Development of a Methodology for Making Indirect Estimates of the Built Physical Environment

by Barclay Jones

Abstract

A conceptual framework was developed for the processes by which elements of the built physical environment of infrastructure, on-site improvements, and buildings accumulate over time. The basic empirical data are the surviving elements at the present time. Therefore, a complete an inventory as possible was made for one baseline year of one isolated metropolitan area, moderate in size so as to be typical but not so large as to be unmanageable, contained in a single county which had a highly developed city and county computerized data system. Few metropolitan areas met all these criteria, and the one selected was Wichita-Sedgwick County, Kansas. The purpose for making the inventory was to develop short-cut methods for making indirect estimates of the built physical environment for use in risk analysis, reduction of vulnerability, determination of damage rates, and planning relief and recovery with respect to earthquakes and other natural disasters.

The inventory indicated that the replacement cost of the existing built environment in a region is approximately four times the gross regional product. Analysis of recent earthquakes showed that damage rates were quite low, even when the loss in monetary terms was extremely large. Using detailed information from the inventory, a model for making indirect estimates of the existing stock of elements was constructed. Elements vary with population and activities, and these vary outward from centers of urban areas. The use of relative measures rather than absolute ones provided the model with general applicability. The model has proven useful to give preliminary answers to a variety of questions. It has also performed well in tests against direct counts in two cities where it has been applied. Indirect methods appear to be quick, inexpensive means of making estimates of existing stocks. One important finding, which was expected, is that, as with all estimating techniques, results from using the model are more accurate with aggregations of data and as elements are disaggregated into greater and greater detail, the results are less reliable.

Collaboration

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