Commentary

Research Perspectives at the Interface of Marketing and Operations: Applications to Motion Picture Industry

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Abstract

In this comment, I discuss some research issues at the interface of marketing and operations particularly relevant to motion picture industry. The major focus of my comments will be on the exhibition component of the motion picture value chain. Based on research findings and available data, I discuss the following issues: dynamic and interesting characteristics of motion picture industry, the applicability of management science tools to artistic products, the practitioners’ viewpoint, and possibility of moving from specific to general research problems (and vice-versa) in this field. Four promising research areas have been identified for marketing academics and researchers: (i) an integrated scheduling approach, (ii) relationship management and contract design, (iii) role of forecasting accuracy in movie decision support systems, and (iv) impact of digital conversion of movies on operations scheduling.

[Key words: Motion Picture Industry; Operations; Scheduling; Decision Support Systems]
The review paper by Eliashberg, Elberse, and Leenders (henceforth EEL) in this issue of *Marketing Science* employs a different approach from most review articles which typically are either methodological (e.g., state of the art in yield management techniques) or substantive (e.g., short- and long-term effects of advertising) in nature. EEL focus on what is known about an industry and take the perspective of industry executives in drawing conclusions and raising questions for future research. Not only are the authors to be praised for their timely review, but so is the editor for inviting such an industry specific article.

My own interest in this research stream falls under the broad paradigm of implementing marketing strategy (“shelf space management”) in an operations-dominated environment (“movie scheduling”), as noted by Shugan (2004) in his commentary on “Evolving to a New Dominant Logic in Marketing” (*Journal of Marketing*, V. 68, January 2004). Accordingly, I view my comment as discussion of research issues at the interface of marketing and operations in motion picture industry. The major focus of my comments will be on the exhibition component of the motion picture value chain shown in EEL’s article.

**Motion Pictures: A Dynamic and Interesting Industry**

Besides the broad indicators of movie industry’s importance as listed in the introduction of EEL’s article, I consider movies as one of the most dynamic industries in any country/culture due to the emergence of various innovations and technologies, such as, digital production and exhibition, and newer retail formats, such as multiplexes or megaplexes (sci-tech-today.com 2005, Jardin 2005). For example, as of March 2005, there were 73 multiplex locations in India in almost all major Indian cities with a multiplex/megaplex (screenindia.com, 2005) with virtually none in 1997.

Movies are interesting because of their experiential nature, which requires co-creation by both producer and consumer to consummate the consumption. This aspect raises distinctive challenges because the same product (i.e., movie) may appeal differently to different people making the task of forecasting movie’s demand or success probability a difficult one. Hirschman and Holbrook (1982), and Holbrook and Hirschman (1982), and Eliashberg and Sawhney (1994), have discussed the experiential aspects of such hedonic consumption goods. More research of this kind would greatly benefit the managers in need of assessing the market potential of their movies.

A key property of the demand pattern of majority of movies, that renders complexity to several movie scheduling problems, is exponential decay of demand over time. This demand perishability view for multiple movies, coupled with a sliding scale box-office revenue-sharing contract between the distributor and the exhibitor, makes movies scheduling problem a non-trivial one (e.g., Swami, Eliashberg, and Weinberg 1999). As a contrast, in inventory control problems, perishability is typically considered in terms of physical deterioration of a product (e.g., a grocery item with an expiry date). This view comes from the supply side of the product. The movie scheduling problem adopts a “demand side view” in which the physical product (i.e., a copy of the movie) remains the same, but its demand perishes over time.
Can Hard Tools (O.R.) be Applied to Soft (Artistic) Products?

The experiential characteristic of movies raises an interesting issue as to whether science, or scientific approach, can be used in an arena in which both practitioners and researchers traditionally favor an artistic approach. Hirschman (1983) has also argued that artists do not actively engage in marketing of their products since they primarily produce, or create, for “self.” A general impression appears to prevail even in the movie industry that the scientific, or even techno-managerial, approaches are less relevant for movie business. A major source of this impression stems from the considerable uncertainty inherent in predicting success, or market potential, of a movie. Every movie, with its unique mix of components such as stars, music, and director, can be treated as a new product, which has short life-cycle.

As discussed by Belson (1996), however, several functions of movie making process are quite amenable to be approached as management science/industrial engineering problems, such as, systems analysis, queuing and simulation, engineering economy, productivity improvement, and work measurement and analysis. Recent research efforts have resulted in the use of fairly advanced scientific approaches, such as Markov decision processes and genetic algorithms, for deriving normative implications for movie industry, such as replacement policies (Swami, Puterman, and Weinberg 2001), and contract design (Raut, Swami, Lee and Weinberg 2005).

The Practice-Oriented View

EEL note that, “industry practitioners rely heavily on tradition, conventional wisdom, and simple rules of thumb…” This has also been our experience from consulting and interacting with managers in the operations intensive exhibition environment in the movie industry (Eliashberg, Swami, Weinberg, and Wierenga 2001). Although there are variations in managers’ abilities and propensities to adopt a rigorous or sophisticated analysis in decision-making, the analytical part of decision-making is primarily dominated by some use of spreadsheet software. Clearly, there appears to be a strong case for adopting a “50% manager, 50% model” (Blattberg and Hoch 1990) approach in this industry.

In an implementation report, Eliashberg et al. (2005) discuss the use of a close variant of Blattberg and Hoch’s (1990) approach, which is labeled as “60% manager, 40% model”. It was found that the management completely followed the recommendations of the scheduling model, SilverScreener, in about 40% of the cases, and, used their own discretion, aided by model recommendation, the rest of the time. Managers always had more information and other concerns that could not be reflected in the model (e.g., distributor’s pressure, unexpected events in the city, or participation in film festivals, etc.). Thus, it is recommended that the marketing modelers should adopt a “flexible” approach in an implementation setting in this industry, and should not expect the manager to follow the model’s recommendation as such all the time.

One approach that works quite effectively is to generate a list of several feasible and good solutions for implementation, one of which may be chosen by the manager. This would probably work out better than one “optimal” solution, which could be rejected by the manager due to several practical considerations. Finally, model development in this industry could be done in an evolutionary manner. The movie-scheduling research began with a decision-support

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1 Weinberg (1986) provides one of the very few published studies of arts managers actually using management science models.
system (SilverScreener) having a promise of implementability, which was first applied at a single-theater setting (Eliashberg et al. 2001), and subsequently, at multiple theaters in a city (Eliashberg et al. 2005).

From Specific to General Problems

SilverScreener model aimed at helping exhibitors decide each week which movies to continue playing and which to replace at the multiplex theater screens. The model is based on an integer-programming algorithm, which visualizes theater screens as parallel machines and movies as jobs. The resulting retail shelf-space management problem can also be conceptualized as a general parallel machine scheduling problem, which is quite well-studied in operations management literature. However, in the operations management literature, the scheduling problem with maximization objective function and deteriorating job value function has rarely been examined.

It appears that the industry specific movie scheduling problem helps define a new type of highly complex and general scheduling problem. Preliminary analysis suggests that even the single machine scheduling problem, with deteriorating job values and maximization of cumulative job values, falls under the domain of so-called NP-hard problems (Raut, Swami and Gupta 2005). Analysis of this general problem has applications in diverse areas, such as, movie scheduling, remanufacturing environment with high technology product (Fleischmann et al., 1997) and web object transmission (Xia and Tse 2003). Thus, I agree with EEL’s assertion that “insights from the motion picture industry may help to better understand industries that share certain characteristics...” Similar efforts could be extended to other areas, such as contract design, in which “surprisingly little work...” (EEL) has been done.

From General to Specific Problems

The movie scheduling problem could be addressed at two levels – macro and micro. The first level, macro scheduling, has been explained above in the context of SilverScreener model. Level two of the movie scheduling problem, micro scheduling, addresses the screen scheduling problem of a stand-alone theater on a within-the-day basis. The micro-scheduling problem can be formulated as an integer linear program (ILP). The computational complexity of the ILP increases remarkably with the addition of constraints in the model. One possible approach to solving this tough problem could follow a heuristic which is usually developed for a general knapsack problem. It can be applied to the industry specific micro-scheduling problem by recognizing that the availability of each screen of a multiplex throughout the day is like a knapsack with limited capacity.

A Partial List of Potential Research Problems...

I conclude my comment with a description of research problems in which modeling efforts similar to ours could readily be extended.

- **Integrated approach to macro and micro-scheduling:** Traditionally, large theater chains would plan for selection of movies (macro view) at the central planning department, and give a list of the short-listed movies to the individual theaters, which
would then solve their specific screen scheduling problem on a daily basis (micro view). However, it would be interesting to compare this approach with an integrated approach, which performs both macro and micro planning for the entire chain at the central level. This may require addressing challenging operational issues such as, in practice, the schedules are identical on Thursday, Friday, Monday and Tuesday, on the one hand, and on Saturday, Sunday and Wednesday, on the other hand. Also, since theaters have to advertise their schedules in advance in the press for local information, this task may have to be performed more efficiently at the planning department level.

- **Relationship management and contract design:** Relationship management in the motion picture industry is considered by many as very crucial. For example, one reason for the observed discrepancy between a scheduling model’s recommendation and the actual schedule could be a distributor’s pressure “if you do not free up a screen for my new movies, I will keep it in mind when our new blockbuster is released.” Filson et al. (2005) provide an interesting discussion of long-term relationships on contract design in the movie industry. For example, exhibitors do not share concession revenues with distributors. Leaving concession revenue out of the contract creates a problem: the exhibitor has an incentive to reduce ticket price after signing the contract, thus increasing traffic for more profitable concession sales, and sharing less with the distributor. However, long-term relationship with the distributor can prevent the exhibitor from lowering ticket prices. Similar issues could be examined in future research concerning optimal contract design in movie industry.

- **Examining the forecasting part of the DSS equation: Forecasting + Scheduling \(\Rightarrow\) Effective DSS:** The best scheduling (i.e., optimization) algorithms would be rendered useless unless they are supported by an equally efficient forecasting routine. It would be interesting to examine the sensitivity of the results of a DSS to the changes in forecasting effectiveness.

- **Impact of digital conversion of movies on scheduling:** Switching to digital exhibition systems would give exhibitors greater flexibility in movie scheduling. For example, if a blockbuster generates more demand than anticipated, an exhibitor could dynamically re-allocate screens that were not selling by adjusting their capacities to handle the overflow. In a non-digital scenario, such changes can be cumbersome, time-consuming, and costly - requiring an additional print and a reel swap. It would be interesting to examine the impact of such changes in movies’ format on real-time multiplex scheduling.

Finally, researching movies implies a “road-less-traveled” for marketing academics. However, based on EEL’s review, it can be concluded that this road is full of fruitful research opportunities, and reasons for watching a lot of movies!!
References


