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RESIDENTIAL BUILDINGS
AND SUSTAINABLE DEVELOPMENT
IN SLOVENIA

SUBJECT REVIEW
UDC 728:69.05(497.4)"19/00"

STAMBENE ZGRADE
I ODRŽIVI RAZVOJ
U SLOVENIJI

PREGLEDNI ZNANSTVENI ČLANAK
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FIG. 1 PROJECT BREZOVICA AS A TYPICAL EXAMPLE OF CONSTRUCTION FOR THE MARKET
SL. 1. PROJEKT BREZOVICA KAO TIPIČAN PRIMJER IZGRADNJE ZA TRŽIŠTE



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RESIDENTIAL BUILDINGS AND SUSTAINABLE DEVELOPMENT IN SLOVENIA

STAMBENE ZGRADE I ODRŽIVI RAZVOJ U SLOVENIJI

CRITERIA
RESIDENTIAL BUILDINGS
SLOVENIA
SUSTAINABILITY GUIDELINES
SUSTAINABLE DEVELOPMENT

KRITERIJI
STAMBENE ZGRADE
SLOVENIJA
SMJERNICE ODRŽIVOSTI
ODRŽIVI RAZVOJ

Within the framework of the new socio-developmental paradigm, the doctrine of planning and the realization of residential buildings in Slovenia has also been changing. Based on an analysis of typical examples of “constructing for the market” we have established that nowadays the economic performance of the investment and the formal technological norms are exclusively prevalent among the project’s starting points. To improve the conditions, suitable tools will have to be efficiently introduced into the national legislation.

U sklopu nove sociorazvojne paradigme u Sloveniji, načela planiranja i izgradnje stambenih zgrada također su doživjela promjene. Na osnovi analize tipičnih primjera „izgradnje za tržište” zaključuje se da su danas dominantna polazišta projekta isključivo ekonomski učinak investicije i formalni tehnološki standardi. Kako bi se poboljšalo stanje, trebalo bi u legislativu na učinkovit način uvesti odgovarajuće mjere, kao što su smjernice i kriteriji održivog planiranja.

INTRODUCTION

UVOD

Planning residential buildings is a complex process based on various professional, economic and social-political starting points. In Slovenia, these starting points have been changing for the past twenty years because of two basic reasons. The first reason is the changed philosophy of residential investments¹, where the profit stimulated "construction for the market" supplanted the former doctrine of social building in a planned economy.² The other reason is the sustainable development concept which has been gradually implemented at the strategic and implementation planning level³ based on fundamental documents (Agenda 21, 1992; The New Charter of Athens, 2003 and others). Based on new cultural, environmental and economic parameters and design trends, virtually all typological characteristics of urbanistic and architectural design of residential buildings and neighbourhoods have begun to change.

Post World War II period residential buildings – The prevailing part of the existing residential buildings in Slovenia is legacy of the post World War II period urban development, which visibly changed the traditional settlement system.⁴ The residential policy of the Socialist Federal Republic of Yugoslavia⁵ encouraged two basic concepts for constructing residential buildings. In larger settlements, cooperative, multi-family blocks⁶ of flats were planned, and in rural spaces, single family

houses with a simple structure and form design. In the urbanistic and architectural sense, the planning of larger neighbourhoods⁷ took place within the framework of town-planning schemes and under the wing of a suitable specialist service (urban planning institutes, architectural studios etc.). Smaller individual developments (e.g. single-family houses) were predominantly defined by relatively loose regulative instruments (e.g. area specific building codes⁸), which enabled a mass of self-build constructions in the entire national territory.⁹

In the post war decades, the urban design and architectural branch of business¹⁰ formed certain norms for planning residential buildings and neighbourhoods through different studies and research projects, and these norms were actually used in executed projects. Particularly, due to the low prices of building land and the relatively undemanding ecological norms, the needs of the user – as the basic starting point for project design – could be taken into account to a large extent.

The individual spatial, programme and functional qualities of the buildings planned in this way are also proven by newer studies¹¹, which, by comparing the then and now neighbourhoods, residential built-up areas and individual buildings, define the quality differences, especially in the field of open public areas, neighbourhood programme elements and the gabarits of residential units.

¹ Attention is drawn to the need for residential reform and the development of a commercial market in expertise on the residential economy, which was completed before Slovenia gained its independence. [KRANJEC, RIBNIKAR, SIMONETI, 1989]

² MANDIČ, 1996.

³ MLADENOVIC, 2011.

⁴ GABRIJELČIČ, 1985.

⁵ BOJOVIČ, 1984: 5-7; BREZAR, 1984: 17-19

⁶ BEŽAN, 1984.a.: 8-9; PUST, 1984: 23-24

⁷ BEŽAN, 1984.b.: 42-25

⁸ Slovene document: Prostorski ureditveni pogoji

⁹ The policies for managing space in SFRY are also discussed by GABRIJELČIČ [1985.], who ascertains that it was predominantly individual construction which importantly influenced the changing image of the cultural landscape space.

¹⁰ JERNEJC, 1965.; ŠAREC, 1987., 1980-1986

¹¹ LESTAN, GOLIČNIK-MARUŠIČ, ERZEN, GOLOBIČ, 2013: 41-55

¹² MANDIČ, 1996.

¹³ REPIČ-VOGELNIK, DIMITROVSKA-ANDREWS, 1993-1995

¹⁴ GABRIJELČIČ, FIKFAK, ČOK, HUDNIK, GRUEV, GRABAR, ŽIGON, 2011.

¹⁵ SIMONETI, VERTELJ-NARED, 2006:25-33

¹⁶ LESTAN, GOLIČNIK-MARUŠIČ, ERZEN, GOLOBIČ, 2013: 41-55

¹⁷ At the neighbourhood concept level, there was a reduction in the number of basic urban design and programme elements which define the neighbourhood as an area where the built structures and open spaces inter-

The period after Slovenia gained its independence – During the period after gaining independence (after 1991) the developmental trends in the field of building types were marked predominantly by the changed social-economic conditions which significantly changed the starting points, processes and goals of developments in a certain area. By legitimizing the free market principles, the set paradigm of planning and the realization of the built structures gradually adapted to the new conditions of supply and demand.¹² Scheduled planning is replaced by selective investment concepts and the set practice of social construction is replaced by partial projects of construction for the market. By implementing the sustainable development concept¹³, new demands regarding energy efficiency, the use of modern materials and technologies and other elements of planning, execution and management of individual buildings were formed.

After 2004, during the period of seeming conjecture, we witnessed a surge of new constructions within which liberal free-market principles reached their critical value and, in individual cases, even crossed over to contradicting the legitimate principles of sustainable development.¹⁴ Close to larger settlements there was an increase in the construction of new residential neighbourhoods or single blocks of flats with a high factor of use of plots of lands, limited access to public and green areas and a minimal living floor plan.¹⁵ Based

twine; therefore in individual cases it is better to replace the term neighbourhood with the term new residential quarter.

¹⁸ Slovene titles: Simpozij Družba, prostor, graditev, 2005; Konferenca Stanovanjske krajine, 2006.

¹⁹ Regarding the crisis of the branch, GABRIJELČIČ [2013: 12-15] notes: "Looking at all the happenings in the field of Slovenian urban study, Slovenia still has all the characteristics of a country in transition. Particularly in the perception of reality which seems to be the final reckoning with the socialist past and its system solutions, as opposed to the present which seems to be an illusion of complete freedom regarding the use of private property. The majority of investors nowadays believe that we do not need spatial planning or an urban study in the new circumstances, or rather that any urban planning is merely an obstacle to their investment expectations and a redundant and harmful relic of socialism."

²⁰ The need for a modern interpretation of residential environment is discussed by FIKFAK [2007: 341-352]. The problems remain the investors who, except in certain cases, do not consider the needs of a modern user and actual trends of architectural planning

²¹ STEINEMANN, 2008.; FERNANDEZ PER, ARPA, 2010.

²² CANIZARES, 2005.; CONRAN, 2009.

²³ Slovene document: Vodilna načela za trajnostni prostorski razvoj evropske celine, 2000.

²⁴ PRAPER, BIZJAK, GULIČ, PLEVNİK, ŠOSTER, 1999.

²⁵ Slovene documents: Prostorski red Slovenije, 2004; Strategija prostorskega razvoja Slovenije, 2004; Zakon o prostorskem načrtovanju, 2007.

²⁶ Slovene document: Pravilnik o učinkoviti rabi energije v stavbah, 2010.

on economic studies of feasibility and target group purchasing power, hybrid buildings were developed, which offered business, residential, commercial etc. facilities under the same roof. The set building types were redesigned towards the rationalization of all the components¹⁶ (site selection, functional design, gabarits, plots of land, materials, etc.).¹⁷

Different professional initiatives responded to this problem (Symposium Society, space, construction, 2005; Conference Residential landscapes¹⁸, 2006 and others), and warned about system deficiencies and the exclusion of the user and the professionals from the planning system.¹⁹

The crisis of spatial planning in Slovenia is directly mirrored by the crisis of residential environment design.²⁰ At the same time, the residential buildings development trends in a broader international space move towards the user's integration into the planning system²¹ and the design of a productive residential environment in accordance with the modern culture of living.²²

Sustainable development – Implementing the principles of sustainable development is a demanding, long-term and still unfinished process in Slovenia as well as in numerous other EU member states. Despite accepted guidelines at the European level (e.g. Guiding Principles for Sustainable Spatial Development of the European Continent, 2000²³ and others) and several attempts of their introduction at a national level²⁴, Slovenia still has not seen the efficient implementation of detailed guidelines for planning and the incorporation of tools and criteria for sustainability evaluation into a suitable legal framework.

Within the strategic state documents [Spatial Order of Slovenia and Spatial Development Strategy of Slovenia, 2004] and acts [Spatial Planning Act²⁵, 2007] the general principles of sustainable spatial development are defined, but within the implementing regulations and spatial implementing acts, their realization is made relative. The only legal grounds for actual attainment of one of the sustainable development objectives (environmental aspect) are currently the Rules on Efficient Energy Use in Buildings²⁶ [PURES, 2010]. Within this framework, spatial planners often raise the legitimate question: which concrete directives (set of criteria, spatial planning acts or regulations) should creative sustainable solutions be based on, to guarantee the necessary sovereignty to the field of expertise, when in discussion with the investor?

Recently, the question of implementing sustainability principles in the field of residential buildings has been extensively researched at a professional and scientific level. Numerous

TABLE I RESEARCH PHASES AND OBJECTIVES

TABL. I. FAZE ISTRAŽIVANJA I CILJEVI

RESEARCH PHASES AND OBJECTIVES

→ PHASE I: Interviews with investment companies and architects' offices

Objectives: 1. To determine the investment starting points which the investors based the individual projects on;
2. To determine the ratio of economic to other starting points.

Step 1: → Holding semi-structured interviews;

Step 2: → Synthesis of the results, findings.

→ PHASE II: Analysis of the realised projects

Objectives: 1. To determine the project criteria based on which the chosen projects were actually created;
2. To determine which of the criteria falls into the sustainable planning concept and which do not.

Step 1: → Detailed analysis of ten chosen projects (smaller settlements and residential areas built between 1998 and 2012) using the list of nine typological elements:

1 – location, 2 – programme and urban design, 3 – functional design, 4 – flexibility,
5 – exposure to the sun, 6 – volume, 7 – roof, 8 – construction and 9 – façade;

→ Definition of a broad spectrum of criteria which influenced the design of individual typological elements.

step 2: → Synthesis of criteria into nine topic groups:

1 – users' needs and wishes, 2 – marginal location conditions, 3 – investment economic performance – economy, 4 – economic performance – investor's pressure, 5 – modern culture of living;

6 – energetic performance, environmental aspect; 7 – modern design standards; 8 – modern materials and technologies; 9 – other (legal grounds, tradition);

→ Comparison of these criteria with the set of criteria listed in Leitfaden Nachhaltiges Bauen (Guidelines for Sustainable Building);

→ Findings.

→ CONCLUSION: Recommendations for the improvement of the existing conditions in the field of the implementation of sustainable principles into the residential building planning process.

authors have noted that we are dealing with a complex process, which allows for different definitions and interpretations of the guidelines on different levels of treatments.²⁷

In 2013, we received the Slovene translation of the German Guideline for Sustainable Building [Leitfaden Nachhaltiges Bauen, 2011], which systematically defines the principle of sustainable building, protected values and detailed protection objectives. This guideline defines (in accordance with German laws) the integration of sustainability aspects into the planning process and the list of suitable criteria. Because Slovenia does not have a comparable document, we believe that this guideline will play an important role in Slovenia when implementing sustainability principles within a suitable legal framework.

Problem and hypothesis – Despite the existing legal framework [Spatial Planning Act, 2007; Construction Act²⁸, 2002] and the existing practice of implementing within sustainability guidelines, we ascertain that numerous newly built examples show a deviation from the previously existing quality of a residence in individual building types. Two research questions are important within this framework:

1. Why do basic typological characteristics of residential buildings change in Slovenia?
2. Which criteria for their planning belong in the sustainability concept and which do not?

In many cases the planning of residential buildings is no longer based on the fundamental elements which helped form the types of residential buildings (users' basic needs, functional processes which dictate the organization and gabarits of buildings and external spaces, location characteristics etc.), but on

other criteria (economic study of feasibility, analysis of residents purchasing power, permitted utilization of land for construction etc.) which often fail to consider the complexity of the programme and spatial design of residential buildings. When interpreting the principles of sustainable construction, there is a certain deviation or unequal consideration of all three principles of the sustainability concept. The user, as a basic starting point for planning, is fast becoming of secondary importance; numerical demands regarding energy efficiency and the economic performance of the investment are coming to the foreground.²⁹

METHODOLOGY AND MATERIALS

METODOLOGIJA I MATERIJALI

The research took place in two phases (Table I).

Phase one – Phase one was aimed towards defining the current investment trends in the field of residential construction for the market in the period after the year 2001. Within this framework we conducted semi-structured interviews with predetermined questions in 2010 and 2013. Eight Slovenian most prominent investment companies and five architects' offices³⁰ participated in the interviews. The phase one objectives were:

1. To determine the general investment starting points and criteria, based on which the investors design on constructing a certain type of residential building after obtaining the plot of land.

²⁷ This is confirmed by the research of some current sustainability evaluation tools in which the author compares six professional design practices of the criteria apparatus [FREY, 1999; ESCP, 2003; HEMPHILL, 2004; Communities, 2008; CABE, 2008; JENKS AND JONES, 2010]. The author establishes that there are discrepancies regarding methodological approaches as well as starting points and objectives, and consequentially sustainability planning criteria. Because such different tools are used, very dissimilar estimations can be reached when planning or evaluating the realized projects [GABRIJELČIČ, FIŠFAK, ČOK, HUDNIK, GRUEV, GRABAR, 2013].

²⁸ Slovene document: Zakon o graditvi objektov, 2002.

²⁹ Numerous other parameters which present the architectural response to the modern culture of living and define other users' anthropological needs (micro-location, ambiance, living between the interior and exterior space, lighting concept, share of open external areas etc.) have been defined at a level of principal recommendations and directions.

³⁰ Semi-structured interviews were conducted with the following companies: Imos D.D., Sava Ip D.O.O., I-Projekt D.O.O., Zil inženiring D.D., Lesnina inženiring D.D., Givo D.O.O., Emonika D.O.O., Rudis D.D.; Luz D.D., Acer D.O.O., Topos D.O.O., Urbanisti D.O.O., Mediterana D.O.O.

³¹ The interview consisted of five content sections: 1 – building typology, 2 – the factor of land utilization and changes in the Spatial act, 3 – market analysis regarding users' purchasing powers and needs, 4 – the flexibility of

2. Estimating to what extent the economic aspect of the investments is taken into account when planning a residential construction, and to what extent the needs and wishes of potential buyers.³¹

Phase two – Phase two included an analysis of the completed projects (e.g. Project Brezovica as a typical example of construction for the market, where all aspects of distinctively rational approach are visible: minimum size lots, minimal distances between the buildings, and the absence of common external surfaces etc.; Fig. 1). The basic objectives were:

1. To determine the project criteria, based on which the existing projects were actually created, and other reasons, due to which the basic typological characteristics³² of the residential buildings were changed.

2. To determine which of the criteria falls into the sustainable planning concept and which do not.

Within this:

In the first step we performed an in-depth analysis of ten typical residential projects³³ (Table II). Within the framework of the analysis we reviewed the project documentation, the conditions in nature (realization) and consulted with building designers to ascertain and record the criteria which influenced the design of individual typological elements.

The nine basic typological elements (Table III) of architectural and urban design were the subject of the analysis. Those elements were: 1 – location (of the built-up area or neighbourhood), 2 – programme and urban design,

the floor plan, 5 – energy efficiency and other environmental parameters. Analytically it consisted of ten elementary questions and 25 sub-questions. The participants marked the pre-prepared potential answers with a mark on a 1 to 3 scale or 1 to 5 scale and gave additional explanations (option: other). The results were numerically synthesized and a hierarchical distribution of the potential answers was made based on the number of received marks (by per cent). Additional explanations were ranked among the potential answers in accordance to their contents.

³² The residential building typology is determined by different definitions [Čerpes, Blejec, Kozelj, 2008; Azinovic, Kregar, Marn, Sajovic, Vojovic, 2009] and formal regulations. For the needs of the research we determined a set of nine basic characteristic elements, which define the criteria for individual residential buildings and entire neighbourhoods or built-up areas.

³³ Smaller settlements and neighbourhoods built between 1998 and 2012 which were chosen based on the following criteria: 1. The investor of the complete project was an investment company which was constructing for the market; 2. Uniform urban and architectural design, i.e. all structures are the same due to the rationalization of construction.

³⁴ Source of information: for all the realized projects, an inspection of the condition on site was made, but the complete project documentation could not be obtained for all of them nor was it possible to consult with all building designers. In such cases the criteria determination was made through only one information source.

TABLE II ANALYSED PROJECTS
TABL. II. ANALIZIRANI PROJEKTI

No.	Name of the residential area or built-up area; location	Year of construction	Basic data		
			Number of buildings	Plot/area size	Individual building/ apartment size
1	Naselje Razgledi; Perovo, Kamnik	2008-2011	- 6x semi-detached house - 6x detached house	Plots: 260 – 600m ²	Semi-detached house: 166m ² Detached house: 229m ²
2	Vaski zaselek Podpec; Podpec	2006-2010	- 8x detached house	Plots: 420m ²	House: 110m ²
3	Naselje Kamnik pod Krimom; Preserje	2010	- 6x detached house	Plots: 260 – 340m ²	House: 158m ²
4	Naselje Notranje gorice; Notranje gorice	2011	- 5x detached house	Plots: 300m ²	House: 162m ²
5	Naselje Hribci; Uhec	2009	- 12x semi-detached house - 4x detached house	Plots: 300 – 400m ²	House: 177m ² Semi-detached house: 166m ²
6	Naselje Lanovo (terraced houses); Skofljica	2008	- 45x terraced house	Plots: 130 – 250m ²	House: 108m ²
7	Naselje Lanovo (blocks of flats); Skofljica	2007	- 9x villa block, 3x lamella type - 183 residential units	Area: 5.1ha	Flats: 42 – 178m ²
8	Soseska Mostec; Ljubljana	2002	- 24x blocks of flats – lamella type - 540 residential units	Area: 10ha	Residential units total: 81,000m ²
9	Naselje Na jasi; Brezovica	2008	- 7x detached house - 8x terraced house	Plots: 140 – 335m ²	Detached house: 114m ² Terraced house: 107m ²
10	Mali Graben, Trnovo; Ljubljana	2005-2007	- 9x terraced house	Total area: 2,540m ²	Houses: 208 – 231m ²

3 – functional design, 4 – flexibility, 5 – exposure to the sun, 6 – volume, 7 – roof, 8 – construction and 9 – facade. In addition to the listed elements, the analysis dealt with the aspect of their placement in space and the method of determining the construction conditions (as defined by Spatial Planning Act).

Every typological element was divided (based on the principle: function – shape – materials – etc.) into several components which were the topic of the analysis. The components illustrated the integrity of the typological element, and because of that their numbers in individual elements varied. The set of basic elements was pre-prepared in the form of a table which enabled the systematic quotation of criteria in the project documentation analysis process³⁴, the situation in the field and consultations with building designers.

In the second step we synthesized the obtained criteria into nine theme groups (those criteria which occurred most frequently in all analysed examples) and we compared them with the set of criteria for sustainable construction according to Leitfaden Nachhaltiges Bauen (the comparison was executed with all three groups of criteria for guaranteeing: ecological quality, economic quality, and social-cultural and functional quality (Table V). Through partial comparison we sorted them

into those which determined the concept of an individual typological element by sustainability criteria and those which did not.

Based on the results of phase one and phase two, the directives for improving the existing conditions were given in the conclusion.

RESULTS

REZULTATI

Investment companies starting points – Since the interview data (questions, answers, processing) are covered in a comprehensive chapter of research, we have stated the synthesis of key answers by an individual set of contents which marks the heart of stage one:

1. When answering the question regarding the decision on the type of building (detached, multi-family residential buildings, the size of residential units and exterior surfaces etc.) which the investor can realize on the acquired location, 50% of the participants answered that their decision was made solely based on the factor of the maximum utilization of the plot.
2. When asked if after acquisition of the plot of land they decided to change the existing spatial plan towards accepting a new one which would enable a higher utilization factor, 80% answered that they did that in most cases, when it was possible.
3. When asked if the starting points for building and neighbourhoods planning are based on market analysis regarding users' needs and expectations or analysis of their purchase power, 80% answered that they analyse the target groups' purchase powers exclusively.
4. When asked about planning the floor plan design flexibility for the needs of intergenerational cohabitation, organization of working from home and the placement of additional parking spaces, investors mostly adapted to the entry parameters of their own feasibility studies which are adapted to a certain target group of potential buyers or fringe conditions of the existing spatial planning act.
5. Answers to questions regarding guaranteeing the energy efficiency of buildings and other environmental parameters of used materials and machines indicate that they leave this field exclusively to the building planners and the existing legislation.

Based on the results we ascertained the following:

- Projects constructed for the market, and planned in that way; exclude the user to a large extent and economic interests prevail, together with the energy efficiency parameters.

- When in the role of the building designer, it is difficult to introduce sustainability principles which have no relevant formal legal grounds on the level of preparing spatial planning acts (e.g. the municipal detailed spatial plan) initiated and paid for by the investor himself.

Analysis of realized projects – With this analysis we tried to establish which building planning criteria have actually been taken into account while preparing the project documents. Due to the large scope of the analytical material, only some excerpts are listed below, these excerpts illustrate the results of the research.

In the beginning of the research, due to the diversity of the contents, the structure and design of the chosen projects, we dealt with a different scope of typological elements (preliminary analysis) in each individual case. Based on the interim results we established that their number can be limited to the basic nine, which most clearly mirror the individual criteria for their planning (Table III – column one).

Following this we dealt with the elements one more time, in more detail (i.e. an overview of the documents, the conditions on site and consultations with the architects). The subject of the analysis of an individual typological element is presented in the graphical representation (Table III – column two), as well as the list of potential criteria (Table III – column three) for their planning. We ascertained the following:

- Taking into account the fact that the existing legislation has no integrated suitable criteria apparatus and model for sustainability solution evaluation and that the existing practice of residential building planning and realization did not follow the exact guidelines (with the exception of the Rules on the Efficient Energy Use in Buildings), it is difficult to analytically define individual "sustainability qualities" of residential buildings for those spatial solutions which have already been realized.³⁵
- That it is difficult to define the individual reasons which affected certain typological element design as "planning criteria"; in such cases it is better to name them as "planning starting points".
- That there are substantial differences in raising the building designers' and clients' awareness regarding the sustainable construction concept, which is primarily mirrored

³⁵ Therefore significant discrepancies may occur when interpreting "sustainable criteria" that has actually been taken into account. In this sense, the results of the analysis predominantly illustrate the existing situation (in the field of planning), and can contribute to the improvement of current condition;

TABLE III TYPOLOGICAL ELEMENTS AND SET OF CRITERIA WHICH THEIR PLANNING IS BASED ON

TABL. III. TIPOLOŠKI ELEMENTI I KRITERIJI NA KOJIMA SE ZASNIVA NJIHOVO PLANIRANJE

	Typological element	Subject of analysis	Criteria – What are they based on, why are they changing?
1	Area and construction plot	– size and shape	– rational management of space – economic performance of the investment – changed culture of living – modern design trends (urban design, architecture) – absence of suitable norms – foreign examples
2	Programme and urban design	– construction pattern or concept – urban design indicators – connection to neighbouring areas – outfitting (programmes, infrastructure)	– elements for providing spatial diversity, intertwining of built-up structures and green areas – economic performance of the investment – economy of the spatial design – changed culture of living (user's needs) – modern design trends (urban design, architecture), foreign examples – absence of suitable norms – investor pushing towards the rational use of areas, spaces, programmes.
Architectural design:			
3	Functional design	– building organisation concept (introverted, extroverted), – size and organisation of residential spaces, – mono-functional (residential only) or hybrid (other programmes) etc.	– integration of the exterior and interior space as a consequence of modern culture of living – economy of building design (materials) – energy performance – economic performance of the investment – hybrid building concept – modern conditions of living (user's needs), work from home – investor pressuring to rationalize the building as a whole
4	Flexibility – potential transformation	<i>Possibility of functional reorganization:</i>	– cohabitation of various generations – special needs individuals – work from home
5	Sun exposure	– concept of lighting and shading of the building and the exterior areas – numerical parameters	– energy performance – environmental changes – modern parameters: LCCA (life cycle cost analysis) – modern living conditions (exposure to natural light)
6	Volume	– shape, size, direction, concept of dividing	– urban design indicators – energy performance – modern design trends – local materials and technologies – user's needs, foreign examples
7	Roof	– function – shape, size, direction, concept of dividing, – materials of the construction and the outer layer – colours, textures	– energy efficiency, climate changes – multi-functionality: placement of photovoltaic elements and solar panels – utilisation of attic spaces – modern parameters: LCCA (new materials and technologies) – tradition, perception of space, local materials and technologies – modern design trends, user's needs – foreign examples, copies, innovations
8	Construction	– scope, materials – efficiency, multi-functionality	– energy performance – material rationalization (investors pressure) – modern parameters: LCCA – tradition, perception of space – local materials and technologies – modern design trends – new technologies, modularity, prefabricated components etc.
9	Façade	– form, concept of dividing, transparency, – efficiency, multi-functionality – materials, colours, textures, transparency	– energy performance, rationality of materials (investors pressure) – modern parameters: LCCA – tradition, perception of space – local materials and technologies – modern design trends – new materials and technologies: modularity, prefabricated components etc. – foreign examples, copies, innovations
A	Macro location in the settlement system	– allocation in the settlement system – connection to neighbouring areas, programmes, infrastructure	– environmental influence (limitations) – locations with competitive price (locations next to highways, etc.) – changed culture of living (closeness of natural environment, etc.) – guaranteeing balanced development; strategic spatial acts – speculations with plots of land – supply and demand concept
B	Planning conditions – Spatial planning document*	– manner of determining construction conditions (Area specific building code, Spatial implementation conditions (SIC), Local detailed plan, Municipal detailed spatial plan (MDSP), etc.)**	– rational management of space; limitation of dispersed construction – feasibility, economic performance of the investment – changed culture of living – modern design trends (urban design, architecture) – new spatial legislation; strategic spatial acts

* Slovene document: Prostorski izvedbeni akt

** Slovene documents: Prostorski ureditveni pogoji, prostorski izvedbeni pogoji, občinski lokacijski nacr, občinski podrobni prostorski nacr

TABLE IV INFLUENCE OF INDIVIDUAL GROUPS OF CRITERIA ON TYPOLOGICAL ELEMENTS AND THE LEVEL WHERE THEY ARE IMPLEMENTED. SYNTHETIC VIEW.

TABL. IV. UTJECAJ POJEDINE SKUPINE KRITERIJA NA TIPOLOŠKE ELEMENTE I RAZINA NA KOJOJ SU IMPLEMENTIRANI. SINTETIČKI PRISTUP.

Typological elements which were the subject of the analysis	Level of starting points implementation			Groups of criteria								
	Spatial planning – Municipal spatial plan (MSP)*	MDSP / SIC	Detailed design / technical design	1. User's needs and wishes	2. Fringe location conditions	3. Economic performance of the investment - cost-effectiveness	4. Economic performance of the investment - investor's pressure	5. Modern culture of living	6. Energy performance - environmental aspect	7. Modern design standards	8. Modern materials and technologies	9. Other (legal grounds, tradition)
a Macro location in the settlement system	°				+	+	•		•			
b Planning conditions – Spatial planning documents**	°	°			+	•			•			
1 Area and construction plot	°				•	+	+	•				
2 Programme and urban design	°			•	+	+	+	+	•	•		+
3 Arch. design – Functional design	°	°	+		•	•	+	+	•			
4 – Flexibility		°	•	•		+						•
5 – Exposure to the sun	°	°	•		•			•	+		•	
6 – Volume	°	°		•	•			•	+	+		•
7 – Roof	°	°		•	•				+	•	•	•
8 – Construction			°			+	+		•	•	•	•
9 – Facade			°	•	•	•		•	+	+	+	•
	° essential level			+ essential influence			• Partial influence					

* Slovene document: Občinski prostorski načrt

** Slovene document: Prostorski izvedbeni akti

in the professional and moral approach when designing individual buildings.³⁶

– That, despite the above-stated, the wide array of criteria (and/or starting points) taken into account can be defined based on our analysis and those criteria can be classified into the following nine topic groups:

1. Users' needs and wishes – This group includes the users' needs, which were expressed in the initial planning stage. The needs can be seen predominantly in the expected gabarits of the surfaces, buildings and spaces, the functional design and building design. These starting points can only be taken into account if a suitable market analysis regarding the needs and expectation of potential users are conducted. Unfortunately such cases are rare. There are examples of good practice, where the building designer, despite the lack of a market analysis, integrated suitable dimensions and programmes into the projects, based on his own creative and professional initiative and with the investor's agreement.

2. Fringe location conditions – Fringe location conditions stem from the professional

guidelines of the entities responsible for spatial management. These are formally defined criteria, mostly in the domain of protection arrangements which are in principle considered in all the discussed projects.

3. Economic performance of the investment – cost-effectiveness (rationality) – This group includes the criteria which define cost-effective planning regarding gabarits, as well as the use of materials and machines. In principle they stem from technological norms and the feasibility study performed by the investor. In the set of criteria for sustainable planning, this group of starting points belongs to the project's economic quality category

4. Economic performance of the investment – investor's pressure (minimization) – This group includes the investor's wishes for the minimization of individual parameters (gabarits, materials etc.) within the framework of permissible minimum norms. Due to the investor – building designer hierarchical relationship, in many cases the wishes are impacted by business pressures, where the building designer does not have suitable legal grounds to maintain their professional position. The consequences can be seen in the programme, material and dimension solutions which have been curtailed.

5. Modern culture of living – Those examples of good practice which consider the modern user as the key starting point for planning introduce modern functional designs (flexible floor plan idea, open wall idea, integration of interior and exterior, green and water elements at the level of residential unit etc.). This is architecture's response to current residential processes (living outdoors, living indoors, working all day, etc.). Among the set of criteria for sustainability planning, this group of starting points belongs to the category of socio-cultural qualities of the project.

6. Energy performance – environmental aspect – This group includes a broad spectrum of criteria of a formal nature which define the thermal characteristics of the building (share of renewable sources, CO₂ emissions etc.). These are also important at the level of Basic design / Detailed design and have an essential influence on the dimensions and composition of the facade, roof, volume, window openings and other elements of architectural design. They are considered in all the projects dealt with in accordance with the Construction Act.³⁷

³⁶ e.g. taking into account the needs of future users, the broader spatial context, and predominantly an understanding of the fundamental goals of sustainable development which gravitates towards the equilibrium: environment- society-economy etc.

³⁷ Slovene document: Zakon o graditvi objektov (2002)

7. Modern design standards – This group includes the design approaches which follow modern urban and architecture design trends. This is predominantly a subjective element of individual authors or the wishes of the investor or known user. These starting points and criteria influence the exterior and interior design and the image of the buildings, neighbourhoods and quarters. In certain cases awkward interpretations of modern design come into conflict within the context of space. In the set of criteria for sustainability planning this group belongs in the category of the socio-cultural qualities of the project.

8. Modern materials and technologies – This group includes the starting points connected with the use of modern materials and technologies. In a great part they replace traditional practices and introduce cost-effective, material and energy efficient innovation. Their use influences the design and image of individual typological elements of the buildings. In the set of criteria for sustainability planning, this group of starting points belongs to the category of the project’s environmental and economic quality.

9. Group of other criteria and starting points – This group includes:

- Absence of legal grounds which would guarantee planning for programme diversity and the organization of open and public green surfaces (neighbourhood / quarter level);
- Absence of legal grounds which would guarantee the integration of residential neighbourhoods and built-up areas into the broader space (connection with service activities, public transport etc.);
- Absence of legal grounds which would guarantee the planned maintenance and management of the areas;
- Absence of legal grounds which would guarantee the consideration of sustainability guidelines at all levels of planning and the efficient criteria apparatus for evaluating the sustainability quality;
- Consideration of conventional typologies;
- Perception of space, the element of a traditional idea of landscape, urban design and architecture.

It is clear from the facts stated above, that the planning of buildings, neighbourhoods and built-up areas can be impaired in many elements, due to the participation of an unmotivated investor, uninterested competent offices (the municipality which prepares the municipal detailed spatial plan) and passive professionals.

Next there followed a definition of the influence of individual criteria groups on the typological elements and a definition of the level (design and/or planning) where they are im-

TABLE V SIMULATION: COMPARISON OF THE SUSTAINABILITY CRITERIA ACCORDING TO LEITFADEN NACHHALTIGES BAUEN AND THE CRITERIA WE DETERMINED IN THE ANALYSIS.
 TABL. V. SIMULACIJA: USPOREDBA KRITERIJA ODRŽIVOSTI PREMA LEITFADEN NACHHALTIGES BAUEN I KRITERIJI KOJE SMO ODREDILI U ANALIZI

	ECOLOGY		ECONOMY		SOCIO-CULTURAL STANDARDS		
Protected values	– natural resources, – global and local environment		– capital – value		– health – user satisfaction		
protection goals	– protection of natural sources – protection of the ecosystem		– reduced costs in the life span – improved cost-efficiency – preservation of capital		– guaranteeing safety, health and comfort – guaranteeing functionality – guaranteeing design and urban quality		
Set of criteria according to German guidelines: Leitfaden Nachhaltiges Bauen, BMWBS	Ecological quality		Economic quality		Socio-cultural and functional quality		
	Influence on global environment	Use of resources	Costs in a life cycle	Development of value	Health, comfort and satisfaction of users	functionality	Guaranteeing design quality
	Global-warming potential (GWP)	Non-renewable part of necessary primary energy (PEne)	Cost connected to the building in a life cycle	Use for tertiary purposes	Thermal comfort in winter	Accessibility for disabled	Design and urban quality
	Ozone depletion potential (ODP)	Total necessary primary energy and renewable part of primary energy (PEe)			Thermal comfort in summer	Efficiency of surfaces	Art in construction
	Photochemical ozone creation potential (POCP)				Hygiene of internal space	Possibilities for change of purpose	
	Acidification potential (AP)	Necessary drinking water and quantity of waste waters			Acoustic comfort	Accessibility	
	Eutrophication potential (EP)				Visual comfort	Cyclist friendly	
	Dangers for the local environment	Necessary space			User’s influence		
	Sustainable acquisition of materials (wood)				Characteristics of the exterior space		
					Safety and danger in case of errors		
	↓		↓			↓	
GROUPS OF CRITERIA – ANALYSIS RESULTS Principal distribution	Group no.: 6. Energy performance – environmental aspect 2. Fringe location conditions		Group no.: 3. Economic performance of the investment – cost-effectiveness (rationality) 4. Economic performance of the investment – investor’s pressure (minimisation) 6. Energy performance – cost-effective and environmental aspect (!) 8. Modern materials and technologies		Group no.: 1. User’s needs and wishes 5. Modern culture of living 7. Modern design standards		
	Group no. 9: • Investor’s pressure for rationalisation within the framework of the permitted minimum norms • Absence of legal grounds which would guarantee the planning of programme diversity (the concept of residential neighbourhoods) and the organization of external public and green areas • Absence of legal grounds which would guarantee the implementation of sustainability guidelines in all three dimensions (ecology, economy, society) and on all levels (planning) and the absence of a tool for guidelines evaluation ... • Consideration of traditional typology and the established perception of space						

plemented (Table IV). In the synthetic view of the correlations between the criteria and individual typological elements, it is obvious that the groups in the field of economic performance of the investment and energy performance play a particularly important role.

In the discussed examples, most of the criteria appear at the project level.

In the conclusion section we made a comparison of our criteria set (nine groups) with one of the current tools for planning and evaluation of sustainable qualities (Table V). With a simulation of distribution we ascertained that in principle some criteria can determine the individual sustainable quality, but due to insufficient data this cannot be analytically confirmed. Some of them simultaneously appear in two or all three sustainability dimensions.

This comparison is intended only for the assessment of the existing conditions in the field of implementation of sustainability guidelines in Slovene legislation, and it proves that the criteria from group number nine are the key problem.

DISCUSSION

DISKUSIJA

After Slovenia gained its independence, the basic typological characteristics of residential buildings have changed, predominantly because of the new socio-economic conditions and the introduction of western spatial-development standards, which are principally included in the sustainable development concept. Within this framework we can define the following trends which most obviously mark the planning process:

a. The economy of "construction for the market" which causes the overall rationalization

(the trend is evident in the field of selecting low-cost locations, the minimizing of the floor plan gabarits of residential units, external surfaces, public and green public areas, construction quality etc.) Due to the absence of criteria apparatus, the term "cost-effectiveness" is misused and excessive minimization is introduced.

b. The introduction of environmental standards, particularly in the field of energy performance which changes individual building elements (the trend is evident in the area of shape and the concept of dividing the volume, roof design, facade and its grating, materials etc.) In the area of environmental protection it has numerous positive effects, and at the same time it stimulates the design of the exceedingly technological residential environment (e.g. the interior is turning into a hermetically sealed living area with an electronic control of the ventilation, heating and light dispersal in the living areas etc.)

c. Adaptation to the modern culture of living, design trends, new materials and technologies of construction (the trend is evident in the area of floor plan design, textures, interior and exterior design). The trend is evident, but has the smallest influence on the residential building design among the examples dealt with.

Due to the absence of criteria apparatus for the planning and evaluation of sustainability, it is difficult, in current practice, to define those criteria that without doubt belong to

the sustainability concept. Based on the analysis of the condition we ascertain that we are dealing with a complex combination of formal and informal criteria, starting points and reasons the designers are familiar with, and which they integrate in their work with varying degrees of success. Those criteria which have their formal grounds in legislation have been effectively taken into consideration. Despite insufficient legislation in Slovenia, there are also examples of good practice which come from the constructive cooperation of investors, users and building designers.

The introduction of sustainability principles can be direct or indirect. In the first example, key directives and objectives have been determined as part of strategic documents. However, the planning and project guidelines on the level of spatial implementation acts are formed to a far smaller extent. An evident example of the direct implementation of guidelines is the Rules on Efficient Energy Use in Buildings, which exactly cover the environmental and, to some extent, cost-efficiency aspect. Because of their obligatory character they are consistently taken into account by all investors and building designers. Unfortunately, these rules are the only formal concretisation of sustainability guidelines.

Introducing sustainability principles is made most difficult in the lower levels of planning, where it is difficult for the building designer to invoke professional arguments in direct relation to the investor. To improve the conditions, it is predominantly necessary to:

- Define the protected values and protection objectives in all three dimensions of sustainability (ecology, economy, society);
- Introduce a suitable hierarchy of the guidelines;
- Implement concrete guidelines and efficient tools on the level of the documents which are hierarchically directly superior to the spatial implementation acts, such as the Municipal detailed spatial plan/ Spatial implementation conditions. This level presents the strategic and implementation part of Municipal spatial plan;
- Form security mechanisms which will guarantee absolute professional work to the planners and building designers, and which will prevent the abuse of the sustainability concept in terms of its undesirable interpretation.

In addition to the above, the awareness of all the participants (users, designers and investors) is of great importance in the implementation of the sustainable development concept and the consequentially sustainable design of buildings, living environment, or spatial design in the broader sense. Spatial solutions have to – by taking into consideration the formal sustainability criteria or without them – respond to the current needs of modern society and create a healthy and visually attractive living environment, which is the key predisposition for a person's general productivity.

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- Fig. 1 Plan: Geodetska uprava Republike Slovenije; Photos: author

TABLE I-V author

SUMMARY

SAŽETAK

STAMBENE ZGRADE I ODRŽIVI RAZVOJ U SLOVENIJI

U sklopu nove sociorazvojne paradigme u Sloveniji, polazišta u planiranju stambenih zgrada također su doživjela promjene. Uvjeti slobodnog tržišta, promjene u kulturi življenja i uvođenje načela održivog razvoja promijenili su principe društvene izgradnje i uveli pojam 'izgradnja za tržište' utemeljen na konceptu investicije i formalno-tehnoloških standarda. Ovaj je proces doveo do promjena u brojnim tipološkim karakteristikama pojedinih zgrada i četvrti, i to onih koje su nekad jamčile određenu kvalitetu stambene izgradnje. U kontekstu nove prostornorazvojne paradigme, polazišta i ciljevi projekta određeni su održivom kvalitetom izgrađenog okoliša. Unatoč prihvaćanju općih smjernica prema održivom razvoju i izgradnji, unutar postojećega zakonskog okvira u Sloveniji još uvijek ne postoji sustav integriranih kriterija za održivo planiranje. Pri interpretaciji ovih smjernica postoji određeno odstupanje ili, bolje rečeno, neujednačeno stajalište prema trima principima održivosti. Cilj je istraživanja definiranje aktualnih polazišta koja su bila osnova planiranja i realizacije pojedinih projekata u razdoblju nakon što je Slovenija stekla neovisnost.

Istraživanje se odvijalo u dvije faze. Prva je faza bila usmjerena na definiranje tekucih investicijskih tokova u stambenoj izgradnji za tržište u razdoblju nakon 2001. godine. Tako smo 2010. i 2013. provele nekoliko polustrukturiranih intervjua s unaprijed određenim pitanjima u kojima je sudjelovalo osam istaknutih slovenskih investicijskih tvrtki i pet arhitektonskih biroa. Cilj nam je bio utvrditi koja su polazišta (ekonomska i/ili neka druga) temeljna u investicijskom planiranju stambene izgradnje u projektima namijenjenima slobodnom tržištu. Rezultati su bili sljedeći:

1. U odgovoru na pitanje o odluci o tipu zgrade (samostojeća, višestambena, velicina stambenih jedinica i vanjskih površina i sl.) koju investitor može realizirati na kupljenoj lokaciji – 50% ispita-

nika odgovorilo je da se njihova odluka temelji isključivo na kriteriju maksimalne iskoristivosti lokacije.

2. U odgovoru na pitanje odlučuju li nakon kupnje zemljišne parcele zamijeniti postojeći prostorni plan nekim novim planom koji bi omogućio veću iskoristivost – 80% ispitanika odgovorilo je da su to učinili u većini slučajeva kada je to bilo moguće.

3. U odgovoru na pitanje jesu li polazišta u planiranju i izgradnji četvrti temeljena na analizi tržišta u pogledu potreba i očekivanja korisnika ili na njihovoj kupovnoj moći – 80% ispitanika odgovorilo je da analiziraju isključivo kupovnu moć korisnika. Druga je faza bila usmjerena na prepoznavanje kriterija projekta (na kojima su temeljni postojeći projekti) i definiranje drugih razloga koji su potaknuli promjenu osnovnih tipoloških karakteristika stambenih zgrada.

U sklopu analize deset dovršenih projekata – tipični primjeri izgradnje za tržište – pregledali smo projekt-nu dokumentaciju i uvjete realizacije te razgovarali s projektantima kako bismo utvrdili i zabilježili kriterije koji su utjecali na projektiranje pojedinih tipoloških elemenata. Analizirano je devet osnovnih tipoloških elemenata arhitektonskog i urbanističkog projektiranja. Dobiveni su sljedeći rezultati:

– Uzimajući u obzir činjenicu da postojeći zakonski okvir ne sadrži integrirani sustav primjerenih kriterija i model za procjenu rješenja održivosti, teško je analitički definirati pojedine 'kvalitete održivosti' stambenih zgrada za ona prostorna rješenja koja su već realizirana.

– Teško je definirati pojedine razloge koji su utjecali na projektiranje nekoga tipološkog elementa kao 'kriterije planiranja'; u takvim slučajevima bolje ih je nazvati 'polazišta planiranja'.

– Postoje velike razlike u razvijanju svijesti projektanata i klijenata u pogledu koncepta održive izgradnje, a to se prije svega odražava u stručnom i moralnom pristupu pri projektiranju pojedinih zgrada.

– Unatoč prethodno navedenome, široka lepeza relevantnih kriterija (i/ili polazišta) može se definirati na osnovi naše analize i onih kriterija koji se mogu klasificirati u sljedećih devet bitnih kategorija: 1 – Potrebe i želje korisnika, 2 – Rubni uvjeti lokacije, 3 – Ekonomski učinak investicije – isplativost (racionalnost), 4 – Ekonomski učinak investicije – pritisak investitora (minimizacija), 5 – Suvremena kultura življenja, 6 – Energetski učinak – aspekt okoliša, 7 – Suvremeni standardi u projektiranju, 8 – Moderni materijali i tehnologije, 9 – ostali kriteriji i polazišta.

Izvršili smo i simulaciju, tako da smo definirane kriterije iz naše analize uvrstili u postojeće alate za procjenu kvaliteta održivosti (*Leitfaden Nachhaltiges Bauen*) i utvrdili da u načelu neki kriteriji mogu odrediti pojedinu kvalitetu održivosti, ali zbog nedovoljnih podataka to se ne može i analitički potvrditi.

Zbog nepostojanja kriterija u planiranju i procjeni održivosti teško je u praksi definirati one kriterije koji nesumnjivo pripadaju konceptu održivosti. Na osnovi analize uvjeta tvrdimo da se radi o složenoj kombinaciji formalnih i neformalnih kriterija, polazišta i razloga, s kojima su projektanti upoznati i koje s različitim uspjehom inkorporiraju u svoje radu. Oni kriteriji koji imaju formalnu osnovu u zakonskom okviru na učinkovit su način uzeti u razmatranje. Unatoč nedovoljno razrađenom zakonskom okviru u Sloveniji, postoje također i primjeri dobre prakse koji proizlaze iz konstruktivne suradnje investitora, korisnika i projektanata.

Kako bi se poboljšali postojeći uvjeti, potrebno je u zakonski okvir uklopiti neke alate u planiranju održivosti (smjernice i kriterije), kao i pripremiti projekt na razini detaljnoga prostornog plana općine, Osnovni projekt – glavni projekt (slovenski dokumenti: Općinski Podrobni prostorski nacrt, projekt za pridobitev gradbenega dovoljenja – projekt za izvedbu).

GREGOR ČOK

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GREGOR ČOK, BArch., PhD, graduated from the Ljubljana Faculty of Architecture in 1998 and in 2004 received his PhD with the dissertation titled "The Development of a Regional Network of Economic Areas in the Conditions of Modern Information Society". His professional and research work fields are residential and economic area planning, and preparing spatial strategic and planning documents.

Dr.sc. GREGOR ČOK, diplomirao je na Arhitektonskom fakultetu u Ljubljani 1998., a doktorirao 2004. s disertacijom „Razvoj regionalne mreže ekonomskih područja u uvjetima modernoga informacijskog društva“. Područja njegova stručnog i znanstvenoistraživačkog interesa jesu planiranje stambenih i ekonomskih područja te priprema prostornih strateskih i planskih dokumenata.

