ARCHITECTURAL COMPETITIONS & SUSTAINABILITY: A CASE STUDY

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INTRODUCTION

A number of recent initiatives address the thermal building performance of new and existing buildings. Moreover, in recent years architectural competitions demand the consideration of energy efficiency and environmental footprint aspects in their requirement documents. However, the question if and to which extent such aspects influence the jury decisions of competitions remains open. Toward this end, we present a case study on a competition of a large residential building in Austria. This competition specifically addressed the energy efficiency of the proposed designs. Buildings had to be designed in a way that "Passivhaus"-standard could be reached. Participants were required to add basic information such as proposed wall thickness, glazing orientation, and building compactness in their project deliverables. In a later stage, independent evaluators assessed and compared the sustainability of the proposed designs based on a simple point scheme. The energy performance of the designs was neither calculated by the participants nor by the external evaluators. In this contribution we evaluate the energy performance of the ranked designs via a normative energy certification method. Additionally we contrast, in case of one of the participating architectural firms, the designs with early stage work models and their calculated performance. The results might offer insights concerning the question if and to which extent the ranked energy performance of the proposed designs did influence the competition's ranking.

METHODOLOGY

Status Quo of consideration of sustainability criteria in architectural competitions: It is a widely accepted and well-known fact that buildings contribute to a major share of both energy consumption and emission of harmful substances. Moreover, domain specific laws and standard stipulate that the planning process of new buildings and retrofit efforts of existing structues have to result in highly-efficient buildings. However, a notable amount of building designs is generated via architectural competitions. Results of such competitions are regularly based on a ranking of a jury of architects and domain experts in the specific field of building. Whereas the consideration of sustainability can be found in many competition's tender document, it seems not clear, if the ecological performance of proposed building designs can be found in a decision ratings of competitions. In previous research activies [1,2] we captured the common practice of addressing sustainability in tender documents and required deliverables of competitions. In the present contribution we examine a case study competition and its results toward different sustainability criteria

The assessed architectural completion: The assessed competition was conducted in 2014/2015 and addressed the generation of highly-densified, highly-efficient social housing in a larger Austrian city. "Passivhaus"-Standard was a required aspect of the designs. Figure 1 illustrates a part of one of the awarded projects of the competition.

Three-fold-assessments: To assess the sustainability we compare the decision ranking of the competition's six awarded projects with three different other evaluations:

(i) The ranking based on a spread-sheet evaluation of the sustainability criteria, done by a consultancy agency that assessed the competition entries.

(ii) The results of calculations performed with a normative method suitable to assess the energy use of buildings, based on the information given in the competition entries. It has to be mentioned that the required level of detail for a comprehensive calculation of Key Performance Indicators (KPIs), or even a numeric energy performance simulation is regularly not available in the deliverables of competitions. This is the case in the present competition as well. Therefore, a number of assumptions had to be taken to be able to arrive at meaningful results.

(iii) A subjective evaluation of the six awarded projects by a large number of graduate students of Architecture and Building science. The students did rank the six buildings based on their subjective impression of model photographs of the proposed designs regarding energy efficiency, positioning of the building(s) on the corresponding building site, and on the their preference for residing in the corresponding project's residential units.

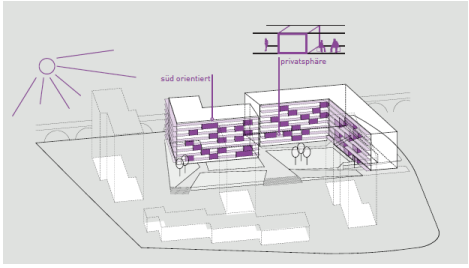

Figure 1: A part of one of the awarded contributions.

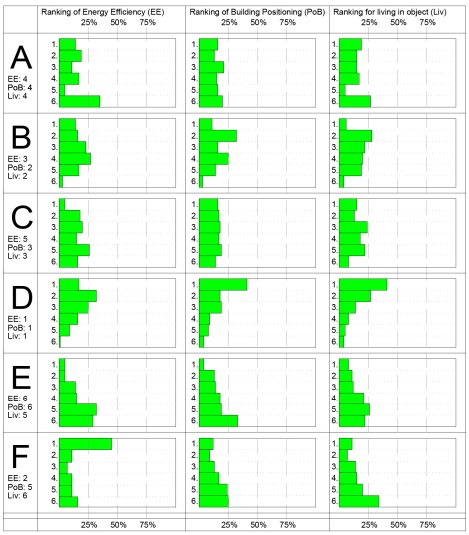

Figure 2: Subjective evaluation results

RESULTS AND DISCUSSION

In general, the comparison showed bid discrepancies between the different rankings. Figure 2 illustrates the results of the subjective evaluation by the graduate students. Interestingly, there is not only a difference between the subjective energy efficiency assessment and the calculated energy efficiency, but also differences in the subjective rankings between the energy efficiency, the building positioning, and the preferences regarding residing in one of the awarded projects.

CONCLUSION & FUTURE RESEARCH

In principle, the results of this study shows that there is a strong necessity to develop both objective and easy-to-use assessment criteria regarding sustainability for ranking of proposed architectural designs within competitions. Future research will extend the study to a number of competitions and suggest different evaluation criteria that can be used in assessment of proposed designs within such competitions.

REFERENCES

[1] U. Pont, K. Kiesel, M. Schuss, B. Sommer, K. Orehounig, A. Mahdavi: "A critical case study of decision criteria in architectural competitions" in: "Proceedings - First International Conference on Architecture and Urban Design - 1-ICAUD", EPOKA Univ.; Dep. of Arch. (Ed.); Epoka Univ. Press, 1 (2012), ISBN: 9789928-135-01-8; 9 S.

[2] K. Kiesel, U. Pont, A. Mahdavi: "Including sustainability criteria in architectural completion: A critical case study of current practices"; Advanced Materials Research - Web, 649 (2013), 4 S.