



---

# SIGNIFICANCE OF RENT ATTRIBUTES IN PREDICTION OF EARTHQUAKE DAMAGE IN ADAPAZARI, TURKEY

Gökmen Tayfur\*, Birkan Bektaş†, Yavuz Duvarcı‡

---

**Abstract:** This paper analyses rent-based determinants of earthquake damage from an urban planning perspective with the data gathered from Adapazari, Turkey, after the disaster in 1999 Eastern Marmara Earthquake (EME). The study employs linear regression, log-linear regression, and artificial neural networks (ANN) methods for cross-verification of results and for finding out the significant urban rent attribute(s) responsible for the damage. All models used are equally capable of predicting the earthquake damage and converge to similar results even if the data are limited. Of the rent variables, the physical density is proved to be especially significant in predicting earthquake damage, while the land value contributes to building resistance. Thus, urban rent can be the primary tool for planners to help reduce the fatalities in preventive planning studies.

Key words: *Earthquakes, urban rent, urban development, regression analysis, artificial neural network*

Received: March 12, 2014

DOI: 10.14311/NNW.2014.24.036

Revised and accepted: December 12, 2014

## 1. Introduction

After the terrible 1999 Eastern Marmara Earthquake (EME), when more than 20 thousands people died, many authorities immaturely stated that the uncontrolled urbanization, basically resulting from the rampant rent-seeking urges accompanied by lack of adequate planning measures, was the major culprit for the increased death toll [1, 4]. However, earthquake-related planning literature to date is weak in proving this hypothesis. The methods of disaster evaluation in planning have not been matured and a few studies point rather only to the major role of planning initiatives in mitigating the earthquake impacts [3, 15, 19]. Furthermore, data

---

\*Gökmen Tayfur – Corresponding Author, Dept. Civil Engineering, Izmir Institute of Technology, Izmir, Turkey, Phone: +90 232 7506802, Fax: +90 232 750 6801, E-mail: gokmentayfur@iyte.edu.tr

†Birkan Bektaş, Izmir Greater City Municipality, Izmir, Turkey, Phone: +90 232 2931425, E-mail: bektas.birkan@gmail.com

‡Yavuz Duvarcı, Dept. Urban Planning, Izmir Institute of Technology, Izmir, Turkey, Phone: +90 232 7507044, E-mail: yavuzduvarci@iyte.edu.tr