

# A proposal for an intervention quality index method (IQI) for the structural consolidation of monumental buildings

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## ABSTRACT

In current days, built heritage is being lost at an alarming rate due to natural and human hazards. Policies for its protection and rehabilitation involve, among other things, challenges related to the refinement of suitable structural strengthening approaches. The arduous balance between gaining acceptable safety levels for occupants without deploying intrusive devices, inconsistent with conservation principles such as those of ICOMOS charters [1] [2], is not simple task. The interests and efforts of the scientific community in this regard have been increasing for decades, but still, it is the structural professional's responsibility and experience which define this arduous balance on a case-to-case basis.

This study addresses the question: How to evaluate the quality of structural rehabilitation interventions in light of conservation principles such as those given by ICOMOS? Here, a preliminary method called the Intervention Quality Index (IQI) method is proposed. It assesses the restoring intervention quality in relation to the: (i) current state of conservation of the monument (vulnerability index of building before of intervention,  $I_v$ ); (ii) seismic intensity (peak ground acceleration, PGA); and (iii) the level of compliance given by the conservation's principle score (conservation's principle index,  $PI_k$ ). To this end, a set of fundamental conservation principles of *authenticity*, *minimal intervention* and *intrusiveness*, *compatibility*, *recognizability* and *reversibility* are reinterpreted and examined in the framework of structural consolidation interventions.

Stability and strength-based techniques for the reduction of seismic vulnerability of monumental buildings are analyzed through the IQI method, which considers the compliance level of each conservation principle formalized through the fulfillment of a category, i.e. respected, partially respected, and not respected. Then, these judgments are translated into scores and statistically evaluated. Scores are attributed in relation to the relevance of a certain conservation principle for seismic structural behavior. For instance, principles of respect for compatibility and minimum intervention have been assessed as being more relevant than reversibility and recognizability.

Preliminary results show that an effective employment of traditional earthquake-resistant practices together with a wise use of modern retrofit strategies allow for the preservation and reinforcement of built heritage without harming its identity.

## REFERENCES

- [1] Cracow Charter, 2000. Signed by representatives of conservation institutions, Proc Int. Conf. On Conservation, Krakow 2000, Krakow, 191–193.
- [2] Venice Charter, 1964. International charter for the conservation and restoration of monuments and sites, Proc., 2nd Int. Congress of Architects and Technicians of Historic Monuments, Venice, Italy.