Integrating Value and Uncertainty in the Sustainable Options Analysis

With rising energy costs, climate change and global warming, property professionals, such as real estate owners, investors, developers, and lenders who are involved in the investment decision-making process have become more interested in investing and financing buildings with sustainable features. However, despite the increased general awareness, these professionals often do not still feel confident in investing and selecting these sustainable options due to substantial risks and uncertainties involved in the investment. Generally, it is the responsibility of design professionals to provide the property professionals with the comprehensive, reliable and understandable information about their design alternatives to enable them to make an informed investment decision. The evaluation methods and assessment analytics that are currently used by decision makers do not simultaneously incorporate all of the costs, benefits, risks and uncertainties of sustainability investment, nor represent them in appropriate terms to be understood and utilized in the investment decision-making process.

In this research, a systematic valuation process is proposed to assess a set of sustainable options (green systems/strategies) for retrofitting an existing commercial property, while clearly articulating the risk and uncertainty inherent in the valuation process. This new assessment method that takes options for sustainable features as the inputs, uses the current technical modeling tools to project the building performance, translates their impact into the key financial model inputs, and ultimately utilized more sophisticated financial and statistical techniques to estimate the final financial performance indicators. The three following domains have been studied and incorporated into the development of the proposed framework: 1) Issues related to sustainable building, green features/systems and their performance projections; 2) Issues related to the sustainable property valuation process and incorporating sustainability into the financial model—Discounted Cash Flow model; 3) Issues related to incorporating and communicating the uncertainty in a financial model and valuation process by utilizing the probability-based valuation model—Monte Carlo simulation. This study is intended to look at these three different domains simultaneously and bring them all together into a new integrated model to functionally evaluate the possible sustainable options and determine their true range of value in a way that can be utilized by investors and owners for making high-quality investment decisions about greening their buildings. The proposed process sets forth the rationales and fundamentals for the development of new integrated assessment tools for assessing the financial performance of sustainable options, and could served as a foundation for the new generation of assessment tools for sustainable building features. A case study will be conducted numerically demonstrate the applicability of suggested methods and hypotheses in the process.

The outcomes of this research could also be very helpful for design professionals, technical decision makers, to understand and analyze the financial performance of their design decisions and its impact on selection of sustainability options at the pre-development stage, resulting in more holistic and viable designs. The process will also communicate with property professionals, in a proper language and benefit them in making high-quality investment decisions and appropriate choices among sustainable options.