

Opponent's review of the dissertation thesis

Doctoral student: **Ing.arch. Bardhyl Rama**

Ecodistricts - principles of planning and designing based on case studies

Supervisor: Doc.Ing.arch. Dalibor Hlaváček, Ph.D.

I prepared the opponent's opinion on the basis of the supervisor's proposal and after the approval of the chairman of the Branch Council of the specialization "Architecture, Theory and Design" and the appointment of Prof.Ing.arch. Peter Vorlík, Ph.D. by letter dated 28.11.2022.

a) to the recency of the chosen topic

In the current period of efforts to reduce the impact of human activities on the environment and especially on climate change, there can be no doubt about the topic's recency. Doctoral student Ing.arch. Bardhyl Rama aptly focused his attention on ecodistricts. He correctly observed that the problem of the eco-house at the building level is almost solved, especially from the energy point of view. We can design and build houses not only energy-saving, passive and almost zero-energy houses, but also partially fulfill the ambition to build houses that produce more energy than they consume, the so-called active houses. Urban units remain a problem, but it is necessary to take into account many more variables and deal with all three components of the environment, as defined by Christian Norberg Schulz, i.e. physical, social and cultural environment.¹ Each of the listed environments is assessed by different parameters. In the dimension of the city, the effort to create an ecologically balanced settlement is difficult to manage, but there are a number of successful proposals and implementation at the level of its parts, i.e. residential estates or districts. Therefore, the doctoral student focused on this topic, which he also give reasons in the introductory chapter of his dissertation thesis.

b) whether the dissertation met its goal

The doctoral student set three goals: The first goal focused on explaining the potential that ecodistricts offer in solving new projects, as well as on justifying their importance in efforts to reduce the impact of human settlements on the environment and the production of greenhouse gases. The second goal was to identify the main urban and architectural categories and a set of

¹ Christian Norberg-Schulz: Logik der Baukunst, Birkhäuser, 1965

indicators that come into consideration when designing ecodistricts. The third, very ambitious goal is to offer how to design new ecodistricts and which principles, based on the experience gained, serve as a basis for their planning and design.

To fulfill these goals, the doctoral student chose a detailed survey of three selected ecodistricts, which could be a model for designing urban complexes of this type. The author selected generally valid data from the characteristics and indicators of the three investigated locations, which, according to the doctoral student, could be used in the design of new ecodistricts. It can be concluded that the doctoral student fulfilled the specified goals.

c) to the chosen processing methods

The chosen methods of the doctoral student's work are described in detail in section 1.4 Methodology (pp. 18 to 21), from the collection of data and literature, through surveys and analyzes carried out on site to the final summary and definition of recommended general procedures for designing new ecodistricts. This cognitive procedure is called **induction**² and is suitable for achieving set goals. For their fulfillment, the selection of model ecodistricts played an important role. Doctoral student in the text on p. 19 states that he chose three out of "*much larger number of cities*" that would come into consideration: the Vauban - Freiburg im Breigau estate, the Kronsberg - Hannover estate, the Bahnstadt - Heidelberg estate. The author, as a justification for the selection of these locations, states: "*These cases represent the sites that are globally recognized and highly evaluated models for their sustainable approaches which focus on, among others, sustainable land use, preservation of water and ecosystems, green spaces, eco-friendly transportation, energy efficiency and renewable energy strategies, architectural solutions that integrate good building orientation and daylighting, thermal comfort, indoor air quality and ventilation*" (p.44). I may have missed the list of sites from which the PhD student made selections, but I was wondering which sites they were and what the criteria were for the final selection. Their availability probably played a significant role in their selection, as well as the fact that all the listed housing estates are in Germany. I am also interested in why the doctoral student did not use the SWOT method when developing analyzes of individual selected ecodistricts and their comparison, which captures not only the strengths and opportunities but also the weaknesses and threats of the evaluated subject.

I appreciate the doctoral student's effort to communicate with local residents and summarize their opinions, experiences or satisfaction with the created environment in the form of questionnaires. When compiling the questionnaires, the doctoral student used the appropriate method of semantic differential.

² Induction is a process of thought, when using statements (observed facts) about individual facts, we obtain statements describing general facts or regularities. Statements that arise through induction have a certain probability of being correct.

d) to the results of the dissertation, indicating what new knowledge it brings

As the doctoral student states, the main outputs that were presented in his thesis are the detailed results of analyzes of individual categories and their respective indicators. He examines in detail the compliance of individual categories and their indicators in combination with new tools and technologies in their design, implementation and operation and compliance with the fulfillment of sustainable development goals. The contribution of the work is a summary of information on the phenomenon of ecodistricts and an attempt to define certain thematic units and their individual components/indicators.³ It is in detail discussed in Chapter 5. *Principles of planning and designing ecodistricts based on case studies*. The author presents the summarized detailed results from the analyzes of individual categories and their respective indicators as new piece of knowledge that should help in planning and designing new ecodistricts.

I would like to add a few of my comments to this section. In the beginning of my assessment, I mentioned the division of the environment into physical, social and cultural and various parameters according to which the quality of the appropriate environment is evaluated. In the categories and individual indicators as presented by the author, the nature of these environments is intertwined. Perhaps it would be useful to define more clearly whether the relevant indicator falls into the field of physical or social environment. For example in the introductory category "*General data*", the author presents indicators: "*Site conditions, Area, Population*" from the point of view of the social environment.

In category "*General data*" I was missing data on the local climate (temperature, humidity, precipitation, sunshine, air flow, prevailing winds , etc.), which largely determine the energy requirements of buildings, the possibilities of obtaining environmental energy, the amount of collected rainwater, etc. (data characterizing the quality of the physical environment, measurable data are also monitored for climate change). In the "*Population*" category, it would be appropriate to deal with the composition of the population, especially its age structure. These data are variable and have an impact e.g. to choose the type of amenities, accessibility, mobility, recreational facilities, etc.

I missed the mention of amenities in the category "*Urban planning approach*". Schools, kindergartens, youth centers included in the Public spaces category are part of them, but the equipment represents a significantly wider spectrum of amenities. In the planning and design general recommendations, I missed the mention of sports areas outside of running tracks and bike paths, as well as larger water areas. The use of solar energy has an impact on the height zoning of buildings, solar cells and collectors are mostly placed on the roofs of buildings, which have an impact on the author's general recommendation to implement exclusively green roofs. Installation of wind generators in a compact urban estates is not an option, their use depends on the specific conditions of the given location.

³ The author calls them categories, e.g. Public spaces, e.g. for the category Public spaces the components/indicators are public squares, schools, kindergartens, youth centers.

e) Importance of the work for the further development of the scientific field and practice

In the work, the author summarized knowledge and experience from ecodistricts in the German cities of Freiburg, Hannover and Heidelberg.⁴ In the conclusions, he tried to define general principles for the design of such urban formations, which would also be valid outside the territory of Germany. The dissertation thesis, also because it contains a range of general information and definitions in the field of sustainable development, sustainable architecture, ecocities, ecodistricts, smart cities (chapter 2. *Theoretical basis*) is a suitable study material for students of architecture, urbanism, spatial planning, but also for workers of local authorities and city urban planning offices, entrepreneurs and the wider public, for whom this segment of urbanism and territorial planning is interesting. The idea of using the results of the dissertation at higher levels of state management and in renowned architectural/design offices is too ambitious, because a significant part of the information is of a general nature and the examined sample of three ecodistricts located in relatively similar geographical conditions for obtaining more widely valid general values is relatively small. Nevertheless, it represents a valuable source of information on the functioning of ecodistricts and a number of topics and incentives for further research in this area.

The information provided in the Appendix (pp.169-175) is valuable, where the findings from the implementation of a questionnaire survey mapping user satisfaction and user experience are summarized. This information provides a certain idea of the functioning of the ecodistrict over time, which is an essential agent/factor in assessing sustainability.

f) Formal preparation of the dissertation

I had the opportunity to study the work both in electronic and printed form. The printed version has 198 pages of text including figures, tables, graphs and appendices. It consists of 6 chapters (pp.15-168), 7th Appendix (pp.169-175), references (list of sources) on 15 pages (176-190), biography oriented towards professional career (pp.191-195), PhD student publications (pp.196-198).

The dissertation has a clear structure, the text is appropriately supplemented with an image attachment and graphs. Perhaps I would recommend the author to supplement the schemes of ecodistricts and especially the floor plans of buildings (e.g. Fig. A 3.6 and A 3.7 on pages 102 and 103) to indicate the orientation to the cardinal points, for the initial situation of the ecodistrict it would be useful to indicate the rosette of the prevailing winds. In addition to the solar access, the air flow is one of the essential factors in the orientation of the street network. The description of some diagrams in the printed version is illegible, e.g. on p. 78 A 2.10.

In terms of formality, the dissertation thesis is prepared at a good scientific level, but part of the text has a character that corresponds more to the character of professional or popular

⁴ In particular, the city of Freiburg is a somewhat atypical example, as it is a pioneer in research into the use of solar energy in buildings (e.g. architect Rolf Disch and his Heliotrope), a city of research workplaces and foundations dedicated to the topic of alternative energy sources, mainly solar energy. The selected ecodistricts are located in the range from 47° north (Freiburg) to 52°N. (Hannover).

literature (chapter 2. *Theoretical basis*). The graphic level of the work is at the standard level of technical and human sciences dissertations, I miss a little more demanding graphics that should appear in the work of an architect.

The dissertation is written in English, it is easy to read and understand, but since I am neither a linguist nor a native Englishman, I cannot assess the overall level of language expression.

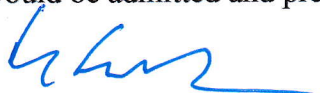
g) Conclusion and opinion of the opponent

In his book "Future Shock" published in 1970, Alvin Toffler writes about the exponential increase in knowledge and the consequences that accompany this phenomenon/process (?).⁵ Scientific research is mostly oriented towards obtaining new knowledge. This is typical of scholastic research. But the mentioned amount of knowledge compels a part of the scientific community to deal with their assessment, classification and selection of relevant knowledge for the given field of science. The result of their work is not new knowledge, but their evaluation, classification and selection of information useful for the given field. This is the so-called **follow-up** or **investigative research**. In this category I would include the research described in the dissertation of Ing.arch. Bardhyla Rama. This corresponds to the character of the dissertation being assessed, which is oriented towards the collection and sorting of information.

After a detailed study of the dissertation, I conclude that the doctoral student is well versed in the issues related to the chosen research topic and was able to summarize the information and knowledge obtained in the submitted dissertation.

Demonstrated the following skills that a doctoral student should acquire during the completion of a doctoral degree: the ability **to define** research topics, the ability **to formulate** research problems, the ability **to identify** and **use** paradigms, concepts, theories and methods of obtaining information that are appropriate for the field and research topic, the ability **to determine** and **appropriately use** sources of important information and identify and use relevant search aids, ability **to evaluate** evidence and **draw appropriate conclusions**, ability **to communicate** appropriately in written, oral and graphic forms, ability **to use IT** and Internet resources, ability **to quote** sources accurately and appropriately, ability **to prepare, process, explain** and **present** information using appropriate qualitative and quantitative procedures, the ability **to plan, manage** and **report** on research.

These acquired abilities, which the doctoral student documented in his dissertation, confirm his competence for scientific work. I recommend that the dissertation of Ing.arch. Bardhyl Rama would be admitted and presented for defense.



Prof. Ing. arch. Julián Keppl, PhD.

Bratislava 28.12.2022

⁵ Alvin Toffler: Future Shock, Random House 1970