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**SEISMIC HAZARD AND STRUCTURAL MATERIAL COST:
QUANTIFYING THE INFLUENCE OF DESIGN PARAMETERS
ON MATERIAL CONSUMPTION FOR INDIVIDUAL DWELLINGS.
A COMPARATIVE STUDY BETWEEN TECUCI
AND CLUJ/SĂLICEA, ROMANIA**

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Abstract

This study evaluates the extent to which spatial differentiation of seismic hazard influences structural material demand and the estimated cost of reinforced-concrete components for individual dwellings. The analysis compares two case-study locations in Romania: Tecuci, situated in an area strongly affected by the Vrancea intermediate-depth seismic source, and Cluj/Sălicea, located in a region with lower design seismic demand. The methodological framework integrates normative seismic parameters defined by the Romanian seismic design code P100-1/2013, namely the design ground acceleration a_g and the control period T_c , with dimensional information extracted from technical design documents for individual dwellings. Concrete volumes and reinforcement quantities were estimated for foundations, plinth/elevation, confined masonry elements, tie beams, lintels/beams, and slabs, and were subsequently converted into material costs using indicative market prices. The results indicate a total material cost of 125,874.95 RON for the Tecuci scenario and 105,157.65 RON for the Cluj/Sălicea scenario, corresponding to a difference of 20,717.30 RON, or approximately 19.70%. The difference is mainly explained by the higher reinforcement demand associated with the higher seismic design parameters in Tecuci. The study demonstrates that seismic zoning is not only a technical constraint of structural design but also an economic variable that affects material consumption, investment planning, and the sustainability of residential construction. These findings have practical implications for designers, beneficiaries, and policymakers involved in territorial planning and seismic risk reduction strategies. Normalized analyses using identical reinforcement indices reduced the difference to 8.11–8.42%, showing that 19.70% is sensitive to the reinforcement-consumption assumption.

Key words: seismic hazard; P100-1/2013; design ground acceleration; structural material cost; reinforced concrete; Tecuci; Cluj-Sălicea

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