

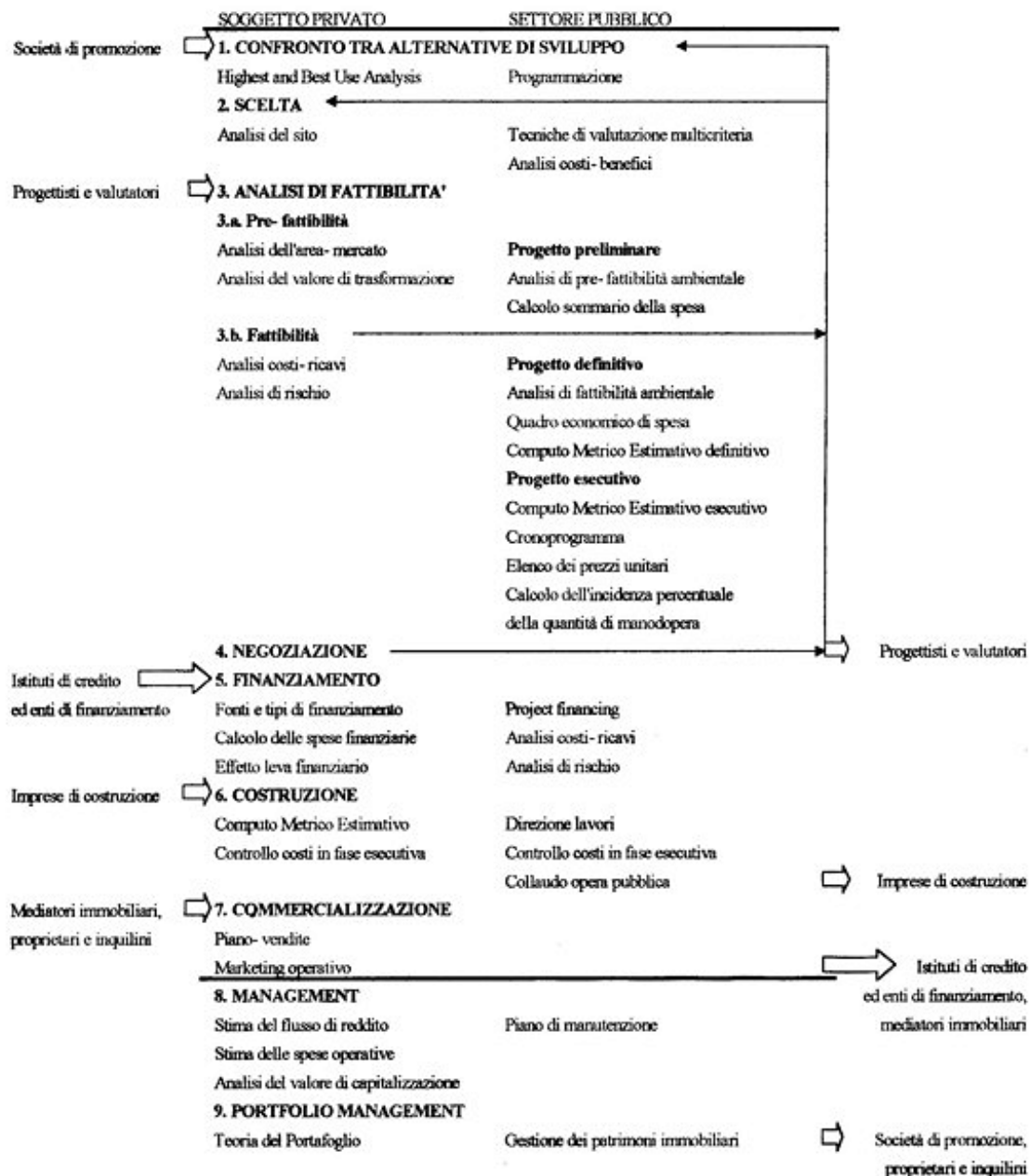
**Property Investment Risk Analysis. The Real Options Theory Applied To A Case Study**

by Sophie Baldi

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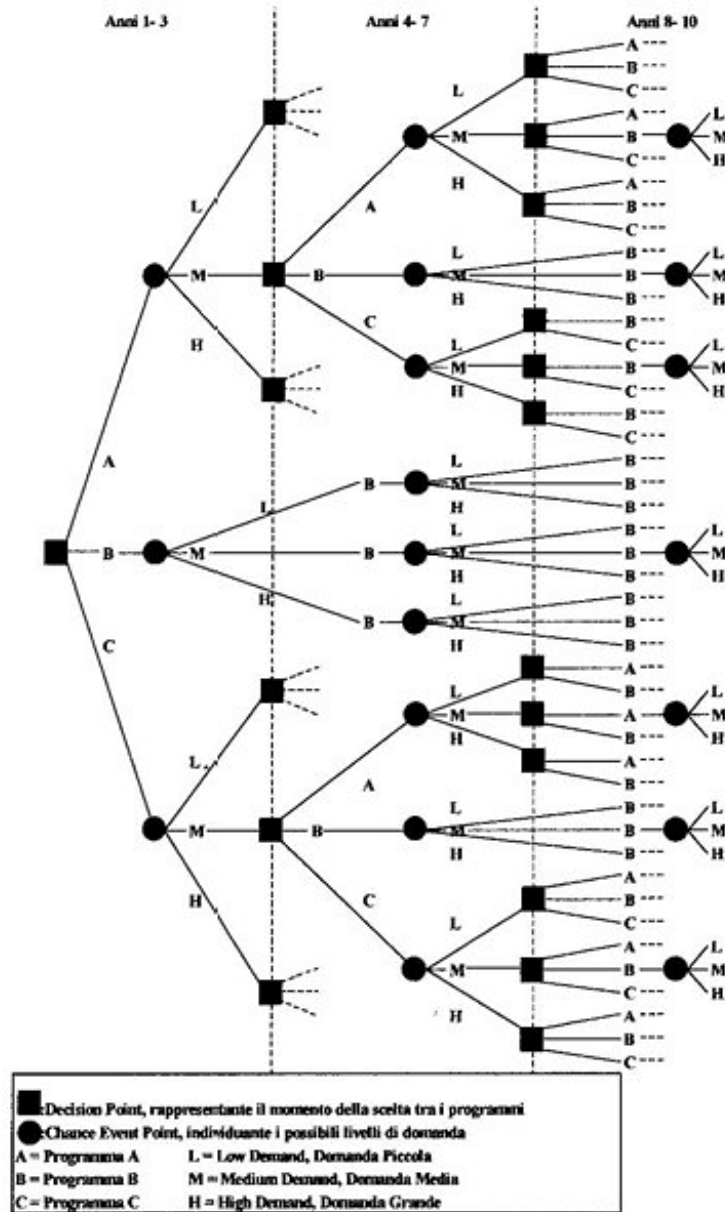
The discounted cash-flow analysis is one of the most used instruments for evaluating territorial transformation and property investment projects. It provides a series of yield indicators allowing decision-making. For a correct property administration, it is necessary to consider that the higher the expected return is, the higher the associated risk is; therefore, the investor must decide considering both the return, which must be satisfactory, and the risk he can take.

The property development preliminary analysis is what is necessary in order to take control of the decision-making process guiding the whole investment. The property development is summarised here by a multiphase model. In parallel, the subjects taking part to the process and the valuation techniques that can be used at each phase are analysed.



## The Property Development

This thesis is dealing with risk analysis, providing the investor with the possibility to compare an investment risk rate with the expected yield. Therefore, the traditional techniques are first considered (Build Up Approach, Capital Asset Pricing Model, certainty equivalent approach). However, some property market segments are highly characterised by instability and uncertainty, as well as by a lack of real transparency. The possibility theory allows the uncertain items of the discounted cash-flow analysis to be considered as casualty variables with different risk rates; therefore, the economic results can be represented in stochastic terms. In particular, two specific analysis areas are detected, distinguishing between the deterministic approach (sensitivity analysis and decision tree analysis) and the probability approach (analytic and simulation method).



### The Decision Tree Structure

The traditional methods are inappropriate for the property investment analysis because they do not appropriately consider the promoter's flexibility in adapting and reviewing their own decisions according to unexpected market developments. Therefore, this thesis suggests using the real options theory, where the concept of option value is introduced for projects. It derives from the real options embedded in a capital investment opportunity, such as for example postponing the investment choice, interrupting the building process, modifying the project scale, abandoning the project. Such options allow either taking advantage from future possibilities or mitigating losses. The greater advantage of the real options theory is increased information about the project value, which is particularly useful when this value is either negative or null (whenever flexibility is absent).

Finally, a specific valuation problem has been suggested. The project chosen as a case study entails the realisation of a village at the ancient Italgas area in Turin to host journalists and information operators during "Torino 2006" 20<sup>th</sup> Winter Olympic Games, destined to become a university residence hall in the future.



**Aerial Photo Showing the Roof Covering Plan**

We referred to the contingent claims analysis and to Cox's, Ross's and Rubinstein's exponential model, which are instruments that allowed the management flexibility to be considered by patterning uncertainty. For example, two different options were suggested: the alternative no-risk investment and the change in architectural allocation of the project. These options allowed the theory to be applied and a duly tested model to be built. This model could be included among the decision-making criteria supporting the traditional discounted cash-flow analysis.

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