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Sustainability Assessment in Architectural Competitions in Switzerland

Mobiglia M, Cellina F, Castri R

Campus Trevano, 6952 Canobbio, Switzerland

massimo.mobiglia@supsi.ch

Abstract. Architectural and urban planning decisions, that have a strong impact on all areas of sustainability, are often set during preliminary phases of project development. This work focuses on the architectural competition, that is traditionally an instrument for enhancing quality in architecture and urban planning in the preliminary phase. However, in Switzerland, only occasionally assessment criteria adopted in such competitions include principles of sustainable development (SD), as there are no specific references to SD in the specific national SIA 142 "Regulation of architecture competitions".

In the Swiss Canton of Ticino, in some architectural competitions the evaluation criteria of sustainable development have been already clearly enumerated in the tender documents. Those criteria were selected according to existing tools (Sustainable neighbourhood by SMEO, SNBS, SIA 112/1) widely used in Switzerland. In addition to the usual graphic documents each project team had to structure a sustainability report. The presented projects have been then assessed by an interdisciplinary team, after that the results in several representations (global index, dimension index, category index, bar graph diagram and spider web diagram) and compared them to show the strengths and weaknesses from an integrated point of view.

A change in the competition culture is needed because the sensitivity for the topic depends strongly on subjective purposes, namely primarily on the composition of the jury.

1. Introduction

"The uncontrolled proliferation of settlements is only an indication that settlements and infrastructure development is not yet resource efficient. And this impacts not only land use, but also energy and material use, as well as social aspects. However, the high rates of land use also reflect the fact that the various practices of settlement formation and infrastructure development have not yet been brought together and integrated into an overall context. Too often, the various aspects are optimized on their own. For example, the current efforts to renovate buildings usually have no real connection to the wider building environment, and the modernization of city centers often neglects the related social aspects. Even the self-sufficient one-family house in the countryside without connection to public transport indicate that the different disciplines work independently of each other.

What is needed is a fundamental change towards an integrative approach and processing of our settlements and infrastructures in all their dimensions. [...] a change in society, only through a reduction of the growth, an economic development that leads to quality instead of quantity [...].

It is necessary to check whether it is really necessary to build a project before designing it."

Dr. Prof Eugen Brühwiler, President of the NFP 54 Steering Group



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Sustainable is a development that meets the needs of the current generation without putting at risk the ability of future generations to meet their own needs and choose their lifestyle. [1][2]

Still, today the various actors (public and private clients, associations, designers, builders, etc.) involved in the design and / or transformation processes of the micro-urban environment deal with decisions that are often at the limit of the underlying concept of sustainability. Based on appropriate knowledge of the disciplines and methods that enable the prediction and assessment of the impact on SD, this approach requires a more multidisciplinary approach.

This paper focuses on the assessment of sustainability in the architectural competition phase, which sets architectural and urban planning decisions that will have a strong impact in all areas of SD. Furthermore, it generates results, that can be used more widely, for example as a general framework. The presentation of the results of four case studies aims to propose new approaches towards integrating SD criteria in architectural competitions, by setting new tasks in the process management.

2. Architectural competition procedure

In Switzerland the competition procedure is described by the specific SIA 142 "Regulation of architecture and engineering competitions" [3]. Although the procedure is dedicated to find the best quality projects, there are no specific references to SD in its recommendations. This is delegated to the involved actors, above all to the jury, the client or the experts. The regulation, for example, defines the composition of the jury, only by differentiating jury members between professional and non-professional subjects and fixing that the majority has to be represented by professionals.

In this procedure, the few instruments available to stakeholders to guarantee the inclusion of SD criteria are the selection of the jury, who is in charge of choosing the winner project, the project assessment by a team of experts in SD, the requirements defined in the competition program or the sensibility of the competition coordinator.

To encourage the introduction of sustainability criteria in the construction sector, the trend of recent years has been to move from simple environmental requirements to a complete analysis, pursued by representative interdisciplinary teams.

3. Assessment tools

In addition to the competition procedure, the SIA proposes a documentation with a methodology to assess sustainability, namely the SNARC (System to assess environmental sustainability in architectural projects) [4]. Moreover, contracting authorities may use the Albatros tool, a methodology that incorporates the criteria of SD in the strategic planning of public buildings [5]. In recent years, the SméO / Sustainable Neighbourhood by SméO, a project promoted by the two Swiss Federal Offices of Energy and Territorial Development [6], has partly replaced SNARC and Albatros.

To evaluate a topic as complex as sustainability, a multi-criteria analysis has to be used, as they allow the solution of complex problems by assessing each variable and assigning each one its relative importance.

However, the tools to evaluate a complex concept such as sustainability, which aggregate the results into a single index, are very problematic. The Dashboard of sustainability, model created within the UN Commission on Sustainable Development (UNCSD) and later enhanced by a small group of researchers led by the International Institute for Sustainable Development (Canada) and presented in 2002 at the World Summit in Johannesburg, aims to integrate everything into a single index of economic, social and environmental aspects. The objective pursued is therefore to provide an instrument that can be used to briefly illustrate the level of sustainability of a given territorial reality based on a set of selected indicators.

For this reason, the interpretation and understanding of the obtained results is very difficult. Consequently, the "dashboard" has also been defined as a "black box": an instrument that shows an output after entering data, but without knowing what exactly is happening in there.

Aggregating different criteria into a single sustainability index, even if it is obtained as a result of a multi-criteria evaluation process, is very close to the concept of weak sustainability due to the compensatory effect that appears between socio-economic and environmental aspects.

The approach that currently obtains the greatest favours and attentions is the one of an instrument close to strong sustainability, which, according to many, should be considered true sustainability. This aggregative logic leads to the integration of social, economic and environmental aspects, while maintaining their own autonomy, so that no aspect is penalised. This approach of multi-criteria analysis is at the basis of evaluation tools as decisional support. [7]

4. Competition tender

The involved stakeholder has the chance to influence, positively or negatively, the process of sustainability in the architectural competition. Among them the clients/promoters have the main and most important role. In fact, it is up to them to define the composition of the jury and the experts. As assistance they have a coordinator which has the role to follow the SIA 142 Regulation. Afterwards, promoter and jury define the criteria of judgment in the competition announcement and define the experts. This means that in the initial phase of the architectural competition, key decisions are taken by the promoter. Those decisions significantly influence the sustainability of the project.

The preparatory phase of the competition is the right moment to integrate the principles of SD in the tender, that will be held throughout the process. Namely it is necessary to clearly set the evaluation criteria. The selection of indicators is mainly based on the SméO instrument.

5. Case studies

In 2018, the Institute for Applied Sustainability to the Built Environment (ISAAC) of the University of Applied Sciences of southern Switzerland (SUPSI) had the opportunity to assess the sustainability of four different architectural competitions in Canton Ticino:

- New Campus SUPSI in Mendrisio [8], 22 projects in the 2nd competition phase
- New Campus USI-SUPSI in Viganello, 12 projects in the 2nd competition phase
- New Retirement home in Coldrerio, 5 projects in the 2nd competition phase
- New Kindergarden in Gerra Cugnasco, 6 projects in the 2nd competition phase

In the specific case of the Campus in Mendrisio, thanks to the involvement of a team of sustainability experts before publishing the tenders, it was possible to introduce some SD principles already in the preface: "The new campus will serve as a showcase and model of sustainability for its users and territory, in order to guarantee the principles of sustainable development a diffusion in today's society".

The experience of this first competition served as solid base for the other ones.

In each competition, the evaluation of the projects reaching the second selection phase was carried out by an interdisciplinary team. Each project team produced a specific sustainability report that explicitly described the decisions taken. These should also be visible in the provided plans.

The multi-criteria analyses carried out are based on an aggregation principle. A colour is assigned to each answer (from green - good to red - bad).

6. Results

6.1. Sustainability assessment

At the end of each evaluation process, it is necessary to explore how to deliver results in ways that are easy to understand to all the possible actors, even non-experts.

The evaluation results of the various architectural competitions have been presented in several variants.

The first option is to present the results of aggregate logic with the global index, but this does not express the full complexity of a score. In Figure 1 in the next page an example from the architectural competition of the Campus SUPSI in Mendrisio is shown with single or global index, for all the projects accepted in the second phase of the competition: weaknesses and strengths of each project are not visible here, but only the general ranking.

Dividing the global index into the domains of sustainability, and dividing each domain into categories can facilitate the comparison. The Figure 3 and Figure 4 in the following page have the advantage that a compensation logic between the different domains is not possible. In this way, the weaknesses and strengths of each project are better visible. Hence the expert can express clear and understandable recommendations.

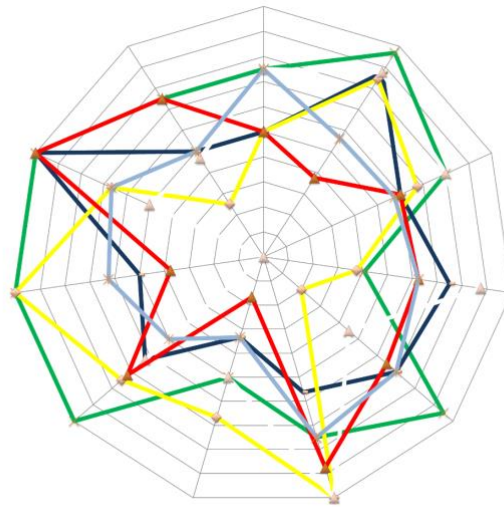


Figure 1: Competition Campus SUPSI in Mendrisio: spider web



Figure 2: Competition Campus SUPSI in Mendrisio: global index



Figure 3: Competition Campus SUPSI in Mendrisio: dimension index

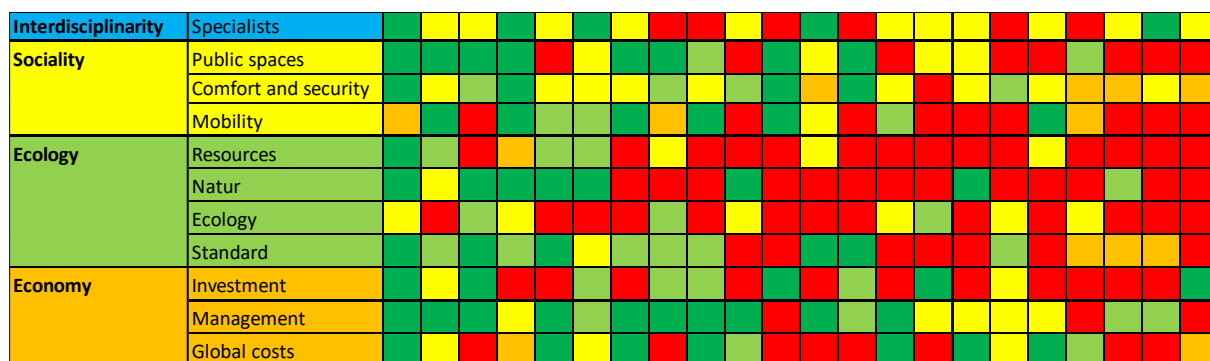


Figure 4: Competition Campus SUPSI in Mendrisio: category index

Another possibility of representation is the bar chart. The Figure 5 shows again the comparison between the 22 projects of the SUPSI campus in Mendrisio.

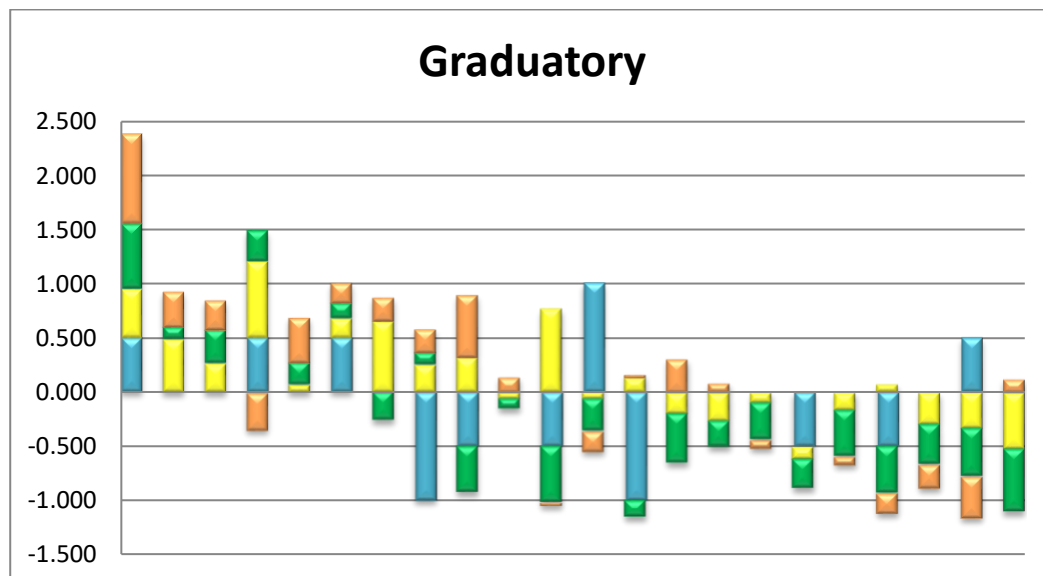


Figure 5: Competition Campus SUPSI in Mendrisio: bar chart

At first glance, Figure 5 easily allows everybody to see the peculiarities of every project: on one hand, the height above 0 of the cumulative bars identify the strength of each project, on the other hand, the bars below 0 identify the weaknesses.

A further representation is the spider web diagram. This type of illustration is easy to understand, as long as it displays a rather limited number of projects.

The following figures show two different ways to use spider web diagrams:

- Figure 6: the six projects of the SUPSI campus in Mendrisio, which have received the best sustainability indices. Reading is difficult in this representation.
- Figure 7: three projects of the architectural competition of the new campus USI-SUPSI in Viganello. Here the comparison of the projects is easier.

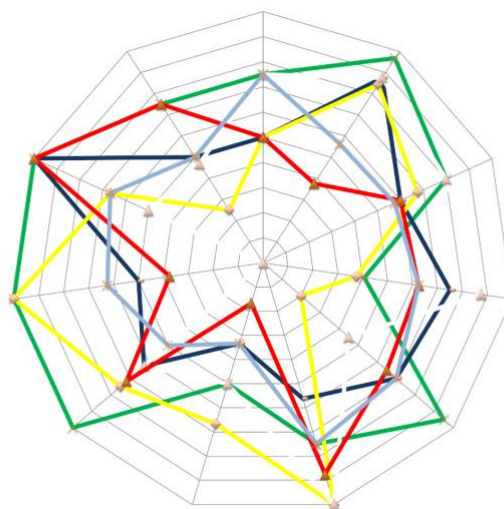


Figure 6: Competition Campus SUPSI in Mendrisio: spider web with the best 6 projects

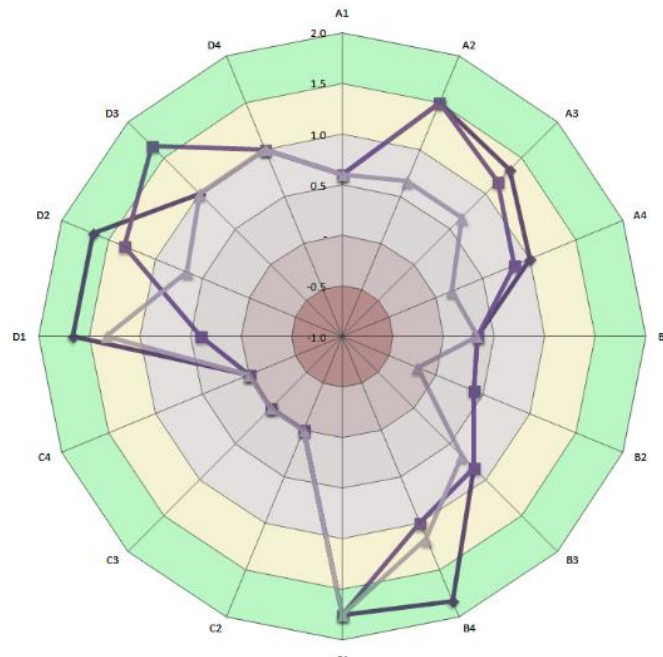


Figure 7: Competition Campus SUPSI in Viganello: spider web with the 3 best projects

6.2. Winners of the competitions

Only in the competition related to the SUPSI Campus of Mendrisio the decision of the jury coincides with the ranking of the sustainability assessment. In this case, more jury members were really interested in the SD assessment and did clearly understand the potential.

In the Coldrerio case study, the winner was placed second in the sustainability assessment, among the 5 competitors passing the second selection phase.

In Cugnasco Gerra, the winner reached the fifth place in the sustainability assessment, among the 6 selected competitors of the second phase.

In Viganello, the winner attained the eleventh place in the sustainability assessment, among the 12 selected competitors of the second phase.

This shows that the criteria of the jury differ from the ones of the sustainability team. In our experience the composition of the jury plays an essential role.

7. Conclusions

7.1. Choice of the best representation of the results

Thanks to the experience accumulated in the four architectural competitions, it was possible to identify the representation of the results that better visualize the facets of the assessment of SD:

1. The representation that allows in a quick way to highlight the strengths and weaknesses of a project is the bar chart. We therefore believe that this is the right way to represent the results of a sustainability assessment with more projects;
2. The spider web diagram is useful to present a single project rather than comparing many projects. But it has the advantage to better follow the development of a single project in its realisation;
3. The global index is of great interest to the client because it explicitly expresses a ranking, but it does not allow for any comparison.

7.2. *New approaches towards more sustainability in architectural competitions*

The architectural competition is traditionally an instrument for quality research in architecture and urban planning. Often, however, the assessment criteria do not include the principles of SD or, if they do so, they are very weak.

In order to emphasize the qualitative requirements of projects, including architectural aspects or urban planning, it is necessary to change the culture, as the sensitivity to the topic depends heavily on the composition of the jury.

Therefore, we propose a new approach toward more sustainability in architectural competitions. The new tasks in the process management are:

- **Adaptation of legislation**
an adaptation of the SIA Recommendation 142 would be desirable by introducing explicit paragraphs on SD. First of all, in the initial preface, then in the definition of the type of architectural competition, but especially in the definition of the different actors involved in the competition procedure and in the definition of the documentation.
- **Coordinators' training - drafting of the tender**
in order to implement the proposed change in the SIA Recommendation it is necessary that the involved personnel are prepared. From this point of view, the person who has the most influence is the coordinator of the competition, namely the person to whom the public bodies normally refer to, to prepare the competition procedure. If the coordinator has a solid foundation in SD, he can make sure that the tenders include the underlying concepts of sustainability as one of the main criteria of choice.
The training of coordinators could be implemented by the order of architects.
- **Composition of the jury**
To include sustainability in those processes, it would be desirable a composition of the jury 1/3 professional (Architect, urbanist), 1/3 SD-professionals, 1/3 non-professional.
- **Role of the experts of SD**
Actually, the experts of SD only have advisory function without voting rights. In this way the proposal is to include them in the jury (1/3 of the jurors).

7.3. *Next steps*

In the near future, the method will be applied to other architectural competitions in the Canton of Ticino, Switzerland, and namely for a new retirement home in Vacallo and for the refurbishment and extension of the retirement home in Morbio Inferiore.

It would be desirable to propose the following proposal to the SIA.

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