1. INTRODUCTION

The Operations Management and Information Systems (OM/IS) field has been slow to apply game theory. This is partly because of the complexity involved in coordinating large-scale activities for creation of goods and services in a fast- and ever-changing and increasingly competitive environment. Not surprisingly, the field has focused primarily on analyzing and improving the performance of physical systems (e.g. queueing or inventory systems) from the decision-theoretic perspective. This approach assumes that there exists a single body possessing the information set and decision making authority on behalf of the system as a whole. Recently, however, the field has expanded to address various issues of inter-person and inter-firm dynamics. Examples include the design of performance systems for managers who may have conflicting incentives, the design of contracts between supply chain members in the presence of incomplete information, and market competition with positive or negative externalities.

This chapter gives an overview of the existing OM/IS literature using game theory. We have chosen to focus on five topics: (1) time-based competition, (2) priority pricing for a queueing system, (3) manufacturing/marketing incentives, (4) incentives for information sharing within
oligopolistic competition, and (5) competition in the software market highlighting network externalities. On each topic, we review one or two works at some length and list other related works as references. Admittedly, the list or the coverage is biased around the authors’ taste and research interest.

*Time-based competition* (in Section 2) is a subject of great interest to the OM/IS field where the response time (as well as the price) is an important dimension of market competition. In the operation of a manufacturing or service facility, e.g., a computer/communication system, queueing delays arise in a nonlinear fashion as the utilization of the facility increases. The focus is on how queueing delays change the outcome of competition in markets where customers are sensitive to delay and what role a firm’s operations strategy plays in such competition.

*Priority pricing* (in Section 3) has a similar setting as time-based competition, but the concern is the mechanism design under asymmetric information. Queueing delays as a form of negative externalities create an incentive for each individual to overcrowd the system in the absence of any control. Moreover, each individual user is better informed about her own usage. The question is how to use the pricing scheme and induce selfish and better-informed users to achieve the overall efficiency of the system under the informational asymmetry.

*Manufacturing/Marketing Incentives* (in Section 4) deals with goal congruency within a manufacturing firm which makes to stock. There exist three types of goal conflicts. First, in setting the inventory level, a potential conflict exists between the manufacturing manager who wants to minimize inventory cost and the marketing managers who want to minimize stockouts. Second, different marketing managers in charge of different products compete over the fixed capacity of the manufacturing facility. Lastly, there exists the traditional principal-agent problem in which managers (in the absence of appropriate incentives) would exert lower efforts than the owner would like. The objective is to design an internal compensation scheme that mitigates the conflicting incentives.

*Information Sharing* (in Section 5) addresses whether competitors in oligopolistic competition would sincerely disclose their demand and/or cost information to competitors. The tradeoff facing a player is between the efficiency gain by having more information and the strategic gain or loss caused by the reaction of other players to the changed information allocation.

*Software competition* (in Section 6) highlights positive network externalities associated with a software product. As the installed base of a software product grows, it becomes more attractive to other users, thus growing the installed base even more. This bandwagon effect can