CHAPTER IX

MULTI-ACTOR DECISION MAKING

1. Structural Models in Multi-Actor Settings

1.1 Conceptual Aspects

A decision maker has been defined in Chapter I as a person who participates in the assessment of the decision options and in the choice process. People who are not decision makers but are relevant to the problem solving process are called stakeholders. Actor is a generic term that refers to both decision makers and stakeholders. When multiple actors participate in the decision making process we have a multiactor setting. Being able to make a decision means being able to assess the alternatives under consideration and to make a choice. Thus, we would expect that multiple decision makers might disagree in their assessments as well as in their choices.

Multiactor settings can be characterized in different ways. The most relevant distinction is between multiactor settings which must make a single choice as a group, and those where each decision maker can make a different personal choice. In both cases, the decision makers might communicate with each other, hoping either to reach a consensus that will suit all of the decision makers as much as possible or just to consult on individual choices. Multiactor settings which have to come up with a single choice are engaged in group decision making, while those where each decision maker can make a personal choice are engaged in conflict resolution and negotiation.

1.2 Finding the Best Alternative in Group Decision Making

The objective of group decision making is to find a solution that suits the group as a whole. Hopefully, this will also be a satisfying compromise solution for each group member. We assume that all group members want to optimize the performance of the group as a whole rather than pursuing their individual objectives. Differences among group members can therefore be seen as different views on how to achieve the best for the group, rather than on how to maximize personal benefit. Figure IX.1 shows the structural model of group decision making where each decision maker assesses the preferences for the decision alternatives. The assessments of the preferences by each decision makers could be done with respect to multiple criteria. In such cases, we would have to address two types of preference aggregations, one across the criteria (for each decision maker) and one across the decision makers. There are two ways to aggregate these preferences, first across the criteria and then across the decision
makers, or first across the decision makers for each criterion and then across the criteria.

Figure IX.1: Group decision making with utility aggregation.

The issues in group decision making refer to the assessments of the alternatives, the prioritization of the decision makers, and the aggregation of preferences. If the group members are of varying importance, like the shareholders of a company, their assessments have also different weights. If the group constitutes a society, then we are dealing with democratic theory and address the issue of social choice. Finally, if the group is a business unit, we might have a 'dictatorial' choice process or preference aggregations according to preestablished rules.

1.3 Finding the Best Alternative for each Individual Decision Maker

Conflict resolution and negotiation are elements of game theory [Luce and Raiffa, 1985]. Each decision maker can choose the solution which suits him/her best. In this chapter, we address a few selected aspects of game theory. Elements which characterize conflict situations include uncertainty of the outcomes (complete vs. incomplete information) and dynamics of the conflict situation (static vs. dynamic decision making). However, we will confine our discussion to static conflict situations under certainty.

The number of decision makers in conflict with each other must be at least two. Two-person conflict situations are the most thoroughly studied conflict situations. Decision makers do not have to be individuals; they may represent interest groups, companies, or nations. Each decision maker may choose from a predefined set of alternatives, also called strategies. If a decision maker chooses exactly one alternative, we say s/he adopts a pure strategy; if the choice of the alternative is uncertain (described by a probability distribution over the alternatives), we say that s/he adopts a mixed (randomized) strategy.