Introduction

Game theory has existed for millennia and has been applied to many forms of situations, ranging from, for example, historical events (such as Spain’s rebellion against Rome in 75 BCE [McCain, 2010]), biological models (such as natural selection), market environments (such as oligopoly), politics (such as election bidding), and computer science to name a few. This field of applied mathematics captures behavior in strategic situations (called games), wherein the success (payoff) of the choice made by an individual (the player) is dependent on the choices made by others (other players) (Myerson, 1991).

The three main mathematical models of games are the extensive form, the strategic form, and the coalition form. The bases of differences in one of these models is which differ in terms of the amount of detail provided, e.g., the players, their preferences, their information, the strategic actions available to them, and how these influence the outcome.

In this paper, we describe the strategic form and study the underlying phenomena in a business management case of management—labor negotiation at an automobile factory.

The strategic form, also called the normal form of a game, has much less detail compared with the extensive form, in which the moves of the game are closely followed, and the rules define the probable outcomes in planned or random moves (as applies to gambling). By contrast, conversely, in the strategic form, the players’ choices, i.e., a strategy selected from a set of possible strategies, determines the outcome, i.e., payoff. All players choose a strategy, and once the choices are revealed, the game ends with each player getting some payoff. Each player’s payoff is influenced by each of the other players’ choices. Payoffs can be quite complex entities. For our model, we represent payoffs by numerical values. Hence, we assume that the numerical payoffs depend on the choices of all the players.
Three objects define the strategic form of a game: 1) the set of players, \( N = \{1, 2, \ldots, n\} \); 2) the sequence of the players’ strategy sets, \( X_1, X_2, \ldots, X_n \); and 3) the sequence of player’s pay–off functions, \( f(a_1, \ldots, a_\ell), \ldots, f(a_1, \ldots, a_n) \).