Chapter 7
Conclusions and Future Perspectives

Similarly to models in other sciences, financial models are nothing more than mathematical representations of complex financial phenomena, based on assumptions, hypotheses, and simplifications that facilitate the model building and solution process. In a highly volatile global environment, building accurate models becomes a very challenging task. Relaxing the set of assumptions and simplifications leads to more realistic but also more involved models.

The multicriteria paradigm introduces a decision-theoretic approach to financial decision making, based on the simple fact that decisions are taken by actual decision makers instead of models. In this context, each particular decision situation requires the consideration of domain knowledge from the theory and practice of finance, which derives from normative and descriptive financial models, but also a prescriptive and constructive approach that will support the financial decision maker in evaluating and designing proper ways of action suitable for the problem at hand. MCDA contributes towards this direction, providing analytic techniques for supporting all stages of the decision process with emphasis on incorporating all relevant decision criteria (qualitative and quantitative) in the analysis.

The introduction of multiple criteria contributes in relaxing the assumptions that increase model risk, facilitates the learning process of financial decision makers, and ultimately leads to more informed decisions. The techniques and methodologies available in the field of MCDA introduce a systematic and formal approach for addressing the conflicts arising from the consideration of multiple points of view, criteria, and objectives, thus avoiding empirical ad-hoc solutions that not well-grounded on a systematic treatment of their assumptions, consequences, and validity.

Nevertheless, the rapid transformation of the global financial and business environment, along with the new technological developments and innovations, provide new opportunities but also raise important challenges for the use of analytic methods in financial decision support. This also involves the field of MCDA and its uses in this field. In that regard, one can mention a number of important issues, such as:

- Strengthening the connections and synergies with the latest developments in financial risk management, behavioral finance, and financial economics, using updated data, research findings, exploring new application areas, and covering new financial instruments and services. This is fundamental for the adoption of MCDA models by finance researchers and professionals. Given that existing MCDA techniques are "general purpose" decision support tools, the possibility of introducing specific concepts, theories, and practices from the field of finance, should be explored to ensure that MCDA models best match the special features of the financial environment.

- Introduction of systematic ex ante and ex post validation procedures for multicriteria models under financial performance measures in accordance with the requirements imposed by the regulatory environment. The realism and appealing features of multicriteria systems for financial problems, are not enough for their practical adoption in finance. The financial regulatory framework has become much stricter as far as it concerns the validity and effectiveness of the models used to support financial decisions. Therefore, MCDA models and techniques need to be further validated through comparative computational results and rigorous model validation tests, based not only on decision-theoretic criteria, but also using measures that are relevant from a financial perspective. Such an approach will highlight not only the methodological contributions of MCDA, but also the added value that it brings compared to existing and well-established financial models.

- Introduction of computational improvements that will allow existing models and algorithms to scale up to massive financial data, in a real-time decision support context. Data derived from the global markets and corporate information are of massive size. Therefore, computational analytic techniques for decision support should be able to handle the dimensionality of the data in an efficient manner. Several algorithmic advances in multi-objective optimization allow the analysis of large-scale problems. Many discrete MCDA methods, however, are mainly focused on smaller data. Extending, such techniques to enable the handling of large sets of alternatives is an important issue for their successful use in finance decision support.

- Implementation into decision support systems, taking advantage of new technologies from the fields of information systems and computer science. Computer-aided support through user-friendly systems is of major importance for providing decision aid through the integration of data and analytic methods. Such systems could be either stand alone (such as the ones illustrated in Sect. 5.6) or based on distributed environments such as client-server architectures and web-based technologies, which provide new capabilities for monitoring, retrieving, processing, and analyzing financial and business data.

- Integration of other emerging areas in operations research and computational intelligence (e.g., data mining, evolutionary algorithms, fuzzy systems, and other soft computing technologies), which will further strengthen the applicability of the multicriteria paradigm in financial domains of high dimensionality/complexity, non-linearity, and uncertainty.