

Decision Support System for Vulnerability Assessment of Masonry Churches Including Architectural and Artistic Assets

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ABSTRACT

The heritage building stock represents a significant element at risk from earthquakes, as recent seismic events have shown, especially in the Mediterranean area [1]. In fact, in the last few years, the issue of assessing its seismic vulnerability has been widely discussed by the scientific community. The vulnerability assessment procedures involve many critical points related to the complexity and uncertainty of the parameters involved. If a detailed analysis of the individual buildings is to be performed this of course requires a great effort in both the data retrieval, modelling and analysis phases.

In particular, historical masonry churches have been studied in detail in Italy and empirical approaches have been proposed in which a vulnerability index based on the classification of recurrent failure mechanisms is defined, exploiting a macro-elements approach to identify the parameters that influence the index [2]. On the other hand, intangible aspects related to the architectural, historical and artistic value are not included in the Index, either in the structural parts themselves or in additional non-structural elements or contents.

This paper proposes a procedure that combines the well-known vulnerability analysis based on the macro-elements approach and classification of recurrent failure mechanisms with an evaluation of the church's architectural and artistic assets, such as frescoes, statues and paintings, by applying the Analytic Hierarchy Process. The novel procedure is integrated in a useful Decision Support System to provide a complete overview of a church's structural condition, including its artworks, in order to create a priority scale for the assessment, retrofitting and protection of existing masonry churches.

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REFERENCES

- [1] Canuti, C., S. Carbonari, A. Dall'Asta, L. Dezi, F. Gara, G. Leoni, M. Morici, E. Petrucci, A. Prota and A. Zona. *Post-Earthquake Damage and Vulnerability Assessment of Churches in the Marche Region Struck by the 2016 Central Italy Seismic Sequence*. International Journal of Architectural Heritage, 1-22 (2019).
- [2] Lagomarsino, S., S. Podestà, G. Cifani, A. Lemme. *The 31st October 2002 Earthquake in Molise (Italy): a new methodology for the damage and seismic vulnerability survey of churches*. in: Proc. 13th World Conference on Earthquake Engineering Vancouver, B.C., Canada August 1-6. (2004)