

Valumaa	
volume.	

Number:

Year:

Title:

Author:

e-mail: <u>MktgSci@notes.cba.ufl.edu</u>

Marketing Science Homepage http://bear.cba.ufl.edu/centers/MKS

SilverScreener: A Modeling Approach to Movie Screens Management

Sanjeev Swami • Jehoshua Eliashberg • Charles B. Weinberg

Department of Industrial and Management Engineering, Indian Institute of Technology, Kanpur, India, sswami@iitk.ac.in

The Wharton School, University of Pennsylvania, Philadelphia, Pennsylvania 19104, eliashberg@mktgmail.wharton.upenn.edu Faculty of Commerce and Business Administration, University of British Columbia, 2053 Main Mall, Vancouver, British Columbia V6T 1Z2, Canada, weinberg@unixg.ubc.ca

Abstract

Managing the allocation of shelf space for new products is a problem of significant importance for retailers. The problem is particularly complex for exhibitors-the retailers in the motion picture supply chain-because they face dynamic challenges, given the short life cycles of movies, the changing level of demand over time, the scarcity of shelf space, and the complex revenue sharing contract between the exhibitor and the distributor. In the face of this complexity, the aim of current research is to provide a structure for analyzing management problems of exhibitors in the movie industry. Using a mathematical programming approach and a fast, but readily accessible algorithm, we propose a decision support model, SilverScreener, whose aim is to help exhibitors make effective and timely decisions regarding theater screens management. The major objective is to help select and schedule movies for a multiple-screens theater over a fixed planning horizon in such a way that the exhibitor's cumulative profit is maximized.

By treating the multiple screens as *parallel machines* and the movies as *jobs*, we provide an analogy of the current problem to the parallel machine scheduling problem. We formulate the resulting problem as an integer program. We depart from the typical parallel machine scheduling problems by introducing the *time-indexed formulation* that is particularly useful for solving the current problem. An important distinction between the current problem and typical machine scheduling problems is that the present approach allows for the choice of which movies to play; typically, in machine scheduling, all jobs have to be scheduled.

We provide various analyses of normative versus actual decision making, based on publicly available data. The developed model is readily implementable and appears to lead to improved profitability in different comparative cases. Through sensitivity analysis, we demonstrate that the above results are robust to variations in various parameters of the problem. The main findings and insights from the normative policy suggest the following: • Based on SilverScreener's recommendations, the exhibitor can achieve substantially higher cumulative profit.

• The improvement over actual decisions in terms of profitability appears to result from a combination of better selection and scheduling of the movies.

• The general structure of the exhibitor's normative decision is: *choose fewer "right" movies and run them longer*.

We propose a two-tier integrated application of the model to show how the model can be applied to realistic decision making. The first tier involves development of a movie selection plan to help the manager plan an entire season and bid for movies before the start of that season. An ex ante revenue prediction scheme is developed, based intuitively on a matching of the forthcoming movies with similar movies played in this theater previously. If the forthcoming season's scheduling plan can be visualized as a two-dimensional (week-byscreen) matrix, then that matrix contains only "empty cells" before the first tier. After a bid plan is developed, the exhibitor can "fill" some of those empty cells. The remaining empty cells represent slots, which can be decided during the season by either extending movies the exhibitor booked before the season or by scheduling other movies which may become available later in the season. This motivates the second tier-adaptive scheduling approach-of the integrated approach. The second tier helps the exhibitor in weekly decision making during the season. This application involves "rolling," and updating data, from one time window to another. The approaches followed in the two tiers of the integrated application are quite general in that they can incorporate a sophisticated demand prediction model, managerial judgments, or a combination of both. We also propose an alternative behavioral decision rule (heuristic), which exemplifies relationship dilemmas in the movie industry. This heuristic shows that the exhibitors need to be selective in their choice of movies and may suffer a substantial loss in profitability if they place too much emphasis on accommodating distributors.

(Movies; Decision Support Systems; Retailing; Scheduling; Integer Programming)