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Editorial

Complexities in markets: Introduction to the special issue ☆

Abstract

Many consumer markets display complex behavior, meaning that traditional forecasting models perform at a level that excludes practical use, for instance when predicting the market shares of new products or the effects of marketing strategies. Interaction among consumers, comprising normative influences and word-of-mouth, is one of the key processes behind this complex market behavior. The papers in this *JBR* Special Issue adopt a complexity approach in analyzing and managing consumer markets. This approach focuses on a general problem that is highly relevant to marketing and market dynamics: how one can describe, understand, predict and manage complex consumer markets.

Keywords: Marketing; Complexity; Agent-based modeling

Since Henry Ford′s statement that his new model T would be available in "any color, so long as it′s black", marketing and marketing science have made much progress. Beginning with Ford′s focus on efficient production at low cost, subsequent objectives addressed the issues of product improvement striving to satisfy the demands of consumers more efficiently than the competition. This was achieved using aggressive sales methods, promotion activities and marketing as well as by segmenting markets into relative homogeneous groups of consumers, each approached by means of tailor-made strategies.

The important role that a modern marketing department plays reflects the recognition of the competitive advantage of effective marketing strategies. Most stages of the product life-cycle, from product development to after-sales involve these institutions. The marketing research that academics conduct supports many of the practices in the field. The findings of the research to evaluate and improve marketing strategies give current marketers a much more profound understanding of how marketing tools can positively affect the performance of their product or brand. In markets displaying periods of relatively stable sales, one is able to forecast the effects of different strategies on market share changes (e.g., DeKimpe and Hanssens, 1995, 1999). However, under some conditions the performance of forecasting models drops to a level that excludes practical use, for instance when predicting the effects of new products or changes of practice. Examples are the increasing sales of olive oil in North European countries, the shift from Word Perfect to Word as the dominant word processor, and the trend toward the digital recording and distribution of music. These examples are markets behaving in a stable way for prolonged periods of time, and then finding a new equilibrium after a short period of volatile behavior. New producers often have difficulty in procuring a substantial share of such markets, as frequently illustrated by the fact that despite substantial marketing efforts only about 5% of new product entries achieve a profitable market share. Other markets, such as for fashion, are more volatile and display continuous fluctuations in market share. These fluctuations are often small and incremental, but may sometimes be surprisingly large.

Interaction among consumers is one of the key processes behind this complex market behavior. Consumers inform one another about (un)favorable product characteristics or express their normative evaluations of products and brands by word-of-mouth. While this can be observed in the daily interaction among groups of people, review sites on the Internet have also become influential, in particular when products are reported to fail. In addition to exchanging information, consumers may also influence others simply by visibly using a product. People of high status especially may have a disproportionate influence on other consumers, which is one of the reasons why many producers use famous people to endorse their products. Others target specific cool groups of consumers through viral marketing strategies, hoping that these will encourage the diffusion of their product. Recently some producers discovered blogs as a possible channel to stimulate the social diffusion of their products. By sending free samples, such as a new model of a cell-phone, to popular bloggers, they hope to get positive product reviews that generate word-of-mouth recommendations.

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Although marketers are unable to manage the interaction among consumers directly, a more profound understanding of how this affects the behavior of a market may contribute to the development of strategies by means of which one can anticipate, or even exploit this interaction. This approach results in strategies such as viral marketing, buzz marketing and narrow casting, which target particular types of consumers who are expected to play a critical role in the further diffusion of a product.

Meanwhile, in academia a strong interest is emerging in modeling complex market behavior. Multi-agent simulation (MAS) enables the simulation and study of the interactions among consumers in artificial markets. MAS is capable of describing complex behavior at the macro level by means of a set of simple interacting agents at the micro level (see Gilbert and Troitzsch, 2005). Multi-agent models are based on formal descriptions of empirical phenomena (Edmonds and Hales, 2005), with or without the help of empirically validated theories. Holland (1995) defines agents as rule-based input–output elements of which the rules can be based either on simple economic rationality or on complex psychological processes.

Although MAS is still in its infancy, the first applications are already being used in the field (e.g., Goldenberg et al., 2001; Libai et al., 2005). This *JBR* Special Issue is yet another sign of this increased attention. In January 2006 a workshop on agent-based models of market dynamics and consumer behavior was held at the University of Surrey, Guildford, United Kingdom, bringing together a number of researchers with backgrounds in marketing and modeling. This *JBR* Special Issue includes eleven papers — a selection from presentations at the workshop.

The selection procedure for this special issue started with a pre-workshop meeting where the aims and the scope of the workshop were defined, and a call for papers was made. The editors selected a number of submissions for presentation as a full paper at the workshop on the basis of their relevancy for understanding market complexities. During the workshop all papers were distributed, and were presented and intensely discussed in one hour sessions each. These discussions significantly contributed to the quality of the revised papers that were submitted after the workshop. Subsequently, the editors selected eleven papers out of a larger set on the basis of their relevancy, originality and scientific quality. These papers were reviewed by all editors, and the revised versions were closely inspected and edited. This selection and reviewing procedure resulted in the acceptance of the following eleven papers.

Deffuant and Huet describe a model of attitude formation focusing on how processes of information filtering may generate counter-intuitive effects, such as the emergence of an overall negative product attitude within a population, despite initial favorable views. These results are relevant in understanding how processes of word-of-mouth may affect consumers' evaluations of products, and are hence important in understanding the promotional effects on consumers' product evaluations.

Delre, Jager, Bijmolt, and Janssen explore how the timing and targeting of a promotional strategy affect the diffusion of a new product within different types of markets. This study indicates that targeting a number of clustered consumers is effective in generating positive recommendations and successful product diffusion. The timing of such a promotion strategy also appears to be a critical variable, and is related to the relevance of social aspects to markets.

Frenzel Baudisch explains how heterogeneity among consumers may emerge from social comparison processes. Using data on the market for shoes in Germany, the author clearly illustrates how new reference groups may emerge from social comparison processes, leading to the establishment of new submarkets and the evolution of aggregate consumer heterogeneity. These results are relevant to understanding how new consumer segments develop.

Garcia, Rummel, and Hauser focus on how agent-based-models can be validated against empirical data. Following the history friendly model approach, the authors study a case from the wine industry by first describing the industry background, then delineating the main theoretical issues to be explored, and finally developing a computational model. The tentative simulation results provide insights into how an alliance of wine-makers is able to make the diffusion of screw-caps a success, and thereby contribute to the understanding of how collaboration among competing companies may benefit all parties.

Izquierdo and Izquierdo use an agent-based model to demonstrate how consumers' uncertainty about product quality may cause market failure. Assuming that buyers assess product quality by using their past experiences, and considering quality estimation rules that are individually sensible and unbiased, the authors show that market interaction results in an underestimation of product quality, which produces systematic drops in prices and losses in market efficiency.

Jager presents a general framework for developing agent rules to simulate artificial markets. Jager's argument is that for testing marketing strategies one should equip agents with rules that capture how consumers respond to these strategies. The author's general framework is organized along the main marketing strategies of product characteristics, pricing, placement and promotion. The paper concludes with suggestions for the construction of experimental designs and the use of different types of empirical data.

Kuenzel and Musters focus on involvement and social interaction processes in the purchase of everyday food products. In an empirical study the authors have found considerable differences in consumer involvement in different food products. Moreover, Kuenzel, and Musters observe differences in consumers' susceptibility to informative social influence as well as in the size of consumer networks. These results are relevant to modeling consumer behavior, in particular with respect to how involvement and social interaction play a role in different types of product markets.

Midgley, Marks, and Kunchamwar use an agent-based model depicting the complex interactions among consumers, retailers and manufacturers to explore issues of model assurance. The two challenges these authors address relate to

software verification and the empirical validation of models. The paper proposes a method based on the Genetic Algorithm to confront both these challenges, generally suggesting a minimalist approach to building and assuring agent-based models.

Schenk, Löffler, and Rauh focus on the spatial dimension of consumer behavior. This paper examines the applicability of multi-agent modeling to simulate spatial choice in shopping behavior at a regional level. Based on individual population and store data gathered in northern Sweden, the authors have developed a model for grocery shopping. The authors validate this model on the basis of empirical data.

Vag presents an integration of two modeling philosophies: conjoint analysis and multi-agent simulation. The conceptual integration into dynamic conjoint modeling accommodates notions of social network analysis, consumer behavior modeling, and word-of-mouth marketing. An important point is that these methods are complimentary; for example, conjoint analysis may serve as a tool to supply multi-agent models with behavioral data, and multi-agent simulation may offer dynamics to the static results of conjoint analysis. Vag presents a market model to illustrate how the association between consumers' communication and sales can be studied by using this approach.

Zhang and Zhang focus on the decoy effect, which denotes how adding a third product may alter the preferences for two competing products. With the aid of an agent-based model, the authors formalize consumer motivation as a function that combines personality traits with consumer interaction. The paper demonstrates that this decoy effect is an emergent market dynamic phenomenon originating from the individual behavior of heterogeneous consumers and their interactions in a real-world complex market. This approach offers a perspective on how to cope with such dynamic changes.

As the articles in this issue demonstrate, computer models, even if they include only quite simple agents, often show aggregate behavioral patterns that may be quite difficult to predict and understand. Complexity research is developing new tools for exploring, describing and theorizing this complex behavior in order to respond more efficiently to real phenomena. These tools and methods may be of great interest to researchers in marketing or market dynamics, even if adaptation of the models would be required to make them fit specific contexts.

The guest editors hope that this *JBR* Special Issue will help marketing practitioners recognize the potential of adopting a complexity approach in analyzing and managing consumer markets. As the papers in this issue demonstrate, the complexity approach focuses on a general problem that is highly relevant to marketing and market dynamics: how one can describe, understand, predict and manage the global effects generated by the interactions of numerous interacting dynamical units. The guest editors also hope that this collection of articles stimulates marketing scientists to consider the perspectives and methodologies that the authors discuss.

While acknowledging that the study of market complexity is still in its infancy, this *JBR* Special Issue should serve as a catalyst for adopting complexity approaches in marketing, and thus contribute to the development of marketing science.

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