly with Baće's field expertise and knowledge of the area, developed during years of professional career as Heritage Preservation Officer at the Conservation Department in Dubrovnik (and its former Head).

Baće's book offers thorough insight into the architecture of the interwar period in Dubrovnik and its immediate surroundings (from Cavtat in the east to Trsteno in the west, including the Elaphite Islands). What is presented are the most important examples from the total building activity of the period, estimated at around 600 new buildings (plus numerous adaptations, extensions and additions of existing buildings) are.

The introductory discussion on the very notion of 'tradition' and its meaning in the context of the Dubrovnik region has enabled an authoritative interpretation of a qualitatively diverse and quantitatively imposing building stock. Yet, precisely because of the obvious dependence of interwar architecture on architectural heritage, present not only in Dubrovnik but also in the wider Mediterranean, Baće had to deal with prejudice about the loss of architectural value after the fall of the Republic of Dubrovnik. Reaffirming the continuity, he skillfully interpreted the 19th century building development before moving onto the interwar period. In addition to architecture and urban development, it was equally important to explain the political and cultural circumstances during the French and Austrian administration in Dubrovnik.

In several inspired chapters, the author further outlines the great expectations brought on by the end of the First World War, while also focusing on the deep disappointment of the people of Dubrovnik with the new Yugoslav state. However, despite the provincial environment, the vitality of the descendants of the once powerful city-state resulted in high cultural achievements. Although, according to Baće's interpretation, in Dubrovnik's world, there was much more sensibility for nurturing literature and painting than for nurturing architecture, thanks to its unsurpassed architectural heritage and wealthy clients, in the interwar period the city remained an attractive environment for architects from both near and far. Still, the distinct dominance of residential architecture in relation to public and sacred, as well as the simultaneous application of different stylistic currents, from vernacular regionalism through eclecticism to modernism, has led the author to replace the established practice of chronological and typological discourse with an analysis of architects and their works.

The key section of the book dedicated to "Creators and their works" contains nine chapters with masterfully arranged architects and groups, entailing authors from local master-builders to established architects intermittently active in Dubrovnik. The role of the conservation office led by the charismatic Kosta Strajnić, an ardent proponent of modern architecture and the main promoter of the most important modern architect active in Dubrovnik – Nikola Dobrović, is rightfully analyzed in a chapter of its own.

Among those coming from other places and active in the Dubrovnik area, the most significant is certainly the arrival of young Nikola Dobrović from Prague. He designed and built truly exceptional and internationally relevant work during his 10-year stay in Dubrovnik. Zagreb-based architects active in Dubrovnik in the period between the two wars – Mladen Kauzlarić, Stjepan Gomboš, Lavoslav Horvat, Harold Bilinić, Drago Galić, Zdenko Strižić, Bela Auer, and others – brought in high standards with their projects and, furthermore, demonstrated how to reconcile the principles of modern architecture with the specificities of local architectural heritage.

The bearers of modernity are contrasted by Lavoslav Horvat and Harold Bilinić with the monumental Neo-Historicist villa of the shipowner Božo Banac in Ploče, which once again, in the most visible place in the city, refers to the heritage of Dubrovnik's Gothic-Renaissance summer villas. The original interpretation of the palace as a complex work of architecture, extending beyond the discourse on the continuity of tradition and modernity, could indeed be applied to a large part of Dubrovnik's interwar architectural heritage. Architects from Split (Ivan Ivačić, Fabijan Kaliterna and Budimir Pervan) left their mark in Dubrovnik too, as did Ivan Meštrović and Heinrich Lauterbach. The same is true of the great Slovenian architect Jože Plečnik and his students.

Baće extensively discusses the most important built and unrealized projects, assessing their significance in the context of the 20th century Croatian architecture. In doing so, he routinely re-examines and corrects certain misattributions or wrong years, introduces new data, and expands our knowledge of the works of certain architects and master-builders, some of whom were poorly known or completely forgotten. Thanks to Baće's research, we now know more about Jozo Dražić, Fridrich Valenta, Drago Pogačić, Rikard Trostman, Vilim Doršner, to name just a few, and how much they contributed to Dubrovnik's interwar architectural development. Nevertheless, in his research, Baće is not guided only by architectural quality; he paints a broader picture of the overall architectural production, and situates the general characteristics of the interwar building and urban development in a larger social context.

Baće consulted and scrupulously collected all available data from publications and professional literature, archival sources and old newspapers, so we can learn a lot about the historical details of every particular design and building discussed, architects, clients, and the most significant architectural features. For this book, beautifully illustrated with valuable visual material, numerous reproductions of little-known or unknown architectural drawings and old photographs, Antun Baće was recently awarded the 2023 Annual Book Award by the Society of Art Historians of Croatia.

Sanja Kiproski

Central Europe and Belgrade: Architectural Influences 1919-1941

Srednja Evropa i Beograd: arhitektonski uticaji 1918-1941

Biljana Mišić

Publisher: Cultural Heritage Preservation Institute of Belgrade, Institute for Contemporary History Belgrade, 2022

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Studies of the development of the Yugoslav architectural scene between the two world wars have recently been enriched by the monograph *Central Europe and Belgrade: Architectural Influences 1919-1941*, authored by Dr. Biljana Mišić. Stemming from her doctoral dissertation titled *Central European Influences on the Development of Belgrade Architecture 1919-1941*, defended in 2019 at the Department of Art History, Faculty of Philosophy, University of Belgrade, under the mentorship of Prof. Dr. Aleksandar Kadijević, this monograph represents the most comprehensive scientific synthesis to date in interpreting cultural transfers between Central Europe and Belgrade.

Although Central European stylistic paradigms inspired architects during the artistically prosperous period of the Kingdom of Serbs, Croats, and Slovenes / Yugoslavia, this topic has often been interpreted fragmentarily in scholarly historiography, lacking a fuller historiographic contextualization of this complex phenomenon. Therefore, Biljana Mišić's monograph, as a result of the author's years of research efforts, represents a significant scholarly contribution.

Published in 2022 by the Cultural Heritage Preservation Institute of Belgrade and the Institute for Contemporary History as co-publisher, the monograph has 343 pages and a plethora of high-quality illustrative materials. The illustrations, which facilitate easy tracking of the main narrative, significantly contribute to its quality, thanks to the fruitful collaboration between the author and numerous professional and scientific institutions, such as the Cabinet for Architecture and Urbanism of the Croatian Academy of Sciences and Arts, the Institute of Art History in Zagreb, and the Zagreb City Museum.

The main narrative of the monograph is functionally structured through five chapters, divided into several conceptual units in which the author analytically examines the adoption of creative impulses from Central Europe and their transposition onto the architectural scene of the Kingdom of Serbs, Croats, and Slovenes / Yugoslavia. Preceding them is an *Introduction* in which the subject and aim of the research are clearly defined, along with a systematic presentation of previous historiographic contributions on this topic. Following the main narrative are *Concluding Remarks, Abbreviations*, an extensive list of *Sources and Literature, a Register of Names and Terms, Acknowledgments by the author*, and a very significant *Summary* in English, allowing researchers from a wider European area to have a concise overview of its content and main conclusions.

In the first chapter, titled *Central Europe: Historical, Cultural, and Artistic Framework*, the author points out the complex nature of the concept of *Central Europe*, used in the monograph as a term for one of the multiple creative sources of the architectural development of interwar Belgrade. In the second chapter, *Central Europe and Belgrade*, through several smaller units, gradual but continuous processes of Europeanization and modernization of Belgrade are presented within a chronological framework from the first half of the 19th century to the middle of the 20th century, materialized through the presence of Central European architectural paradigms in shaping Belgrade's distinctive, then contemporary identity. Significant roles in cultural and artistic exchange were also occupied by higher architectural institutions in Central Europe, interpreting the education and professional advancement of Yugoslav students in Prague, Munich, Berlin, Vienna, Graz, and other centers. In the next section, the author analyzes the significance that the conceptual principles of architects Otto Wagner, Adolf Loos, Peter Behrens, and Hans Poelzig had on Yugoslav architects, such as Viktor Kovačić, Vjekoslav Bastl, Hugo Ehrlich, Josip Pičman, Drago Ibler, and many others, who transmitted creative Central European impulses into Belgrade's architecture. The contribution of Yugoslav regional architectural schools to the penetration of Central European concepts in the construction of interwar Belgrade is also examined, with particular attention paid to Zagreb, a leader in modern architectural tendencies in the Kingdom of Yugoslavia.

In the chapter *Sources of Central European Architectural Influences*, the author thoroughly analyzes the exchange and adoption of progressive Central European artistic concepts, interpreting, through specific sections, the history and course of some of the most significant Belgrade architectural and urban planning competitions, architectural exhibitions, and public lectures, the contribution of professional journals and literature, as well as the travels of artists, the importance of congresses, and fairs.

In the fourth chapter, titled *Central European Influences on the Development Trends of Interwar Belgrade Architecture*, the author provides a clear overview of the stylistic pluralism of the Belgrade architectural scene, founded on the stylistic ideas of Central Europe. This chapter previews the subsequent fifth chapter, *Belgrade Interwar Modernism: Architectural and Urban Concepts of Central European Origin*, which is the most extensive and analytically layered section in the monograph. Here, Central European stylistic paradigms are observed in numerous Belgrade objects, systematized into separate chapters according to their purpose. Projects by many European and Yugoslav architects are analyzed, such as Alois Mezer, Viktor Kovačić, Ernst Weissmann, Vjekoslav Bastl, Dionis Sunko, August Rheinfels, Alexander Popp, Otto Bartning, and many others.

The greatest significance of the monograph *Central Europe and Belgrade: Architectural Influences 1919-1941* lies in its comprehensive interpretation of complex cultural transfers between Central Europe and Belgrade. Through identifying similarities in the theoretical views of Yugoslav architects and their materializations, the author clearly defines and recognizes the presence of Central European stylistic matrices, significant for the evolution of Yugoslav architecture, in a layered and methodologically grounded manner. With its depth and comprehensiveness, it represents a valuable source for broader contextual interpretations of Yugoslav and European architecture.

Marija Barović

Watching, Waiting: The Photographic Representation of Empty Places

Editors: Sandra Križić Roban and Ana Šverko

Contributors: Ruth Baumeister, Isabelle Catucci, Stella Fatović-Ferenčić, Martin Kuhar, Catlin Langford, Jessie Martin, Stuart Moore, Luca Nostri, Kayla Parker, Bec Rengel, Tihana Rubić, Klaudija Sabo, Anna Schober, Elke Katharina Wittich

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Download: https://muse.jhu.edu/book/109814

Crises are not merely moments of disruption and breakdown, but also catalysts for transformative thinking and action. Embracing the moment of the Covid-19 pandemic crisis as an opportunity for critical reflection and collaboration, the book "Watching, Waiting: The Photographic Representation of Empty Places" emerged as a timely anthology exploring the landscapes of emptiness through the lens of photography.

The title "Watching, Waiting" stands like an invitation to pause amidst urgency and observe the profound issues laid bare by the global crisis. This call for analysis and reflection came at the onset of the pandemic with the announcement of the scientific conference "Watching Waiting – Empty Spaces and the Representation of Emptiness", an annual cycle of the "Discovering Dalmatia" conference series. While the conference title suggests a geographical determination, the successful international and interdisciplinary response to the 2020 thematic call centered on examining empty spaces through the medium of photography surpassed regional boundaries contributing to a multi-faceted interpretation of the global crisis.

Book editors Ana Šverko and Sandra Križić Roban – integrating their scholarly interests and research roles at the Institute of Art History – recognized the critical potential of the topic and curated a book project that stands out for its unique integration of various disciplines. Focused on the theme of emptiness, the book features contributions from authors of diverse professional backgrounds and geographical experiences offering a layered reading of the topic.

During the pandemic, the medium of photography gained heightened significance allowing individuals to document the unprecedented circumstances of life in lockdown and to easily share them with millions forced to isolate in their homes. Emptiness is taken as a focal point of the book's inquiry. However, the book delves into the broader realm of emptiness, exploring both its contemporary and historical manifestations. While the motifs of emptiness are not exclusively tied to the pandemic, its profound impact has offered a new standpoint for reflection.

The essays on the politics of emptiness navigate through pertinent contemporary issues such as the coexistence of life amidst ongoing military conflicts, the Black Lives Matter Movement, exacerbated social divisions in neoliberal society, and the rise of technocratic rule. These discourses are illustrated through various lenses: Stuart Moore and Kayla Parker's static portrayal of the demilitarized buffer zone in Nicosia; Bec Rengel's exploration of the emptiness felt in photographs of the empty plinth where the statue of slave trader Edward Colston once stood in Bristol; Anna Schober's analysis of pandemic-era media broadcasts and their polarizing social effects; and Klaudija Sabo's examination of the formal-aesthetic dimension of space created by the disposition of beds in temporary Covid-19 hospitals. Through these diverse perspectives, the book explores how space transforms under political dynamics, whether neglected, reclaimed by nature or shedding its former identities.

Moving beyond the political, the book delves into the emotional landscapes of emptiness – loneliness, isolation, and longing – that permeate scenes encountered in the wake of the health crisis. Catlin Langford addresses this by examining staged figures in historical and contemporary photographs. Reflecting on images of historical and contemporary ruins, Elke Katharina Wittich analyzes how memories, personal experiences, and media can evoke feelings of loneliness. Jessie Martin explores generic places of transit, like airports and other 'non-spaces' of neoliberalism. Addressing the relationship between space and emotions inevitably leads to the domain of architectural phenomenology. Drawing on Arne Jacobson's iconic National Bank in Copenhagen, Ruth Baumeister considers how emotions intersect with physical spaces discussing empty spaces as a design feature that can empower the contemplative and metaphysical dimension of place.

Memories of places are also preserved and revived through photographic collections. This publication brings two somewhat insufficiently known Croatian collections into focus: the Photographic Archive of Milovan Gavazzi, examined by Tihana Rubić, and the Photographic Collections of Vladimir Čepulić. The pioneering work of Čepulić in medical photography is highlighted by Stela Fatović-Ferenčić and Martin Kuhar.

When the space of communication and socialization loses its physical dimension, we are challenged to reckon with the complexities of virtual communication and manipulation in an age of information overload. Isabelle Catucci's aerial photographs of excavated graves in Brazil shed light on the manipulation of official data, emphasizing the importance of contextualizing local responses within the global pandemic narrative.

The book also offers insights into the creative process behind photography and filmmaking, elucidating the conceptual underpinnings of visual storytelling in times of uncertainty. Photographer Luca Nostri, for instance, describes his methodology, underscoring the therapeutic nature of artistic expression as a way to navigate the complexities of the pandemic.

Overall, this multidisciplinary exploration into the political, sociological, visual, and aesthetic dimensions of emptiness invites readers to navigate through disciplinary intersections, fostering a deeper engagement with its complexities. As an illustration, while Catlin Langford analyzed photographic staging for its artistic prowess in conveying a sense of isolation, Tihana Rubić provided a pedagogical perspective on the same technique, writing about the role of staging within anthropological research. These engaging overlaps remind us of the generative potential of cross-disciplinary intersections and knowledge exchange.

In conclusion, "Watching Waiting: The Photographic Representation of Empty Places" not only contributes to scholarly research on the theme of emptiness but also encourages a wider audience to explore the topic. With its evocative imagery and insightful analysis, the book invites readers to embrace emptiness – to confront it, to contemplate its depths, and to discover meaning within its silence.

Stanka Ostojić

Light Nature Architecture
A Guide to Holistic Lighting Design

Ulrike Brandi

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The phenomenon of light is deeply integrated into quotidian reality and often not consciously perceived. In her book "Light Nature Architecture – A Guide to Holistic Lighting Design" author Ulrike Brandi presents authoritative discourse on the profound integration of natural light within architectural landscapes. In her work as a practician and member of interdisciplinary teams Ulrike Brandi is focused on diverse architectural strategies to obtain sustainable compositions and atmospheres in creating the poetry of light. The author's insightful approach arises from more than 1300 projects and transcends conventional paradigms, offering a sophisticated understanding of how light can be harnessed as an integral element in architectural design. The book also refers to new findings from other disciplines such as neurology, medicine, biology, and environmental protection and incorporates them in holistic lighting design. Through ten book chapters (Nature, Evolution, Perception, Culture, Sustainability, Health, Darkness, Dynamics, Composition, Atmosphere/Magic) the author examines and systematically describes the multifaced impact of natural light on various dimensions of the built environment. Each chapter is focused on a specific lighting project and precisely structured into five subchapters (*Introduction*, *Phenomena*, *Background Knowledge*, *Practical Knowledge*, and *Implementation*). The photo material is carefully selected to demonstrate the light atmosphere of each project. Book chapters are individually formed and allow random reading order.

Nature – The author describes the specific nature and distinctive characteristics of daylight using the terms of distribution and diffusion, spectrum and colour rendering, illumination levels, sun positions and daylight factors in simple vocabulary, diagrams, and basic physical models. European standards and criteria regarding indoor daylighting are presented together with recommendations for openings positions to obtain an outward view.

Evolution – The subchapter focuses on specific light reception variations among living organisms as the results of a long evolution process strongly affected by the alteration of night and day. The author describes the development and the structure of visual functionality of the human eye, as well as tools and equipment that significantly help in the improvement of the light observing process.

Perception is, together with lighting and space, one of the key elements of the holistic lighting concept. A crucial part of spatial perception is the information processing between the eye and the brain. Ulrike Brandi defines neurological and psychological aspects of perception. The integration of experience into the seen image helps in creating specific lighting atmospheres and optical illusions. The author also points out shade as an essential part of spatial perception.

Culture – In this subchapter, the author describes culturally developed visual habits. Europeans, for example, often neglect immaterial and spiritual aspect of light: the light source characteristics are more important to them than the created atmosphere. Diverse cultural backgrounds result in various preferences with a clear example being the inclination toward either warm or cold light based on the geographical latitude of a particular culture. Besides latitude, colours of the landscape and its natural materials determine the culturally defined light preferences.

Sustainability (in lighting design) is a result of interaction and consideration of ecological, economic, and social aspects of culture. Ulrike Brandi emphasizes the importance of life cycle management of implemented lighting strategies. Generous and ideal application of daylight is at the heart of sustainable lighting design.

Health – Light has a great visual and nonvisual effect on people's health and is one of the key elements of the circadian rhythm. All biological processes are adjusted to this rhythm. Internal oscillating clocks are adjusted daily thanks to exposure to natural light of sunrise and sunset.

Darkness – By analysing and describing different aspects of light in architecture, the author emphasizes the importance of exposure to the alternating rhythm of intense shining light during the day and darkness at night. The darkness exposure is just as important as light exposure. Light pollution presents a rising concern in terms of indistinct star sky view.

Dynamics – Ulrike Brandi underlines the importance of adjustability and flexibility of lighting conditions. The introduction of lighting systems control enables adaptation to various requirements (often in terms of ergonomics). Also, adjustable lighting affects psychological condition and consequently creates specific atmosphere or space accent. Additionally, light system control is crucial in energy saving promotion and light pollution reduction.

Composition – The choice of lighting instruments and their characteristics plays a crucial role in composition realization. Light compositions can encourage communication, promote privacy, emphasize hierarchy, or line out certain architectural sensation.

Atmosphere/Magic – An interdisciplinary collaboration of architects, designers and craftspeople guided by clients' preferences and requirements in lighting design can significantly improve the space atmosphere. The author highlights that factors such as the specific height of light points, the colour temperature of white light, and the arrangement of luminaires can significantly influence the perception of security or spaciousness in both indoor and outdoor spaces. For instance, a high-standing sun in a bright sky suggests an energizing atmosphere, contrasting with the low evening sun or the warm glow of a campfire.

The presented case studies (Trident Park Malta, Elbphilharmonie Hamburg, Amsterdam Holocaust Memorial of Names, Oldenburg State Theater, Elmshorn Control Center, ICE 4 Train, Mall of the Netherlands, Rotterdam Centraal Station, London Royal Academy of Music) provide a granular analysis of the intricate interconnections between light, nature, and architecture. This comprehensive work sheds light on the interplay between environmental luminosity, architectural form, and human experience. A glossary and further reading suggestions present a valuable source of additional information at the end of the book. By aligning theoretical insights with practical applications, this book emerges as a seminal guide for architects, designers, and enthusiasts seeking an enlightened approach to lighting design.

Korina Vuković

Herzog & de Meuron, Royal Academy of Arts, London

Herzog & de Meuron, Royal Academy of Arts, London

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Herzog & de Meuron's architectural office was established in Basel in 1978 and is one of the pioneers of architecture. They have designed a wide range of projects, from small-scale private houses to large-scale urban plans and many public buildings, such as museums, stadiums, and hospitals. They have won many awards, the most important of which is the Pritzker Architecture Prize in 2001. Over time, the office has grown to 600 architects dispersed in different cities, but the main office is still in Basel, the hometown of the founders.

In October 2023, Herzog & de Meuron organized an exhibition of works from their office and *Kabinett* archives, which is a rare occasion. The exhibition took place in London at the Royal Academy of Arts and was supplemented by this catalogue. Herzog & de Meuron's exhibition catalogue provides an approachable picture of the fundamentals, sequence of thinking, and their approach to each project. The catalogue consists of six essays written by seven authors (Ila Bêka, Louise Lemoine, Ricky Burdett, Marc Forster, Vicky Richardson, Henrik Schødts and Beate Söntgen) in which different topics are analysed. Herzog & de Meuron's analysis of human movement and perspective, collaboration between architects and artists and architecture's presentation play a pivotal role in their design process.

Starting with an interview with the founders, the first essay **"Making Windows in Sandcastles"** leads us through the making of the *Kabinett*. The *Kabinett* serves as an archive, laboratory, studio, display, and documents of more than 450 out of 600 projects designed since the office opening in 1978. The *Kabinett* is located on the lower floor of their office building in Basel. The aim is to document a large part of their past and future dossier with drawings, models, etc.

The second essay, **"Emotion of Space"**, is a conversation with Jacques Herzog in which he explains his relationship to photography and whether architecture can provoke emotion. Herzog concludes that emotions can't be stimulated by a specific form of architecture. Therefore, their architecture does not have a unique signature style. Emotional perception of a place exists, and architecture plays a significant role in this perception. When we enter a new space, we absorb everything, from light, smell and sound to materials, colours, shapes and forms, all of which are part of the exterior and the interior of the space. Together they give rise to some emotion. Herzog & de Meuron believe that people play a key role in the creation of architecture. It doesn't exist at its full potential if there's no movement in it, human movement creates architecture. Their architecture represents a human performance stage. These behavioural patterns are known as *architecture des gestes*. According to Herzog, *architecture des gestes* does not rely solely on past reference memory or education, but directly appeals to gestures that people learn from personal experiences and the way they live, similar to how children learn. This instinctive and gestural approach has been implemented in two projects: Autobahnkirche and Calder Gardens.

"Spaces of Potential" the third essay, elaborates on the understanding that if architecture is intentionally designed, it becomes a by-product, a stage for people. It can be seen in their Battersea campus building project for the Royal College of Art, where they planned vast studios that were later transformed into an organized mess of student work. They are contemplating their artistic influences and collaborations with Donal Judd, R**émy Zaugg,** Joseph Beuys, Gordon Matta-Clarke and Dan Graham. It was particularly important when Herzog & de Meuron designed Tate Modern in 2000, which coincided with their long-term relationship with artists and the idea that the creative industry could become a key part of British economy. They became one of the main architects of public cultural buildings. The design of the interior was also influenced by observing people's movement; it was a successful attempt to re-categorise public and private spaces by dimming the membrane between the two spaces. Herzog & de Meuron won the Pritzker Prize for Architecture in 2001 after the completion of Tate Modern.

Movement was also the subject of **"Different Takes"**. This study discusses how architecture directs a person's movement and perception of the city. Different epochs have different approaches to movement. Baroque architecture had only a visual impact as it represents the owner's status. In Modernism, the movement is very precise, because every interaction has a social consequence. The perception of a building by a user is crucial, creating a different interpretation of architecture. Are you looking at it from a distance, or are you moving through it? Are you looking at it from a higher or lower level? Similarly, are you seeing it in real life or in photographs and movies? Presentation is important for the outcome of the experience.

The essay **"Envisioning Unimaginable Architecture"** further reflects on perception and how space, light and the absence of light can affect one's emotional well-being. The author juxtaposes architecture with the film. Numerous directors (Hitchcock, Michelangelo Antonini, etc.) used architecture as a storytelling tool. Herzog & de Meuron also imbued architecture as a tool for storytelling, creating emotions, not directly, but as an unspoken word.

The sixth essay, **"Building for More than Healthcare"**, explains the process of architectural design when movement is prohibited, in this case due to illness. As mentioned above, movement is essential in the design. Herzog & de Meuron doubted the institutional understanding of what a hospital is. By focusing on non-movement factors, they envisioned and designed healthcare institutes using innovative typologies. The horizontal perception of a patient who is unable to move prompted them to think about what he sees all the time: the ceiling, reinterpreting what a ceiling can be and consequently creating new hospital layouts.

Their designs affect the way we use public spaces, the way we perceive them, and how we behave. They have an unusual angle on the relationship between architecture and society, creating buildings according to humanistic principles with a focus on the urban fabric, social spaces, and users of buildings.

To summarise, Herzog & de Meuron's architecture answers the following question: How do people perform?

Marija Krajnović

Criteria for Designing School Outdoor Spaces

Kriteriji za projektiranje otvorenih prostora škola

Marija Krajnović, born in 1988 (Osijek, Croatia).
She completed her Master's studies in 2013 at the Faculty of Architecture in Zagreb. She is currently employed as a teaching and research assistant at the Faculty of Civil Engineering and Architecture Osijek.

Supervisor: Prof. Mia Roth-Čerina, Ph.D.
Members of the committee:
Prof. Emerita Hildegard Auf-Franić, Ph.D. (president)
Prof. Krunoslav Šmit, Ph.D.
Assoc. Prof. Sanja Lončar-Vicković, Ph.D.
Date of public defense: December 21, 2023

The dissertation has 301 pages, 9 chapters, 117 illustrations, 4 tables, 449 footnotes, 181 bibliographic units, and two catalogues.

The subject of this dissertation is school outdoor spaces in the context of defining criteria for their design from the pedagogical, architectural and urban planning points of view. Based on a review of scientific and professional literature, as well as selected reference examples of school outdoor spaces, characteristics of outdoor spaces were identified and design criteria were determined. By establishing a connection between pedagogy, architecture and the urban context, a holistic approach to the design of school outdoor facilities is made possible. Based on the defined criteria, the existing outdoor facilities of 15 elementary school buildings in the city of Osijek were evaluated and guidelines for their improvement were proposed.

During the construction process of a school, outdoor spaces are very often not an integral part of the planning, programming, design, and construction of the school complex, and positive examples are the result of partial interventions. Without a systematic approach to planning and design, the result is an inadequate and suboptimal use of school outdoor spaces, design that is inconsistent with the modern educational program and, depending on the environment in which they are located, failure to meet the potential for fulfilling the needs of the local community through multipurpose use.

The research consists of three phases (analysis, synthesis and evaluation), and for the purposes of the research, two catalogs were created. The first catalog refers to the analytical phase of the research and consists of graphical representations of 24 selected reference examples of school outdoor spaces from the 20th and 21st century, which support the theses established in the analytical part of the research. The second catalog consists of detailed analyses of 15 examples of outdoor spaces in existing elementary schools in the city of Osijek, on the basis of which a graphical analysis of the content of outdoor spaces was made and based on which the defined criteria were evaluated.

In the **analytical part** of the paper, an overview of scientific and professional literature is given, supported by reference examples of national and international school outdoor spaces of the 20th and 21st century. These examples underline the importance and role of the use of outdoor spaces and confirm the theses established in the professional and scientific literature. The analytical part of the study is based on the consideration of schools' outdoor spaces from three important aspects that influence their design: educational program, planning and programming and the urban context in which they are located.

The first part of the analysis, related to the educational program, deals with the issue of outdoor education, with the question of the influence of school architecture on the success and development of children, and with the research of the program and the development of school buildings.

The second part of the analysis examines school outdoor spaces through a review of legislation, regulations, and standards that regulate the programming, planning, and design of school buildings, as well as an analysis of the content of school outdoor spaces.

The third phase of the analysis explores the potential relationships between the school outdoor spaces and the context in which the school is located, as well as oportunities for interaction with the local community.

The **synthesis of the research** consists of the evaluation of 24 selected reference examples from the 20th and 21st century and the establishment of design criteria based on data from the analytical part of the research and the results of the evaluation. The comparative analysis method was used to identify outdoor spaces characteristics based on the evaluation parameters of size, layout, design, content, and relationship to indoor spaces and the urban context, based on which the design criteria were established in relation to the educational program, planning and programming, and the urban context in which the schools are located.

The **evaluation phase** consists of a presentation of the development and analysis of the outdoor spaces of 15 elementary schools in the local context, i.e. the city of Osijek, and the evaluation according to the established criteria. The evaluation was carried out through field research, recording and examination of characteristic urban and spatial elements, photo documentation, and comparative analysis and identification. The most productive period for the construction of elementary schools is the period from 1945 to 1990, when the development of the city was most intensive and the norms regulating the compliance with the educational program of that period were applied. Elementary schools outdoor spaces in the city of Osijek at most fulfilled 50% of the criteria, which is an indicator of the level of (un)equipped outdoor spaces as well as (un)awareness of their importance for children's upbringing and education. The average rating of the selected examples in the city of Osijek, resulting from the evaluation according to the criteria, is 4.03 points out of a maximum of 10 possible points. The evaluation has shown that the greatest improvements are needed in the area of educational compliance.

The research has shown that a stronger correspondence between outdoor spaces and the pedagogical framework leads to a more intensive relationship between outdoor and indoor spaces and to a more active use of outdoor spaces. The research has also confirmed that the optimal use of school outdoor spaces also depends on their relationship with the context and that multifunctional use can influence the narrower and broader context and life of the community. The scientific contribution of this study consists in the definition of comprehensive criteria for the design of school outdoor spaces, based on the synthesis of pedagogical, architectural, and urban planning analyses as well as on the established systematisation of school outdoor spaces depending on the urban context. The multidisciplinary nature of the research topic ensures that the research results can be applied not only in the field of architecture but also in other disciplines. In addition to the contribution of theoretical and phenomenological research in the field of educational architecture and education-related peripheral areas, this research can serve as a starting point for new research processes and as a starting point for concrete applications in practice.

IVA KOSTEŠIĆ

INTERDISCIPLINARY DESIGN MODELS IN URBAN PLANNING, ARCHITECTURE AND PRODUCT DESIGN FOR ORGANIZED HOUSING PROGRAMS

MODELI INTERDISCIPLINARNOGA PROJEKTIRANJA U PODRUČJU URBANIZMA, ARHITEKTURE I DIZAJNA U ORGANIZIRANOJ STAMBENOJ IZGRADNJI

IVA KOSTEŠIĆ (1986, Zagreb), graduated from the University of Zagreb Faculty of Humanities and Social Sciences in archaeology and art history in 2012. She is currently working as a teaching and research assistant at the University of Zagreb Faculty of Architecture, at the School of Design.

Supervisor: Tihomir Jukić, Ph.D.
Members of the committee:
Kristina Careva, Ph.D. (president)
Dubravko Bačić, Ph.D.
Željka Jurković, Ph.D.
Date of public defense: February 15, 2024

The dissertation has 230 pages, nine chapters, 56 illustrations, 11 tables, two appendixes, 620 footnotes, and 334 bibl. units.

The central theme of the research is interdisciplinary design approaches in urban planning, architecture, and design of organized housing programs. Housing is a basic human need and fundamental human right, and it is also the largest user of urbanized space, therefore, the availability and quality of housing is one of the main tasks of every civilized society. Given that housing encompasses a wide range of human activities, and that numerous and complex processes are involved, both in its creation and in its consumption, interdisciplinarity is taken as a fundamental principle in the procedures for planning and designing living spaces and forming a living culture.

Interdisciplinary work is seen as part of the technical heritage, namely in the following areas: of the mind – in the procedures of theoretical elaboration of an interdisciplinary approach; oneiric – in the desire to improve the quality of life through the application of mechanical and industrial production; and constructional – in which the principle of interdisciplinarity is established as a practice.

By systematizing, analysing, and comparing European and domestic examples of interdisciplinary approaches in the procedures of organized housing, eight hypothetical models are proposed based on four criteria: interdisciplinarity, authorship, rationalization and recognition, and social sustainability.

According to the criterion of interdisciplinarity, four models are defined: architectural-urban model; built environment synthesis model; built and product environment synthesis model and urban ambient forming model, that is, the environmental model. According to the criterion of authorship, two models are defined: autonomous model and collaborative model. According to the criterion of rationalization, one model was defined: cost and construction time rationalization model. According to the criteria of recognizability and sustainability, two models were defined: model of social sustainability and settlement identity creation, and as a hypothetical future model, the model of resilient communities is defined, which is based on the positive experiences of "historical" models established by research.

The architectural-urban model includes the integration of the disciplines of architecture and urban planning for the purpose of creating a functional, harmonious, and well-connected built environment and corresponds to the oneiric area of technical heritage. Examples are mainly present in the interwar period. The strengths of the model lie in an integrated approach to urban planning and architecture, however, green infrastructure, accompanying social standard amenities and urban design are neglected. Projects are often a result of collaborative work.

The built environment synthesis model means planning and designing, in which urban planning, architecture, landscape architecture or horticulture are integrated, and is characteristic for the periods of the first and second Croatian modernization. Settlement projects are mostly a result of collaborative work. The advantages of the model are in the integration of the built environment and green infrastructure, which creates functional, well-connected, harmonious, humane, and sustainable spaces.

The built and product environment synthesis model is characterized by the connection of urban planning, landscape architecture, architecture and interior design, and most often appears in the interwar period. They are characterized by standard, and prefabricated construction, as well as furnishing the interior with standardized objects of everyday use. The value of the model is reflected in collaborative work and the quality and higher standard of interior living spaces.

The urban ambient forming model, that is, the environmental model, includes planning and designing in the field of urban planning, landscape architecture, architecture, and urban design, and is the result of collaborative work on projects. The model focuses on the creation of sustainable outdoor spaces that are an extension of the traditionally understood living space limited to an apartment. They are richly equipped with accompanying amenities with social purpose, arranged, and equipped with green and public areas and are a contribution to the humanization of the environment.

The autonomous model implies projects signed or created for the most part by one author. Although rare, it appears mostly in the interwar period, namely in the "built environment synthesis model", the "architectural-urban model" and the "built and product environment synthesis model". The advantages of the model are greater control over the project and work, easier decision-making, and flexibility in the process.

The collaborative model is characterized by the involvement of several authors or authorial teams who participate and collaborate in settlement planning and design projects. The advantages of the model are increased creativity and insight into housing issues from the perspectives of different disciplines.

The cost and construction time rationalization model is characterized by the use of typical, prefabricated, and standardized elements. It appears in all periods, but it has the greatest momentum during post-war reconstruction period, when the need for massive and rapid construction is most evident and urgent. The advantages of the model are fast and economical construction and affordable housing.

The model of social sustainability and settlement identity formation includes the participation of future users in the planning of new settlements, the existence of social purpose content, typological and form diversity, preservation of the ambient values of the space and an affirmative attitude towards the found space. The advantages of the model are precisely in the transdisciplinary and interdisciplinary approach in which the needs of the inhabitants are considered in creating a quality and sustainable environment.

The model of resilient communities is a hypothetical future model of interdisciplinary design that combines the advantages of historical models and corresponds to contemporary ones. As a basis for creating the model, it is possible to use the positive historical experiences of the "urban ambient forming model" ("environmental model"), the "cost and construction time rationalization model" and the "model of social sustainability and settlement identity creation". The advantages of the model are affordable and high-quality housing in a thought-through and harmoniously planned and designed environment.

Ana Velinova

In-situ Museum Buildings: Transformation of Architectural Form through Parameters of Place

Zgrade muzeja in-situ: transformacija arhitektonske forme kroz parametre mjesta

Ana Velinova (Skopje, 1983) graduated from the Faculty of Architecture at University "Ss. Cyril and Methodius" in Skopje and received a master's degree from the School of Architecture and Design at University American College Skopje. She is employed at the School of Architecture and Design at University American College Skopje.

Supervisor: Prof. Karin Šerman, Ph.D.
Members of the committee:
Assist. Prof. Marko Rukavina, Ph.D. (president)
Assoc. Prof. Nataša Jakšic, Ph.D.
Prof. Leonida Kovač, Ph.D.
Date of public defense: March 7, 2024

The dissertation has 242 pages, 5 chapters, 67 sub-chapters, 78 illustrations, 232 footnotes, 132 bibliographic units, 7 tables, 8 catalogue units.

The dissertation investigates the relation between the architectural form of the museum and place with a specific analytical approach based on key parameters that define the museum's relation to place.

The dissertation introduces an analytical framework based on the integral assessment of the processes that established the museum's relation to place and the approaches regarding the protection, interpretation and presentation of place. The first part of the analytical framework outlines the development of the modern notion of the museum through a process in which the museum becomes a public institution. The inherent features of the museum that enable its function can be identified in this process, and those features are: collections and display, layout and circulation, and as a final stage in the development of the modern museum, the emergence of the museum as building type. In the second part of the framework, general knowledge on museums is accompanied with one specific stream that emerged in museum practice and led to the formation of museum concepts related to place, among which the influential concept of the ecomuseum based on in-situ museum interpretation. Three main aspects of the museological interpretation of place are developed through these new museum concepts: a holistic approach to the interpretation of place, the distinction between the synchronic and diachronic museological interpretations of place and the interpretation of buildings as museological objects. This stream in museum practice and theory greatly influence the notion of the museum and the transformation of the definition of the museum. One of the significant changes brought about by the new museum concepts that develop in relation to place are: defining the museum beyond the museum collections, revising the spatial characteristics of the museum by including the in-situ museum, defining new functions for the museum, recognizing and transferring protection approaches in museum studies, interpreting and presenting place.

In order to fully understand the relation of the museum with the place, as a particular aspect of the analytical framework, key documents that elaborate on the protection, interpretation and presentation of place have been reviewed, together with recommendations concerning the programmatic or spatial interventions, in order to find the main points of interaction and overlap with museum studies. Those points are in-situ protection, interpretation and presentation that are communicated in both fields, as well as the widening of the notion of museum based on this particular aspect.

This inclusive analytical framework is then used to extract key parameters that define the museum's relation to place built on the existing relations of place, and those parameters are: parameters that define the museum concept in relation to place, those that define spatial relations to place, and parameters that define the visual relations to place. The case study analysis of the architectural form of the museum is carried out using the postulated key parameters. From the observable characteristics, the museums related to place are presented through a wide spectrum of architectural forms: from museums in which there is an observable correspondence or similarity of form between the museum and the interpreted elements of place, to museums in which there is no clear perception of form and the museum is merged with the specific place. Key similarities and differences in defining the architectural form of the museum have been analysed to uncover the underlying architectural procedures in the design of in-situ museum buildings. The architectural procedures in the process of designing in-situ museum buildings are divided into four main groups, which are: the procedure of superimposition, the procedure of disposition, the procedure of integration, and the procedure of interpolation. These procedures reveal the relations between the museum and the place. They are based on museum content, the interpreted elements of the place in spatial and visual sense, as well as on spatial and visual relations with the place, as three key aspects in the design of in-situ museum buildings. These aspects participate in the design approach. The viewpoint, which includes the possible architectural operations in a single frame with the recommendations for the protection, interpretation and presentation of the place, creates a basis for various comprehensive solutions in the design that respect the existing place, but can at the same time contribute to the advancement of the place.

The dissertation has three main scientific contributions. The first contribution of the dissertation is the introducing of the analytical framework based on the integral assessment of the processes that established the museum's relation to place and the approaches regarding the protection, interpretation and presentation of place. The introduced analytical framework uncovers the main features that define the in-situ museum, and those features are a result of the overlap of the two reviewed fields. The second contribution of the dissertation is the postulation of key parameters that define the museum's conceptual, spatial and visual relations to place for a systematic analysis of the architectural form of the museum. The conducted analysis reveals the key parameters that determine the architectural form of the museum. These parameters, which are a result of the interaction of the two fields of the museum and the place, define the frame in which the design of in-situ museum buildings can be realized. The third contribution of the dissertation is the recognition of operational architectural procedures in the process of the design of in-situ museum buildings. The procedures reveal the established relation between the museum and the place, as the most applicable approach between the preservation and the intervention in the place. The dissertation provides a basis for new comprehensive approaches in the design of in-situ museums based on the exchanges between the museum and the place and on the mutual contribution to the protection, interpretation and presentation of place.

Ivana Banović Đorđević

Criteria for Planning and Designing Urban Libraries and for Creating a New Open Public Spaces Network

Kriteriji za planiranje i projektiranje urbanih knjižnica i za stvaranje nove mreže otvorenih javnih prostora

Ivana Banović Đorđević (Kruševac, 1977) graduated from the Faculty of Architecture at the University of Belgrade in 2002, and has been a Ph.D. student at the Faculty of Architecture University of Zagreb, since 2018. She is a co-founder of Vemex Projekt Design, based in Belgrade, where she works as the lead architect.

Supervisor: Prof. Bojana Bojanic Obad Ščitaroci, Ph.D.
Members of the committee:
Prof. Bojan Baletic, Ph.D. (president)
Prof. Emeritus Tihomir Jukic, Ph.D.
Assist. Prof. Jasenka Kranjčevic, Ph.D.
Date of public defense: April 4, 2024

The dissertation consists of two parts (281 pages of text + 257 pages with catalogues) with 15 chapters, 761 footnotes, 117 bibliographic units, and 112 units from urban planning documents and internet sources.

Throughout the first two decades of the 21st century, urban library projects in European and North American cities played a significant role in shaping their global image and identity. These libraries have become iconic symbols, inspiring cities worldwide to recognize the immense potential of library projects as a powerful tool for urban transformation. The library/city relation dates back to the beginning of history. It has evolved through history, depending on socio-political and technological impact factors.

The dissertation relates the urban library to urbanscape, providing a comprehensive study of the library/open public space relation and including its role in creating a network of open public spaces. The development of this relation over time addresses the essence of this objective. The research consists of two parts, including 76 historical and contemporary libraries in the context of their cities. All library examples are analyzed on three scales – in the context of the city associating the library project to urban planning, in the relation to the open public space associating the library to the urban design and qualitative planning, and in the context of the library building referring to architectural design.

The first part is a comparative analysis of all library examples, delivering a comprehensive review of the urban library functions and attributes. The library's attribute of "being public" is recognizes as a critical attribute in defining the relation between the library and the city. It is represented in the urban library's architectural features and the library/ open public space relation.

The first part of the research identifies types and development of the library/OPS relation, sorted into eight basic groups: library as an OPS façade; park library; collapsed spaces of the library and OPS; library enclosing a public square; library as the centerpiece in a public square; library in networking OPSs of different character; mobile library, micro library, and dispersed library concept; combination of basic types.

The urban library is defined by the library space in the urban fabric; the duality of library function, in terms of library service and the library as a tool in urban transformation; as well as its relation to the open public space.

In addition to this, the urban library network in the urbanscape is recognized to be a powerful tool in the urban transformation. Therefore, the second part of the research was based on analyzing case studies of libraries in Birmingham, Barcelona and Helsinki, their relation to urbanscape transformation, the urban library network, and the network of open public spaces. It results in determining two basic types of urban library networks in the urbanscape.

Type 1 of the urban library network consists of the central library and branch library units. The central library is a part of the strategic urban plan and an iconic building with intensive OPS relation, while branches are less relevant in the urbanscape context.

Type 2 of the urban library network consists of branches of the same character that are of high architectural value, intensive interaction with the open public spaces and relevant to the process of urbanscape transformation.

The urban library is redefined as a unit of library space (physical and virtual) as a constitutive part of the OPS in the urban fabric, and the duality of library function in terms of the library service and the library as a tool in the urban transformation process. Defined in this manner, the urban library can be a part of the network of urban library/ OPSs units and the existing network of OPS in the city, creating a whole new layer of the urbanscape. This network shall be determined as network+. As the urban library is both a node and a connector in the network+, and an active element in the processes of urban transformations (infrastructure), the network+ becomes infrastructure in the city.

This research detected the existing criteria for planning and design of urban libraries, based on urban library attributes, functions, and types of library/OPS relations. The existing criteria are supported and complemented with the case studies of the libraries in the second part of the research, and are sorted into seven groups: criteria for functional planning and design; criteria for upgrading library functions; criteria for sustainability; criteria for accessibility; criteria for the location selection; criteria for the continuity of heritage; criteria for creating new centralities.

The redefinition of the urban library has introduced new criteria for planning and designing urban library and for creating a new open public spaces network that can be summarized as:

– criteria for planning and designing the urban library as a constitutive part of the library/OPS unit at physical and functional levels,

– criteria for planning and designing the library/OPS unit as a constitutive element of the network of OPSs,

– criteria for planning the library/OPS unit as a part of the urban library network,

– criteria for creating flexible and open network+/infrastructure,

– criteria for the library location selection in supporting the library character as a node and a connector in the urban fabric.

The set of new criteria produce the method for transforming the urbanscape by adding a new layer of urbanscape and a new network of OPSs in the city, created by planning and design of the UL defined as part of the network+/infrastructure. This method supports urban development toward polycentric urban systems. It is applicable to both monocentric and polycentric urban and library systems in order to develop new sustainable, flexible, responsive, and resilient OPSs networks and urbanscape in a sustainable manner.

This thesis offers listed and chronologically sorted library examples that can be used as a material base for further research on urban libraries. In addition, the dissertation opens up space for further research in terms of possible application of the research method to other public spaces and buildings in cities. Considering the research on the historical relationship between the development of urban libraries and open public space and urban landscape, there is room for exploring the significance of urban library projects in the emanation of the urban landscape.

Ana Sopina

Spatial Planning Criteria for Relation Enhancement between Urban and Natural Landscape if the East Adriatic Coast

Prostornoplanski kriteriji za unapređenje odnosa urbanoga i prirodnoga pejsaža istočne jadranske obale

Ana Sopina (born in 1985 in Zagreb, Croatia) graduated in 2011 at the University of Zagreb Faculty of Architecture, where she is currently working as an assistant at the Department of Urban Planning, Spatial Planning, and Landscape Architecture.

Supervisor: Prof. Bojana Bojanic Obad Ščitaroci, Ph.D.
Members of the committee:
Prof. Sanja Gašparović, Ph.D. (president)
Assoc. Prof. Ana Mrđa, Ph.D., MBA
Asst. Prof. Ilenia Pierantoni, Ph.D. (University of Camerino, Faculty of Architecture and Design 'Eduardo Vittoria')
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Book I – 333 pages, three parts in 9 chapters, 62 tables, 47 illustrations, 55 footnotes, and 341 bibl. units. Book II – Appendix has 263 pages, 7 research catalogues, 18 research tables, 13 illustrations, and 26 bibl. units.

The research phenomenon of the 'urban and natural landscape relation' testifies to 25 centuries of urban culture in the Mediterranean. It is a multidimensional changeability process that integrates spatial, temporal, and perception landscape characters, as well as functional and holistic principles fostered by the spatial planning perspective. The research is incited by the premise that urbanity has emerged from landscape, transforming and intertwining the natural with the cultural and urban landscape. The spatial conditions of extensive urban spread into natural resources indicate the disrupted urban and natural landscape relation that is further intensified in the Mediterranean and Adriatic Coast where cities are settled between natural elements of the sea and the mountain which limit spatial development and planning.

The identified theoretical research gap (research phenomenon is not systematically analysed within the scientific field of spatial planning), spatial condition (disrupted relation between urban and natural landscape), and related spatial planning challenges (missing criteria for enhancing the landscape relation) are responded to by research objectives, hypotheses, and expected scientific contributions. The research aims to investigate how spatial planning evaluates and guides the changeability process of the urban and natural landscape relation in the context of Adriatic coastal cities, towns, and settlements.

The methodological research approach integrates three research steps – theoretical analysis of the existing knowledge, spatial comparison of case studies with field research of landscape relation perception, and verification of spatial planning criteria for the enhancement of the landscape relation in spatial plans. These research steps are explored by seven research catalogues in establishing groups of criteria for evaluating and the enhancement of the landscape relation. The spatial planning research of the landscape relation has its methodological background in the *Heritage Urbanism* approach and the *Urbanscape Emanation*[1] concept in overlapping different perspectives and multiple landscape layers to plan the holistic balance between urban and natural landscape.

The research introduction (Chapter 1) presents the urban and natural landscape relation from the spatial planning perspective within the wider context of the comprehensive understanding of landscape. The state-of-the-art (Chapter 2) sets the theoretical framework by using the literature review in establishing the identity factors of urban and natural landscape as well as determining the research phenomenon from the spatial planning perspective. The theoretical research step is finalised by the systematisation of theory-based criteria for evaluating and planning the enhancement of the landscape relation (Chapter 3).

The spatial research is initiated in the wider Mediterranean scope of the landscape relation (Chapter 4) identified in twenty-six Mediterranean Overview Examples that are presented in the spatial research catalogue. The comparison of Mediterranean examples has resulted in identifying spatial criteria for evaluating the landscape relation that are applied to the landscape settings of the Adriatic Research Cases (Chapter 5). The thirty-six Adriatic cases are presented in the spatial research catalogue and compared to set types of local spatial landscape relations that are used as the criteria for selecting the three representative cases of Ancona, Italy; Rijeka, Croatia; and Budva, Montenegro. Perception of the landscape relation in field research of Representative Research Cases (Chapter 6) explores landscape representation through the field research catalogue and the perception research catalogue. The comparison of representative cases has resulted in establishing perception and identity criteria for evaluating the landscape relation.

Verifying the results of research synthesis on spatial planning documentation of representative cases (Chapter 7) is conducted on two historical and three contemporary spatial plans presented in the spatial planning research catalogue. The existing and missing spatial planning criteria confirm and update four groups of spatial, perception, identity, and spatial planning criteria for the enhancement of the landscape relation that reflect both the content of spatial plans and the spatial planning process.

Discussion on the scientific contributions and application of research results in scientific, professional, and educational domains of spatial planning (Chapter 8) bring structured responses to research problems. The theoretical contribution of determining the landscape relation and methodological contribution of a holistic approach to the theoretical, spatial, and spatial planning research of the landscape relation, are complemented by the contextual scientific contribution that promotes spatial planning as a tool for planning landscape transformations in making urban and natural conditions more holistic, resilient, and sustainable. The application of research results includes the addition to the general spatial planning method, use in preparation of spatial and landscape plans, and a complement to the existing system of protection and management of natural and cultural heritage from the spatial planning perspective.

Conclusion as the synthesis of the established research results (Chapter 9) involve twelve spatial planning criteria for the enhancement of the urban and natural landscape relation that promote constituents of landscape setting: spatial criteria of (i) administrative setting, (ii) geographical setting, (iii) continuity of historical setting, (iv) heritage setting; perception criteria of (v) interaction of anthropogenic and ecological networks, (vi) transformations of landscape setting, (vii) visual (scenic) setting, (viii) communications setting; identity criteria of (ix) identity setting, (x) vivacity setting, (xi) endogenous setting; and (xii) spatial planning setting. These spatial planning criteria advance resilient development, foster the quality of life in concordance with spatial planning goals of sustainability, and contribute to raising awareness of the multidimensional values found in every landscape.

1 This research has been a part of the Urbanscape Emanation research project, carried out with the financial support of the University of Zagreb for the scientific and artistic research, conducted at the Faculty of Architecture, University of Zagreb. Until November 2023, the project has been led by prof. Bojana Bojanic Obad Ščitaroci, Ph.D. and since November 2023, it has been led by assist. prof. Tamara Zaninovic, Ph.D.

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