



Marketing Science

Publication details, including instructions for authors and subscription information:
<http://pubsonline.informs.org>

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

Sanjeev Swami,

To cite this article:

Sanjeev Swami, (2006) Invited Commentary—Research Perspectives at the Interface of Marketing and Operations: Applications to the Motion Picture Industry. Marketing Science 25(6):670-673. <https://doi.org/10.1287/mksc.1050.0163>

Full terms and conditions of use: <https://pubsonline.informs.org/Publications/Librarians-Portal/PubsOnLine-Terms-and-Conditions>

This article may be used only for the purposes of research, teaching, and/or private study. Commercial use or systematic downloading (by robots or other automatic processes) is prohibited without explicit Publisher approval, unless otherwise noted. For more information, contact permissions@informs.org.

The Publisher does not warrant or guarantee the article's accuracy, completeness, merchantability, fitness for a particular purpose, or non-infringement. Descriptions of, or references to, products or publications, or inclusion of an advertisement in this article, neither constitutes nor implies a guarantee, endorsement, or support of claims made of that product, publication, or service.

Copyright © 2006, INFORMS

Please scroll down for article—it is on subsequent pages



With 12,500 members from nearly 90 countries, INFORMS is the largest international association of operations research (O.R.) and analytics professionals and students. INFORMS provides unique networking and learning opportunities for individual professionals, and organizations of all types and sizes, to better understand and use O.R. and analytics tools and methods to transform strategic visions and achieve better outcomes.

For more information on INFORMS, its publications, membership, or meetings visit <http://www.informs.org>

Invited Commentary

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

Sanjeev Swami

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

In this comment, I discuss some research issues at the interface of marketing and operations particularly irrelevant to the 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 the motion picture industry, the applicability of management science tools to artistic products, the practitioners' viewpoint, and the 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) the role of forecasting accuracy in movie decision support systems, and (iv) the impact of digital conversion of movies on operations scheduling.

Key words: motion picture industry; operations; scheduling; decision support systems

History: This invited commentary was received September 16, 2005, and was not revised; processed by Steven Shugan.

The review paper by Eliashberg et al. (2006) 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. Eliashberg et al. (2006) 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 of *Marketing Science* 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, "Evolving to a New Dominant Logic in Marketing." Accordingly, I view my comment as discussion of research issues at the interface of marketing and operations in the motion picture industry. The major focus of my

comments will be on the exhibition component of the motion picture value chain shown in the Eliashberg et al. (2006) article.

Motion Pictures: A Dynamic and Interesting Industry

Besides the broad indicators of the movie industry's importance as listed in the introduction of the article by Eliashberg et al. (2006), I consider movies one of the most dynamic industries in any country/culture because of the emergence of various innovations and technologies, such as digital production and exhibition, and newer retail formats, such as multiplexes or megaplexes ("*Star Wars*" Is Mother of Technology 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 (*Changing Face of Cinema* 2005); in 1997 there were virtually none.

Movies are interesting because of their experiential nature, which requires cocreation by both producer and consumer to consummate the consumption. This aspect raises distinctive challenges, because the same product (i.e., the movie) may appeal differently to different people, making the task of forecasting movie's success a difficult one. Hirschman and

Although invited commentaries are not formally peer-reviewed and represent the opinion of the author, authors were carefully chosen based on their outstanding expertise in the areas of their respective commentaries.

Holbrook (1982), 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 the majority of movies that adds complexity to movie scheduling problems is exponential decay of demand over time. This demand perishability for multiple movies, coupled with a sliding scale box office revenue-sharing contract between the distributor and the exhibitor, makes the movie scheduling problem a serious one (e.g., Swami et al. 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 expiration 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 declines over time.

Can Hard Tools Be Applied to Soft (Artistic) Products?

The experiential characteristic of movies raises an interesting issue as to whether science, or a scientific approach, can be used in an arena in which both practitioners and researchers traditionally favor an artistic approach.¹ Hirschman (1983) has also argued that artists do not actively engage in marketing their products because they primarily produce, or create, for “self.” A general impression that appears to prevail even in the movie industry is that the scientific, or even technomanagerial, approaches are less relevant for the 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 the 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 the movie industry, such as replacement policies (Swami et al. 2001) and contract design (Raut et al. 2005).

¹ Weinberg (1986) provides one of the very few published studies of arts managers actually using management science models.

The Practice-Oriented View

Eliashberg et al. (2006) 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 et al. 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” approach (Blattberg and Hoch 1990) 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% model, 40% manager.” It was found that management completely followed the recommendations of the scheduling model, SilverScreener, in about 60% 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 managers to follow the model’s recommendation 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 the manager may choose. This would probably work out better than one “optimal” solution, which could be rejected by the manager for several reasons. Finally, model development in this industry could be done in an evolutionary manner. The movie-scheduling research began with a decision-support 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

The 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 that 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 et al. 2005). Analysis of this general problem has applications in diverse areas, such as movie scheduling, remanufacturing environment with high-technology products (Fleischmann et al. 1997), and web object transmission (Xia and Tse 2000). Thus, I agree with the assertion by Eliashberg et al. (2006) 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...” 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. The computational complexity of the integer linear program increases remarkably with the addition of constraints in the model. One possible approach to solving this tough problem could follow a heuristic that 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, based on managerial assessment, 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 (microview). However, it would be interesting to compare this approach with an integrated approach,

which performs both macro and microplanning for the entire chain at the central level. This may require addressing challenging operational issues such as the schedules being identical on Thursday, Friday, Monday, and Tuesday on the one hand and on Saturday, Sunday, and Wednesday on the other hand. Also, because theaters have to advertise their schedules in advance 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 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 contractual relationships 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 the ticket price after signing the contract, thus increasing traffic for more profitable concession sales, and sharing less with the distributor. However, a 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 the movie industry.

- **Examining the forecasting part of the DSS (Decision Support Systems) equation:** *Forecasting + Scheduling* → *Effective DSS*: The best scheduling (i.e., optimization) algorithms would be rendered useless unless they were 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 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 reallocate screens that were not selling by adjusting their capacities to handle the overflow. In a nondigital 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 the review by Eliashberg et al. (2006), it can be concluded that this road is full of fruitful research opportunities and reasons for watching a lot of movies!!

References

- Belson, David L. 1996. IEs and the movies. *IIE Solutions* (April) 26–31.
- Blattberg, Robert C., Stephen J. Hoch. 1990. Database models and managerial intuition: 50% models and 50% manager. *Management Sci.* **38**(8) 887–899.
- Changing Face of Cinema*. 2005. http://www.screenindia.com/fullstory.php?content_id=10858 (July 29, 2005).
- Eliashberg, Jehoshua, Mohanbir S. Sawhney. 1994. Modeling goes to Hollywood: Predicting individual differences in movie enjoyment. *Management Sci.* **40**(9) 1151–1173.
- Eliashberg, Jehoshua, Anita Elberse, Mark A. A. M. Leenders. 2006. The motion picture industry: Critical issues in practice, current research, and new research directions. *Marketing Sci.* **25**(6) 638–661.
- Eliashberg, Jehoshua, Sanjeev Swami, Charles B. Weinberg, Berend Wierenga. 2001. Implementing and evaluating Silver-screener: A marketing management support system for movie exhibitors. *Interfaces* **31**(3) S108–S127.
- Eliashberg, Jehoshua, Sanjeev Swami, Charles B. Weinberg, Berend Wierenga. 2005. Operations research in the movies: Scheduling the multiplexes. Working paper, University of British Columbia, British Columbia, Vancouver, Canada.
- Filson, Darren, David Switzer, Portia Besocke. 2005. At the movies: The economics of exhibition contracts. *Econom. Inquiry* **43**(2) 354–369.
- Fleischmann, M., J. M. Bloemhof-Ruwaard, R. Dekker, E. van der Laan, J. A. E. E. van Nunen, L. N. Van Wassenhove. 1997. Quantitative models for reverse logistics: A review. *Eur. J. Oper. Res.* **103** 1–17.
- Hirschman, Elizabeth C. 1983. Aesthetics, ideologies and the limits of the marketing concept. *J. Marketing* **47**(Summer) 45–55.
- Hirschman, Elizabeth C., Morris B. Holbrook. 1982. Hedonic consumption: Emerging concepts, methods and propositions. *J. Marketing* **46**(Summer) 92–101.
- Holbrook, Morris B., Elizabeth C. Hirschman. 1982. The experiential aspects of consumption: Consumer fantasies, feelings and fun. *J. Consumer Res.* **9**(September) 132–140.
- Jardin, Xeni. 2005. The Cuban revolution. *Wired* <http://www.wired.com/wired/archive/13.04/>
- Raut, Sumit, Sanjeev Swami, Jatinder N. D. Gupta. 2005. Capacitated single machine scheduling with deteriorating job values. *Proc. Oper. Res. Soc. India 2005*, Indian Institute Management, Ahmedabad, India, January 8–11.
- Raut, Sumit, Sanjeev Swami, Eunhyu Lee, Charles B. Weinberg. 2006. Channel contracts in the motion picture industry. Working paper, Indian Institute of Technology, Kanpur.
- Swami, Sanjeev, Jehoshua Eliashberg, Charles B. Weinberg. 1999. SilverScreener: A modeling approach to movie screens management. *Marketing Sci.* **18**(3) 352–372.
- Swami, Sanjeev, Martin L. Puterman, Charles B. Weinberg. 2001. Play it again, Sam? Optimal replacement policies for a motion picture exhibitor. *Manufacturing Service Oper. Management* **3**(4) 369–386.
- Shugan, Steve. 2004. Finance, operations and marketing conflicts in service firms. *J. Marketing* **68**(January) 18–27.
- “Star Wars” is mother of technology. 2005. http://www.sci-tech-today.com/story.xhtml?story_id=35013 [May 16, 2005].
- Weinberg, Charles B. 1986. ARTS PLAN: Implementation, evolution and usage. *Marketing Sci.* **5**(2) 143–158.
- Xia, Y., D. Tse. 2000. Survey of single machine scheduling with application to web object transmission. Technical report, Dept. of Electrical Engineering and Computer Science, University of California, Berkeley, www.eecs.berkeley.edu/pubs/techRpts/2000.