A Game Theory Model of the Physician Preference Item Supply Chain

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Abstract

Many types of medical devices (e.g., orthopedic implants, stents, and pacemakers) have significantly higher costs and more frequent product innovations than commodity items. These physician preference items (PPI) are procured through a unique supply chain, in which physicians select what products to purchase based upon clinical preference. This work uses a game-theoretic approach to understand how an average physician’s learning curve affects the manufacturer’s optimal product update pace. Additionally, the impacts of agent based marketing and hospital control efforts are studied. Results indicate that not only is the manufacturer’s product update pace dependent upon physician learning, but also both the manufacturer and the physician benefit when a new PPI product generation requires a shorter amount of time to be mastered.

Bio

Cara is a Ph.D. candidate in Iowa State’s IMSE department. Prior to enrolling at Iowa State, she worked as a systems engineer in the defense industry. Her research interests are in process improvement and innovation in service industries. She holds a bachelor’s degree in industrial engineering from Purdue University, and a master’s degree in operations research from the Georgia Institute of Technology. Currently, she is an operations research analyst at Walt Disney World.